

Contents Authoring Guideline For MA-7 Authoring Tool <SMAF Edition>

Version 1.6.0

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Yamaha Corporation

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Revision History

Ver.	Date	Contents
1.0.0	2005/4/5	Initial release.
1.1.0	2005/4/27	6.1. NoteOff Addition on the explanation of the Note Number. 6.2. Note On Addition on the explanation of the Note Number. 6.3.1. Bank Select MSB/LSB Correction on the Bank Select Replacement List. 6.3.2. Modulation Depth Addition of the table of Relations between control value and its depth. 6.3.4. Channel Volume Addition of Note. 6.3.6. Expression Addition of Note 6.3.8. Filter Resonance Addition of Note. 6.3.9. Filter Brightness Addition of Note. 6.3.10. 3D Path Setting Change Addition of Note. 6.3.14. RPN MSB/LSB Addition of the table of Setup value for RPN MSB/LSB. 6.3.14.3. Coarse Tune Correction the description of Data Entry LSB(II). 6.3.18. Mono Mode On Addition of the description of DVA. 6.5. Pitch Bend Addition of Note. 6.7.2. Channel Status Setting Correction of the description of Channel Information arguments. 6.7.3. HV Channel Setting Correction of Channel Number, and deletion of Control Number. 6.7.4. 3D Initial Path Setting Correction on Data Length argument. 7.7.2. 3D Resource Reservation Correction on explanation. 7.9.3. Conflicition when using Audio and HV Addition of this section. 8. Appendix Addition of this chapter.
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Ver.	Date	Contents
		<p>7.4 Native Meta Event Corrected miss-descriptions; an example of 3D initial path setup.</p> <p>7.5 Universal System Exclusive Corrected for miss-descriptions; an example of Master volume entry.</p> <p>8.3.2 Modulation Depth Added ineffectiveness on Audio and HV.</p> <p>9.2 Registration Data to the Contents Window Deleted this section.</p> <p>9.7.1 How to specify a HV track Changed the title of this subject. Also changed explanation after the function addition for HV track specification on Tr.Status tab.</p> <p>9.8.3 Change Send Level during a playback Added this subject.</p> <p>9.13 Total Length after Conversion Changed explanation about upper restriction range.</p> <p>9.18 RAM Size Restriction Added this subject.</p> <p>10.1.2 XF Rehearsal Mark Deleted this section.</p>
1.5.1	2006/04/04	<p>Changed Copyright as 2005-2006.</p> <p>6.6.3. Effect Change during a music Changed description for Master Track to Effect Track.</p> <p>6.7. 3D Changed description for Master Track to 3D Track.</p> <p>6.9. Karaoke Added this subject.</p> <p>7.4. Native Meta Event Added description for Karaoke Guide Channel Setup, Karaoke Scoring Section Setup.</p> <p>8. Applicable MIDI Events Added description for Karaoke Guide Channel Setup, Karaoke Scoring Section Setup.</p> <p>8.3.11. Dry Send Level Removed Note.</p> <p>8.3.12. Reverb Send Level Removed Note.</p> <p>8.3.13. Chorus Send Level Removed Note.</p> <p>8.3.14.2. Fine Tune Corrected typo.</p> <p>8.3.14.3. Coarse Tune Corrected typo.</p> <p>8.6.6. Rhythm Designation Corrected typo.</p> <p>8.7.4. Karaoke Guide Channel Setting Added this subject.</p> <p>8.7.5. Karaoke Scoring Section Setting Added this subject.</p> <p>9.5.2. Event Intervals Added this subject.</p> <p>9.6.3. Event Intervals for 3D positioning Added this subject.</p> <p>9.6.4.1. File Format Changed description.</p> <p>9.19. Wide Parameter Added this subject.</p> <p>9.20. DRC Parameter Added this subject.</p>
1.5.2.	2006/4/14	<p>8.3. Control Change, Table 3 An wrong value of RPN LSB was corrected.</p> <p>8.3.1. Bank Select MSB/LSB, Table 4, Footnote *5 Description of ATS-MA7-SMAF was added.</p> <p>8.3.12. Reverb Send Level A clerical error was corrected.</p> <p>8.3.13. Chorus Send Level A clerical error was corrected.</p> <p>8.3.15. All Sound Off Description was added.</p> <p>8.3.17. All Note Off Description was added.</p>
1.6.0	2006/11/7	<p>6.1. The main window of the Authoring Tool was changed.</p> <p>6.7.1. A clerical error was corrected. "Edit 3D Event"</p> <p>6.10. "Editing on the Track View" was added as 6.10.</p> <p>8.6.1. Explanation for Note was changed.</p> <p>8.6.2. Explanation for Note was changed.</p> <p>8.7.1. Explanation for Note was changed.</p> <p>8.7.2. Explanation for Note was changed.</p> <p>8.7.3. Explanation for Note was changed.</p> <p>8.7.4. Explanation of Description and Note was changed.</p> <p>9.3. "FM Voice Output Deflection" was added as 9.3.</p> <p>9.20. "Wide parameter" was deleted.</p> <p>9.21. "DRC parameter" was deleted.</p>

1.Outline of this Document

This document stipulates a guideline for authoring contents that elicits maximum performance of MA-7 for the terminals in which Yamaha synthesizer LSI for mobile phone: MA-7 is implementing.

MA-7 Authoring Tool reads a SMF in accordance with this document, and converts into carrier format.

Yamaha does not guarantee the operations in cases of reading SMF that is not defined in this document.

【Note】 About the numerical notations

In this document, hexadecimal numbers or decimal numbers expresses data values.

In the case of hexadecimal numbers, a letter “H” (Hexadecimal) follows the numerical value.

Table 1 Contrast Table of Decimal and Hexadecimal

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.Recommended Sequencer Application

As a sequencer application for authoring SMF that is specified in this document, the followings are recommended.

- Yamaha SOL
- Yamaha SOL2
- Yamaha XGWorks ST

3.What's New in SMAF/MA-7

3.1. Function Addition

3.1.1.Effectors

Two systems of effectors are added: SFX1 (Reverb system) and SFX2 (Chorus system and variation system).

These two systems of effectors can be used for one content.

The volume to go through each effectors and to go through Dry(LR) can control with Control Change messages, “8.3.11Dry Send Level”, “8.3.12Reverb Send Level” and , “8.3.13Chorus Send Level”.

3.1.2.3D-Effect

3D Effect is supported.

Four virtual sound generators can be used for one content.

Output path can be set for each MIDI channel.

There are three types of output paths: virtual sound generator ID0 to 3, LR (Wide stereo output), and Binaural (no 3D-effect).

The sound position of a channel, which is assigned as a virtual sound generator from ID 0 to 3, can be moved in three-dimensional space by assigning the motion of the virtual sound generator.

Wide stereo effect can be applied to the channels to which is assigned as LR path. If an audio source that already has been applied a 3D effect is assigned to this path, the effect may not operate as expected. Be sure to use an audio which are not pre-applied.

3D effect may not be applied to the channel which is assigned to Binaural. It is recommended to assign the pre-encoded audio to Binaural path. Channels except Audio cannot be assigned to Binaural. If assigned, the same operation as that in LR is performed.

In addition, output path can be changed during a song; however, it is required to insert 3D Initial Path Setting message on the beginning of the song to reserve 3D resource. (see 9.7.2. 3D Resource Reservation.)

3.1.3.Fine Tune / Coarse Tune

The function of Master Fine Tune, Master Coarse Tune, Fine Tune, and Coarse Tune are available.

3.1.4.PCM Voice

3.1.4.1.Multi-Bank Support

Multi-bank, which is the function to assign different voices into the maximum of five blocks which divide the keyboard, is supported.

Maximum of eight multi-bank voices can be registered into one content.

3.1.4.2.Pitch EG Support

Pitch EG is supported.

3.2. Function Changes

3.2.1.Tone Generation Mode

Tone generation mode is only the following Normal mode;

Normal contents : 32(FM) + 32(PCM) + 2(Audio) + 1(HV)

3.2.2.Filter Support in All Voice

Filter (AL) can be used in all voices.
Simultaneous use in all channels is also possible.

3.2.3.FM Voice

3.2.3.1.Frequency-Fix Support for All Voices

Frequency-fix can be used for all FM voices.

3.2.3.2.Improvement of Operator EG Resolution

Resolution of operator EG is improved.

3.2.4.PCM Voice

3.2.4.1.Improvement of Amplitude EG Resolution

Resolution of amplitude EG is improved.

3.2.5.Resolution Improvement on Pitch Bend

Resolution of pitch bend is improved.

3.3. Function Deletions

3.3.1.Filter-Channel Designation

Filter-channel designation is abolished because a filter (AL) became effective to all channels.

3.3.2.Audio Reserve Setting

Since the memory for audio data is no longer necessary to reserve because memory of voice parameter and audio data is not shared, message of audio reserve setting is abolished.

In addition, the number of Audio data that can be replay simultaneously is limited up to two, as it has been in MA-5 or older.

4.Notes on Authoring Environment

4.1.MIDI Device

In order to generate MA-7 sound from the sequencer software, you need to install Virtual MIDI Device.

5. Notes on Authoring SMF

5.1. SMF Format

Use SMF Format 0 or SMF Format 1.

The Authoring Tool holds data in Format 1 configured by 33 tracks.

Create a SMF in consideration of distribution operation and in reference to “9.1 SMF” because tracks are distributed when SMF is imported.

5.2. MIDI Channel

MA-7 supports MIDI events for 16 channels.

And, 16 tracks of Audio are available. Up to two tracks can generate sound simultaneously.

5.3. Setup Measure

The position before Start Point [cf. “8.6.3. Start Point and End Point”] is utilized as a setup measure. If it doesn't have, Start Point will be inserted before first note event automatically.

All of the setup messages should be placed before this event message.

The song playback starts from Start Point after examined the events before this event in advance.

5.4. Tempo

Only the range of 5BH 8DH 80H (quarter notes of 4) to 00H EAH 60H (quarter notes of 1000) becomes valid as the Set Tempo values.

If tempo is not designated, quarter note is assumed as 120. Also, Tempo change during the song can be designated.

5.5. Time Base

When converting to SMAF, time base value is fixed to 4 ms.

5.6. Channel Attribute

As the Channel attributes, Normal Channel and Drum Channel are provided. These attributes can be changed by Bank Select.

Unless the Bank Select is designated, channel #10 is treated as a Drum Channel, and other channels are treated as Normal Channels.

6.Operation of Authoring Tool and Work of SMF

The operation of Authoring Tool and the work of SMF in the main authoring work are explained below.

6.1.Authoring Tool

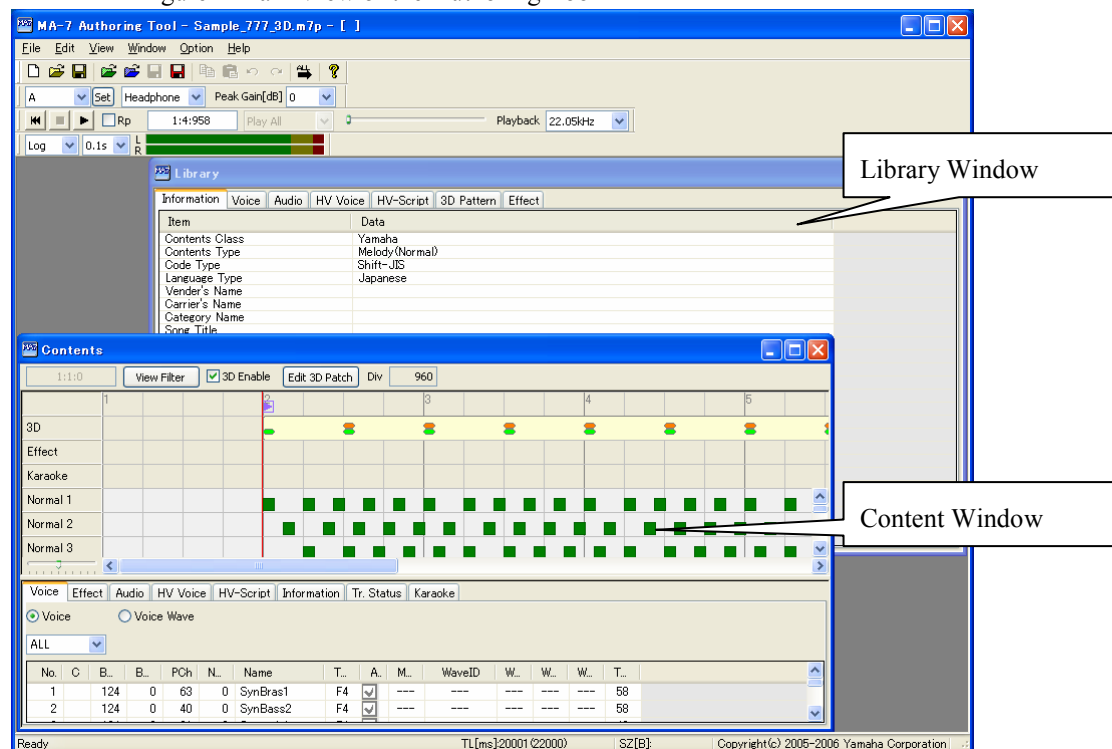
Authoring Tool has two sub-windows called Contents window and Library window.

The Contents window is a window which displays the actual contents information collectively, lists are composed of a track view and some lists, and the list can be changed with tabs.

The Library window is also composed of multiple lists and can be changed with tabs.

On the Track View or each list, it is possible to edit registered events or parameters.

Figure 1 Main View of the Authoring Tool



6.2.Start the Application

When creating a SMAF file, select “SMAF” from Format Type of Type Setting dialog. Also, change Format Sub Type according to the target mobile carrier.

6.3.Voice Registration

6.3.1.Voice Registration to the Contents Window

When loading a SMF file, the Authoring Tool checks Bank Select and Program Change message in the file. If appropriate voices are found in the Library window, these data are automatically copied to the Contents window.

If the Bank Select or the Program Change is not appropriate, a substitution table is applied, and the Bank Select and the Program Change are added / changed according to the substitution table (refer to “8.3.1. Bank Select MSB/LSB”).

Moreover, reloading the SMF file deletes the unused voices on the Contents window automatically.

6.3.2.Editing of the Registered Voice

Parameters of the registered voice can be changed on voice edit dialog displayed by double-clicking the voice name; however, a “Bank Select LSB:0” of a Normal Voice, or a “Program Change:0” of the Drum Voice cannot be edited.

6.3.3.Copy of the Voice

Voices can be copied within the Library window; or between the Library window and the Contents window by Copy and Paste function on the menu, which appears by clicking the right button of a mouse on the Voice tab.

6.4.Audio Registration

Audio files can be registered in Audio tab in Contents window.

The registered Audio data can be pasted on the Audio Track by selecting context menu which appears when clicking-right in Track view. Audio can be performed by following the description in this chapter.

Another way to perform Audio is imprinting Audio note in SMF directly. Designate Drum and Audio Bank by Bank Select MSB and Program Change messages, and place note events for Audio. After imported this SMF into Authoring tool and registered the wave data in Audio tab which corresponds to the imported SMF, Audio playback can be performed.

Read the following explanation, referring to "9.1. SMF"

6.4.1.Load a SMAF Format and/or Audio Events

When reading a SMF file of Format 0, note number of 0 to 12 and 92 to 110 of the Drum and the Audio track (a track with Bank Select MSB:125, and Program Change of 0 to 9 are assigned) are moved to the Audio track as note events for Audios. And, the effective event to Audio is also copied onto the Audio track out of the Control Change events in the original track.

Note that Control Change of the original track is shared in the Drum and Audio Track.

When reading a SMF file of Format 1, the event of SMF tracks # of 18 to 33 is set to Audio tracks of 1 to 16. In this case, the Control Change event in tracks of 18 to 33 is used as a Control Event exclusively for the relevant Audio track.

6.5.HV

HV-Script can be registered in HV-Script tab in Contents window. (see, 6.5.2. Registration of HV Voices and HV-Scripts.)

Choose arbitrary track for HV track in Tr.Status tab.

The registered HV-Script can be pasted on the HV Track by selecting context menu which appears when clicking-right in Track view. HV-Script can be performed by following the description in this chapter.

Another way to perform HV-Script is imprinting HV-Script note in SMF directly. Designate HV Track by “6.5.1. HV Channel (Track) Assignment” message, and place note events for HV-Script. After imported this SMF into Authoring tool and registered HV-Script in HV-Script tab which corresponds to the imported SMF, HV playback can be performed.

If a HV Extension Voice is used in a HV-Script, it is necessary to register a corresponding HV Extension Voice into the HV Voice tab in the Contents window. (see, “6.5.2. Registration of HV Voices and HV-Scripts”)

6.5.1.HV Channel (Track) Assignment

To specify a track as a HV channel (track), it is necessary to check the checkbox in Tr.Status tab of Contents window, or to include “8.7.2. HV Channel Setting” into the original SMF.

Refer to “7. Message Insertion” for the input method.

One track can be assigned in one content.

6.5.2.Registration of HV Voices and HV-Scripts

After executing “HV Channel Setting” message, register HV-Script into the HV-Script tab of Contents window. If a HV Extension Voice is used in the copied HV-Script, register the required HV Extension Voices into the HV Voice tab of Contents window.

HV-Script and HV Extension Voice can be registered by choosing the New menu displayed by copying from the Library window, or by click-right on the relevant list.

In addition, the registered HV-Script can be inserted with the “Add Note Event” menu, which appears by clicking the right button of a mouse on the HV designated track. (This menu only appears when HV-Script is registered.)

It is also available to include the note for HV pronunciation into SMF. In this case, note number of 0 to 63 corresponds to the ID 0 to 63 of HV-Scripts.

Also in this case, HV-Script and HV extension voice must be registered into the Contents window. It is not pronounced unless HV-Script is registered. When HV extension voice is not registered, it will be pronounced in the voice of K0.

6.6.Effect

To enable Effects, Send Level (“8.3.12. Reverb Send Level” and “8.3.13. Chorus Send Level”) should be included, and effect parameters should be registered in the Effect tab in the Content window.

6.6.1.Including a Send Level

In order to control the effectiveness condition of an effect, it is necessary to include “8.3.12. Reverb Send Level” and “8.3.13. Chorus Send Level” into the original SMF.

Since the initial value of "Reverb Send Level" is 40, an effect becomes effective without doing anything; however, since the initial value of “Chorus Send level” is 0, the effect of an effect cannot be confirmed as long as it remains.

In addition, the Send level on the beginning of the song can be included by using Mixer dialog of the Authoring Tool.

6.6.2.Parameter Registration

Copy an Effect Parameter onto the Effect tab in the Content window from the Library window.

6.6.3.Effect Change during a music

When an effect parameter is registered into the Effect tab of the Contents window, "Add Effect Setting Change" will be displayed on the mouse click-right menu on the Effect Track. Choosing this menu on the position where one wants to change the effect enables insertion of the event which changes the effect setup.

Note that noise may occur when changing an effect in a song. Therefore, set them following the note of “9.6. SFX Setting Change.”

6.7.3D

In order to enable 3D Effect, pasting of 3D pattern onto the 3D Track, and 3D path setup must be made.

6.7.1.Paste a 3D Effect

With the mouse right-click menu "Paste from Library / 3D Pattern" of the 3D Track, 3D pattern can be pasted on the Track view of Contents window from the Library window.

Moreover, by 3D pattern edit dialog displayed by choosing the "Edit 3D Event" menu, 3D move event (refer to "8.9.3. 3D Movement") can be inserted newly, or stuck 3D pattern can be edited.

6.7.2.3D Path Setup

By allocating a path to the virtual sound generators of ID0 to 3 for each channel on the 3D path edit dialog, which appears with selecting “Patch” button, the 3-dimensional motion according to its setup patterns can be realized.

Also, it is available to change 3D path during a song with the mouse right-click menu, “Edit 3D Setting Change”, of the Normal Track or the Audio Track. To change a path in a song, it needs to consider the point mentioned in “9.7.1. 3D Path Setting Change” and “9.7.2. 3D Resource Reservation”.

6.8.Track Status

6.8.1.KS, VS, LED, Solo, and Mute

With the Tr.Status tab in the Contents window, KS (*1), VS, LED-R/G/B, Solo (*2), and Mute (*2) can be set for each Track. It is also available to include the VS and LED-R/G/B setting information into the original SMF by “8.7.1. Channel Status Setting”.

*1: Available when designated as a HV channel.

*2: Not reflected on the exported SMAF.

6.9.Karaoke

6.9.1.Guide Channel

Guide Channel assignment and Option Data registration can be achieved in Karaoke tab in Contents window. It is also available to include Guide Channel setup into the original SMF by using “8.7.4. Karaoke Guide Channel Setting”.

6.9.2.Guide Scoring Section

The period for Karaoke scoring can be assigned by selecting “Add new Karaoke Scoring section” from context menu on Karaoke track of Contents window. It is also available to include the Guide period setup into the original SMF by “8.7.5. Karaoke Scoring Section Setting”.

6.10.Editing on the Track View

Editing operations such as Cut, Copy, Paste, Delete, etc. are available for the following events on the track view. For 3D pattern, Split and Join operations can be used for patterns.

In addition, Undo and Redo of these operations are available.

- 3D Pattern
- 3D Movement
- SFX Setting Change
- Karaoke•Guide Evaluation Interval
- 3D Path Setting Change
- HV Note
- Audio Note

6.11.Information

Embedding some information, which controls copyrights, etc., to the SMAF file is available using Information tab in the Content window.

6.11.1.Embedding an Information to SMF

Using “8.6.1. Texts” and including “10.1. XF Information Header -- Language Specific” into the original SMF, these items can be embedded into Information.

Moreover, the contents can be taken into Copyright (c) when “8.6.2. Copyright Notice” is included into the original SMF.

SMF		Information
XF Info	Song Name	Song Title
	Composer	Composed by
	Lyricist	Words by
	Arranger	Arranged by
	Performer	Artist's Name
Copyright Information		Copyright(c)

7.Message Insertion


An example of entering a meta-event and an exclusive message with a sequencer application is shown. Refer them with a template data (all_meta_exclusive.mid).

The following example of message entry are explained according to the method of a recommended sequencer application (refer to “2. Recommended Sequencer”). Because the recommended sequencer application includes the size data of a message automatically, you don’t need to enter it.

Note that there are such cases as a meta-event cannot be entered and the exclusive input method differs from the example of an input, depending on sequencer application.

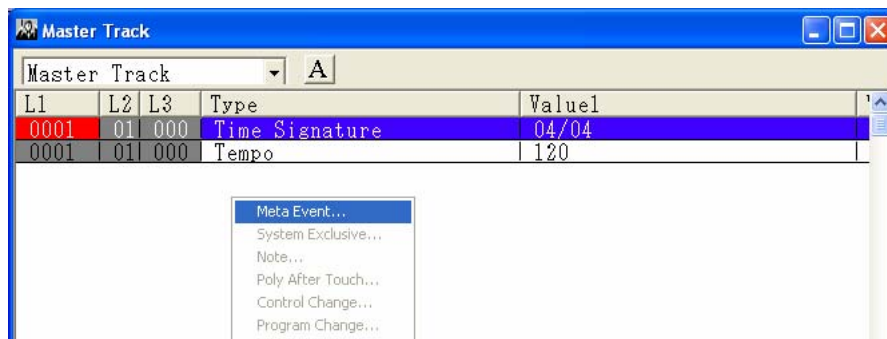
7.1.Example of Insertion to the Master Track

Following is an example of inserting a HV Channel Setup event to the Master Track by the recommended sequencer, XGworks (for the recommended sequencer, see “2. Recommended Sequencer”; and for the example detail, see “HV Channel Setup” of “7.4. Native Meta Event”).

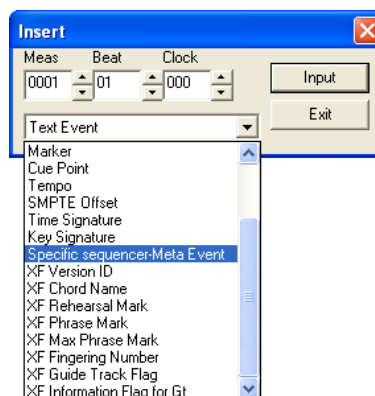
1. Click the Master Track Button () or select [Window] - [Master Track] to show Master Track window.



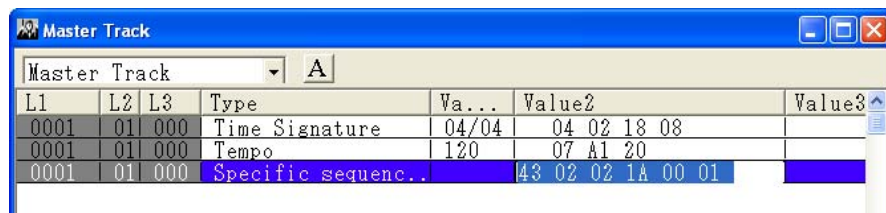
2. Right click on the blank area in the Master Track window and select “Meta Event...” from the appeared menu.



3. Choose “Specific sequencer Meta Event” from the appeared dialog.



4. Click “Value2” of the Master Track window, and enter hexadecimal “43 02 02 1A 00 01” separating with space characters.



7.2.Insertion to the Arbitrary Track

Selecting the list of a menu, which appears by right-clicking on the block of an arbitrary track, shows the List window. On this window, Events can be inserted as well as the Master window.

7.3.Meta Events

For details of following events, see “8.6. Meta Event.”

MIDI Events Name	Description
Texts	Track for the event:
	Master Track
	Event to be added::
	Text Event of Meta Event
	Example Entry:
	XFln:JP:Song Title:Composed by:Words by:Arranged by:Artist's Name:
Copyright Notice	Track for the event::
	Master Track
	Event to be added::
	Copyright Notice Event of Meta Event
	Example Entry:
	Yamaha Corporation
Start Position End Position	Track for the event::
	Master Track
	Event to be added::
	Cue Point of Meta Event
	Example Entry: case, start position:
	START
Track End Position	Automatically inserted by sequencer application.
Tempo	Track for the event::
	Master Track
	Event to be added::
	Tempo of Meta Event
	Example Entry: case, 120:
	120
Measure	Track for the event::
	Master Track
	Event to be added::
	Time Signature of Meta Event
	Example Entry: case, 4/4 beat:
	4/4

7.4. Native Meta Event

For details of following events, see “8.7. Native Meta Event.”

MIDI Events	Description
Channel Status Setup	Track for the event::
	Master Track
	Event to be added::
	Specific sequencer Meta Event of Meta Event
	Example Entry: case, ch0 [VS: OFF, LED B/G/R: OFF], ch1[VS: ON, LEB B/G/R:OFF], ch2 [VS: OFF, LED B/G: OFF, LED R: ON], ch3-31 [VS: OFF, LED B/G/R: OFF]
	43H 02H 02H 03H 00H 20H 04H 00H
HV Channel Setup	Track for the event::
	Master Track
	Event to be added::
	Specific sequencer Meta Event of Meta Event
	Example Entry: case, set Ch0 as HV Channel
	43H 02H 02H 1AH 00H 01H
3D Initial Path Setup	Track for the event::
	Master Track
	Event to be added::
	Specific sequencer Meta Event of Meta Event
	Example Entry: case, Ch0 [Output ID#0], Ch1 to 31[Output LR]
	43H 02H 02H 03H 00H 20H 04H 00H
Karaoke Guide Channel Setup	Track for the event::
	Master Track
	Event to be added::
	Specific sequencer Meta Event of Meta Event
	Example Entry: case, Set Ch0 as Karaoke Guide Channel
	43H 02H 02H 2CH 00H 01H
Karaoke Scoring Section Setup	Track for the event::
	Master Track
	Event to be added::
	Specific sequencer Meta Event of Meta Event
	Example Entry: case, For beginning of Karaoke Scoring Section
	43H 02H 02H 2DH 00H

7.5.Universal System Exclusive

For details of following events, see “8.8. Universal System Exclusive.”

MIDI Events	Description
Master Volume	Track for the event::
	Arbitrarily track
	Event to be added::
	Extended Message (System Exclusive)
	Example Entry: case, 127
	7FH 7FH 04H 01H 00H 7FH F7H
Master Fine Tune	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, 100
	7FH 7FH 04H 03H 00H 64H F7H
Master Coarse Tune	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, 127
	7FH 7FH 04H 03H 00H 7FH F7H

7.6.Native Exclusive

For details of following events, see “8.9. Native Exclusive”.

MIDI Events	Description
Audio Data / Panpot Settings	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, Wave ID as 0, Panpot as 127
	43H 79H 08H 7FH 0BH 00H 00H 7FH F7H
User Event	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, Assign user event #0
	43H 79H 06H 7FH 10H 00H F7H
3D Movement	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, ID#0, Distance as 500mm, Azimuth as 0 deg., Elevation as 0 deg., Movement time as 0.
	43H 79H 08H 7FH 29H 00H 00H 00H 03H 74H 40H 40H 00H 00H 00H 00H F7H
SFX Setup Change	Track for the event::
	Arbitrarily track
	Event to be added::
	System Exclusive
	Example Entry: case, Assign SFX Param21
	43H 79H 08H 7FH 2AH 55H F7H

8.Applicable MIDI Events

MA-7 converts following MIDI events shown in **Table 2**. MIDI events which are not described in this table are ignored. Make sure to input note events (NoteOn/NoteOff). The initial setting values described below represents the default values in which MA-7 uses when the value is not designated in SMF.

Table 2 List of MIDI Events to Use

Name of MIDI Events		Formats
NoteOff		8nH kk vv
NoteOn		9nH kk vv
Control Change		BnH cn cv
	Bank select MSB/LSB	BnH 00H mm(MSB) BnH 20H ll(LSB)
	Modulation Depth	BnH 01H vv
	Data entry MSB/LSB	BnH 06H mm(MSB) BnH 26H ll(LSB)
	Channel Volume	BnH 07H vv
	Channel panpot	BnH 0AH vv
	Expression	BnH 0BH vv
	Hold1 (damper)	BnH 40H vv
	Filter resonance	BnH 47H vv
	Filter Brightness	BnH 4AH vv
	3D Path Setting Change	BnH 4FH vv
	Dry Send Level	BnH 5AH vv
	Reverb Send Level	BnH 5BH vv
	Chorus Send Level	BnH 5DH vv
	RPN MSB/LSB	BnH 65H mm(MSB) BnH 64H ll(LSB)
	All Sound Off	BnH 78H 00H
	Reset All Controller	BnH 79H 00H
	All Note Off	BnH 7BH 00H
	Mono Mode On	BnH 7EH 01H
Program Change		CnH pp
Pitch Bend		EnH ll mm
Meta Event		FFH ...
	Text	FFH, 01H, Size, Text
	Copyright Notice	FFH, 02H, Size, Text
	Start Point and End Point	FFH 07H 05H 53H 54H 41H 52H 54H(START) FFH 07H 04H 53H 54H 4FH 50H(STOP)
	Track End Point	FFH 2FH 00H
	Tempo Designation	FFH 51H 03H hh mm ll
	Rhythm Designation	FFH 58H 04H nn dd cc bb
Native Meta Event		FFH 7FH Size 43H 02H 02H ...
	Channel Status Setting	FFH 7FH Size 43H 02H 02H 03H Ch0 Ch1 ... Ch31
	HV Channel setting	FFH 7FH Size 43H 02H 02H 1AH Ch vv
	3D Initial Path setting	FFH 7FH Size 43H 02H 02H 22H Ch0 ... Ch31
	Karaoke Guide Channel Setting	FFH 7FH Size 43H 02H 02H 2CH Data1 Data2
	Karaoke Scoring Section Setting	FFH 7FH Size 43H 02H 02H 2DH 00H (START) FFH 7FH Size 43H 02H 02H 2DH 01H (STOP)
Universal System Exclusive		F0H ...
	Master Volume	F0H Size 7FH 7FH 04H 01H ll hh F7H
	Master Fine Tune	F0H Size 7FH 7FH 04H 03H ll mm, F7H
	Master Coarse Tune	F0H Size 7FH 7FH 04H 04H 00H vv F7H
Native Exclusive		F0H Size 43H 79H...
	Audio Panpot Setting	F0H Size 43H 79H 08H 7FH 0BH ID CL Data F7H
	User Event	F0H Size 43H 79H 06H 7FH 10H vv F7H
	3D Movement	F0H Size 43H 79H 08H 7FH 29H ID D0 D1 D2 D3 Azm Elv T0 T1 T2 T3 F7H
	SFX setting change	F0H Size 43H 79H 08H 7FH 2AH ID F7H

8.1.NoteOff

8nH, kk, vv

Description

KeyOff operates on the designated note number of the designated channels.
When data bank of applicable channel is a Drum channel (Bank Select MSB=125, Bank Select LSB=0-9), note numbers of 0 to 12 and 92 to 110 indicate the pronunciation end of audio data.
If the applicable channel is a HV channel (assigned as a HV channel), this message is ignored.

Argument

n Channel number (0..15)
kk Note number
 - Valid range of Normal Channel
 Note number on Normal Voice (0..114)
 - Valid range of Drum Channel
 Note number on PCM Audio (0..12, 92..110)
 Note number on Drum Voice (13..91)
vv Key velocity "vv" is ignored.

8.2.Note On

9nH, kk, vv

Description

KeyON operates on the designated note number of the designated channel.
When data bank of the applicable channel is a Drum channel (Bank Select MSB=125, Bank Select LSB=0-9), note numbers of 0 to 12 and 92 to 110 indicate pronunciation start of the audio data.
If the applicable channel is a HV channel (assigned as a HV channel), note numbers of 0 to 63 indicate pronunciation start of HV-Script. At this time, velocity is ignored.

Argument

n Channel number (0..15)
kk Note number
 - Valid range of Normal Channel
 Note number on Normal Voice (0..114)
 - Valid range of Drum Channel
 Note number on PCM Audio (0..12, 92..110)
 Note number on Drum Voice (13..91)
vv Velocity (0..127)
 It is interpreted as NoteOff when velocity vv = 0.
 Vol[dB] = 40× log(vv/127). However, interpreted as MUTE when vv=1.

Note

- Prosody may vary depending on program change number.
Refer MA-7 Authoring Tool Users Manual for the applicable program change number.
- In MA-7, even if more than two notes are attempted to generate sound simultaneously, the later output-sound lags its generation behind of the former one. Therefore, the simultaneous pronunciation in the same note number may cause its level-down according to the playback frequency.
- The note number of 115 or more is automatically deleted.
- A note event for HV or Audio can be placed by Authoring tool.

8.3.Control Change

BnH, cn, cv

Description

This message sets a control change to the designated channel according to the control number.

Argument

n Channel number (0..15)
cn Control number (0..127)
cv Control value (0..127)

Control number and its setting items are regulated as **Table 3**. Since the setting range of control value is defined for each control number, do not set any control value exceeding this range.

Table 3 Table for Control Number and Setting Item

Control number	Setting Item	Initial Value	Setting Range of Control Value
0(00H)	Bank select MSB	0	0~127(00H~7FH)
1(01H)	Modulation	0 [OFF]	0~127(00H~7FH)
6(06H)	Data entry MSB	-	0~127(00H~7FH)
7(07H)	Channel volume	100 (64H)	0~127(00H~7FH)
10(0AH)	Channel panpot	64 (40H) [center]	0~127(00H~7FH)
11(0BH)	Expression	127 (7FH) [max.]	0~127(00H~7FH)
32(20H)	Bank select LSB	0	0~127(00H~7FH)
38(26H)	Data entry LSB	-	0~127(00H~7FH)
64(40H)	Hold1 (damper)	0 [OFF]	0~127(00H~7FH)
71(47H)	Filter resonance	64 (40H)	0~127(00H~7FH)
74(4AH)	Brightness	64 (40H)	0~127 (00~7FH)
79(4FH)	3D Path Setting Change	0 [LR output]	0,2~5 (00H,02H~05H)
90(5AH)	Dray send level	127 (7FH)	0~127 (00H~7FH)
91(5BH)	Reverb send level	40 (28H)	0~127 (00H~7FH)
93(5DH)	Chorus send level	0	0~127 (00H~7FH)
100(64H)	RPN LSB	127 (7FH)	0~127 (00H~02H)
101(65H)	RPN MSB	127 (7FH)	0
120(78H)	All sound off	-	0
121(79H)	Reset all controller	-	0
123(7BH)	All note off	-	0
126(7EH)	Mono mode on	Poly-mode	1

8.3.1.Bank Select MSB/LSB

BnH, 00H, mm (MSB)**BnH, 20H, ll (LSB)**

Description

This message sets a bank in the designated channel. The actual timing of changing the voice is triggered by the Program Change message, “8.4. Program Change”

Argument

n Channel number (0..15)

mm, ll Setting value (0..127)

Initial Value

While n=9 (channel number is “9”), mm=125, ll=0.

While n≠9 (channel number isn’t “9”), mm=124, ll=1.

Note

Bank select MSB and Bank select LSB are recommended to use together.

The correspondence table of bank value replacement that the Authoring Tool replaces from SMF into SMAF is shown in **Table 4**. Replacement is performed when loading SMF.

Table 4 Bank Select Replacement List

Normal /Drum	SMF Setup				Replaced Setup			Notes
	Bank MSB	Bank LSB	Program Change	Channel	Bank MSB	Bank LSB	Program Change	
Normal	124 or 122	0 to 9	0 to 127	0 to 15	124	0 to 9 (*3)	0 to 127 (*3)	RAM
		10	0 to 127	0 to 15		10	0 to 127 (*3)	ROM (*5)
		Except the above or not specified.	0 to 127	0 to 15		1	0 to 127 (*3)	RAM
Normal	121	0 to 127	0 to 127	0 to 15	124	10	0 to 127 (*3)	ROM (*5)
		Not specified	0 to 127	0 to 15		1	0 to 127 (*3)	RAM
Normal	Out of 120 to 125, or not specified.	0 to 127	0 to 127	Except 9	124	1	0 to 127 (*3)	RAM
		Not specified	0 to 127	Except 9		1	0 to 127 (*3)	RAM
Drum	125 or 123	0	0 to 9	0 to 15	125	0	0 to 9 (*3)	RAM
			10	0 to 15			10	ROM (*5)
			Except the above or not specified. (*2)	0 to 15			1	RAM
		Except the above or not specified.	0 to 9	0 to 15		0	0 to 9 (*3)	RAM
			Except the above or not specified. (*2)	0 to 15			1	RAM
			0 to 9	0 to 15			0 to 9 (*3)	RAM
Drum	120	0 to 127	0 to 127	0 to 15	125	0	10	ROM (*5)
		Not specified	0 to 9	0 to 15		0	0 to 9 (*3)	RAM
			Except the above or not specified. (*2)	0 to 15			1	RAM
Drum	Except 120 to 125, or not specified.	0 to 127	0 to 9	9 (*4)	125	0	0 to 9 (*3)	RAM
			Except the above or not specified. (*2)	9 (*4)			1	RAM
			0 to 9	9 (*4)			0 to 9	RAM
		Not specified	0 to 9	9 (*4)		0	0 to 9	RAM
			Except the above or not specified. (*2)	9 (*4)			1	RAM

- *1 All numeric values are described with numbers which begin from zero.
- *2 Replacement is performed at the event timing of the head note message in the relevant channel.
- *3 The value of SMF is output as it is.
- *4 When SMF Format 1 has loaded, the channel message in 11th and 27th track is interpreted as channel 9.
- *5 When assigned a voice in ROM, the generated SMAF doesn't have voice properties. Therefore, note that the playback timbre changes depending on a sound source. (This does not go for ATS-MA-7-SMAF. As in the case with ROM voice unassigned, it is replaced by RAM voice.)

Correspondence between a bank select value (used in a tool) and a 14-bit value is shown in **Table 5**.
In the sequencer application in which MSB and LSB are combined, set values in reference to the table.

Table 5 Bank Select 14-bit Notation

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

8.3.2.Modulation Depth

BnH, 01H, vv

Description	This message changes the vibrato amount in the designated channel.	
Argument	n	Channel number (0..15)
	vv	Control value (0..127)
Initial Value	0	
Note	Not applicable on Audio and HV.	

Relation between control value and depth is shown in **Table 6**. Vibrato Depth in this table is the magnification against the vibration depth of each voice.

Table 6 Relations between control value and its depth

Control Value	Vibration Depth
0	OFF
1 to 31	× 1
32 to 63	× 2
64 to 95	× 4
96 to 127	× 8

8.3.3.Data Entry MSB/LSB

BnH, 06H, mm (MSB)

BnH, 26H, ll (LSB)

Description	This message sets Data entry. It is used when entering RPN value (MSB/LSB). For the detail, refer to the section “8.3.14.RPN MSB/LSB.”	
Argument	n	Channel number (0..15)
	mm, ll	Setting value (0..127)
Initial Value	-	

8.3.4.Channel Volume

BnH, 07H, vv

Description	This message changes the volume in the designated channel. It aims at setting the volume balance between channels.	
Argument	n	Channel number (0..15)
	vv	Control value (0..127) Gain[dB] = $40 \times \log(vv/127)$, <Gain = MUTE if vv = 0>
Initial Value	100(64H)	
Note	Not applicable on Audio, i.e., no output on Audio channel. Sound differs when a project file saved by .mld version is used.	

8.3.5.Channel Panpot

BnH, 0AH, vv

Description	This message sets the stereo positioning in the designated channel.	
Argument	n	Channel number (0..15)
	vv	Control value (0..127)
		$Lch[dB] = 20 \times \log(\cos(\pi/2 \times vv/127))$, < Lch = MUTE if vv = 127>
		$Rch[dB] = 20 \times \log(\sin(\pi/2 \times vv/127))$, < Rch = MUTE if vv = 0>
Initial Value	64(40H) [Center]	

8.3.6.Expression

BnH, 0BH, vv

Description	This message changes the volume in the designated channel. It designates the volume shift set up with Channel Volume of the applicable channel.	
Argument	n	Channel number (0..15)
	vv	Control value (0..127)
		$Exp[dB] = 40 \times \log(vv/127)$, <Exp = MUTE if vv = 0>
Initial Value	127(7FH) [maximum]	
Note	There are two messages to control the volume; Expression and Channel Volume; the aim of them differs. Expression is used in the music in order to add expression into the music by volume change. Meanwhile, Channel Volume is used at the top of the music data for the mix-down by volume setting or fader. Not applicable on Audio. Sound differs when a project file saved by .mld version is used.	

8.3.7.Hold1 (Damper)

BnH, 40H, vv

Description	This message changes the damper setting in the designated channel. This message becomes active only in the voices where the damper is available.	
Argument	n	Channel number (0..15)
	vv	Damper setting (0..63:OFF, 64..127:ON)
Initial Value	0 [OFF]	
Note	When receiving NoteOff in the status of ON, NoteOff is suspended. When the status transits from ON to OFF, the delayed NoteOff is executed, and the volume envelope transits to Release. Not applicable on Audio and HV.	

8.3.8.Filter Resonance

BnH, 47H, vv

Description	<p>This message sets the strength of the filter resonance effect in the designated channel.</p> <p>The resonance effect preset to the voice can be controlled by the designation of relative value (centre 64). As the value becomes smaller, its effect becomes smaller. Also as the value becomes bigger, its effect becomes significant.</p> <p>The effective range of Filter Resonance is -3dB~20.25dB. If the value exceeds the range, the rounded value to min or max of the range is utilized when sound generation.</p>	
Argument	n	Channel number (0..15)
	vv	Setting value (0..127)
Initial Value	64(40H)	
Note	Not applicable on Audio and HV.	

8.3.9.Filter Brightness

BnH, 4AH, vv

Description	<p>This message sets the filter cut-off frequency in the designated channel.</p> <p>The cut-off frequency value, pre-set in the voice, can be controlled by the designation of relative value (centre 64). As the value gets smaller, the frequency becomes lower, and the value gets bigger, the frequency becomes higher.</p> <p>The effective range of Filter Brightness is 8 to 8184. If the value exceeds this range, the rounded value to min or max of the range is utilized when sound generation.</p>	
Argument	n	Channel number (0..15)
	vv	Setting value (0..127)
Initial Value	64(40H)	
Note	Not applicable on Audio and HV.	

8.3.10.3D Path Setting Change

BnH 4FH, vv

Description	<p>This message sets output path setting for the designated channel.</p> <p>When this message is present during sound generation of a note, the note under sound generation is muted.</p> <p>If the Path Information is out of the following range, it is replaced as 0 (LR output).</p>	
Argument	vv	Path Information 0 : LR output 2 : 3D#0 output 3 : 3D#1 output 4 : 3D#2 output 5 : 3D#3 output
Initial Value	0 [LR Output]	
Note	This setup also can be placed by Authoring tool.	

8.3.11.Dry Send Level

BnH, 5AH, vv

Description	This message sets the level of LR-output and binaural-output in the designated channel. $\text{DrySendLevel}[\%] = (vv / 127) \times 100$	
Argument	n	Channel number (0..15)
	vv	Setting value (0..127)
Initial Value	127(7FH)	

8.3.12.Reverb Send Level

BnH, 5BH, vv

Description	This message sets the input level of SFX1 effect in the designated channel. $\text{ReverbSendLevel}[\%] = (vv / 127) \times 100$	
Argument	n	Channel number (0..15)
	vv	Setting value (0..127)
Initial Value	40(28H)	

8.3.13.Chorus Send Level

BnH, 5DH, vv

Description	This message sets the input level of SFX2 effect in the designated channel. $\text{ChorusSendLevel}[\%] = (vv / 127) \times 100$	
Argument	n	Channel number (0..15)
	vv	Setting value (0..127)
Initial Value	0	

8.3.14.RPN MSB/LSB

BnH, 65H, mm (MSB)**BnH, 64H, ll (LSB)**

Description

This message sets PRN number setting.

For the details of the setup value for RPN MSB/LSB, see **Table 7**.

Argument

n Channel number (0..15)

mm, ll RPN number (0..127)

Initial Value

mm = 127(7FH), ll = 127(7FH)

Note

Not applicable on Audio

Table 7 Setup value for RPN MSB/LSB

RPN MSB	RPN LSB	Setup Contents
0	0	8.3.14.1. Pitch Bend Sensitivity
0	1	8.3.14.2. Fine Tune
0	2	8.3.14.3. Coarse Tune

8.3.14.1.Pitch Bend Sensitivity

BnH 65H 00H / BnH 64H 00H (RPN MSB/LSB)**BnH 06H mm / BnH 26H ll (Data Entry MSB/LSB)**

Description

This message sets the sensitivity of pitch bend.

Data Entry MSB (mm) indicates the sensitivity by 100 [cent].

Data Entry LSB (ll) is ignored, unnecessary to be set.

For example, mm=01 performs ± 1 semitone (100 cent), and the shift range is 2 semitones totally.

Argument

n Channel number (0..15)

mm Data Entry value MSB (0..24)

ll Data Entry value LSB (unnecessary)

Initial value

mm =2 [2 semitones]

Note

Not applicable on Audio

8.3.14.2.Fine Tune

BnH 65H 00H / BnH 64H 01H (RPN MSB/LSB)	
BnH 06H mm / BnH 26H ll (Data Entry MSB/LSB)	
Description	<p>This message sets the tuning by the resolution of 100/8192[cent]. mm/ll: 00H/00H (-8192).....40H/00H (0)7FH/7FH (+8191) Formula: Tuning value[cent] = $100 \times (((mm \times 128) + ll) - 8192) / 8192$</p>
Argument	<p>n Channel number (0..15) mm Data Entry value MSB(0..127) ll Data Entry value LSB(0..127)</p>
Initial value	mm = 64 (40H), ll = 0 [Center]
Note	<p>The combined value of Pitch Bend, Fine Tune, Coarse Tune, Master Fine Tune, and Master Coarse Tune is restricted within ± 3[oct]. Not applicable on Audio.</p>

8.3.14.3.Coarse Tune

BnH 65H 00H / BnH 64H 02H (RPN MSB/LSB)	
BnH 06H mm / BnH 26H ll (Data Entry MSB/LSB)	
Description	<p>This message sets the tuning by 100[cent]. Data Entry LSB (ll) is ignored; unnecessary to be set. mm: 00H (-64) .. 40H (0) .. 7FH(+63) Formula: Tuning value [cent] = $100 \times (mm - 64)$</p>
Argument	<p>n Channel number (0..15) mm Data Entry value MSB (0..127) ll Data Entry value LSB (unnecessary)</p>
Initial value	mm = 64 (40H) [Center]
Note	<p>The combined value of Pitch Bend, Fine Tune, Coarse Tune, Master Fine Tune, and Master Coarse Tune is restricted within ± 3[oct]. Not applicable on Audio.</p>

8.3.15.All Sound Off

BnH, 78H, 00H	
Description	This message mutes the sound in the designated channel
Argument	n Channel number (0..15)
Initial Value	-
Note	<p>This event will be ignored on .mld version. Even if All Sound-Off is set immediately after Note-On for audio data (same timing), the relevant audio data may be played back. Keep at least 20-msec interval between All Sound-Off and the last Note-On for audio data. In the case of the sequence data not including audio data, no need to pay attention to the above description.</p>

8.3.16.Reset All Controller

BnH, 79H, 00H

Description	This message resets the control value in the designated channel. The event value shown in Table 8 is set as their initial value.
Argument	n Channel number (0..15)
Initial Value	-
Note	The Reset All Controller message should be placed before the Start Point message (see “8.6.3. Start Point and End Point”). This event will be ignored on .mld version.

Reset each event setting value mentioned in Table 8 into the initial value.

Table 8 Initial Value of Reset All Controllers

Control #	MIDI Event	Initial Value
1 (01H)	Modulation	0 [OFF]
11 (0BH)	Expression	127 [MAX]
64 (40H)	Hold1	0 [OFF]
100 (64H)	RPN LSB	127 [NULL]
101 (65H)	RPN MSB	127 [NULL]
-	Pitch Bend	MSB = 64, LSB = 0
-	Key Velocity	64

8.3.17.All Note Off

BnH, 7BH, 00H

Description	This messages operates to KeyOff the all sound in the designated channel.
Argument	n Channel number (0..15)
Initial Value	-
Note	This event will be ignored on .mld version. Even if All Note-Off is set immediately after Note-On for audio data (same timing), the relevant audio data may be played back. Keep at least 20-msec interval between All Note-Off and the last Note-On for audio data. In the case of the sequence data not including audio data, no need to pay attention to the above description.

8.3.18.Mono Mode On

BnH, 7EH, 01H

Description

This message designates the monophonic pronunciation mode in the designated channel.
Default value is set as polyphonic pronunciation mode.

Argument

n Channel number (0..15)

Initial Value

Poly mode

Note

This message is effective only before the first note in the applicable channel. It can not be changed during the music.

When the channel is mono-mode, notes of poly are operated as slur (legato). If the sound is muted by DVA(*) during the first tone pronunciation of the of slur process, an attack (retrigger) is attached onto the second tone.

- * DVA (Dynamic Voice Allocation) is the system which searches an unallocated voice (pronunciation slot) and allocates dynamically despite the part the voice belongs to, to enhance the resource efficiency of the voice synthesis. Because this synthesizes more voices simultaneously than the former system which voice allocation was fixed on each voice, this feature realizes to build powerful and thick expressed contents.

8.4.Program Change

CnH, pp

Description

This message sets the voice in the designated channel.
 When the applicable channel has been set as the normal channel, the voice is selected from the bank designated by bank select. When the applicable channel has been set as the drum channel, the drum set is selected.
 In ROM voice, FM voice and PCM voice are intermingled.
 User voice also can be assigned into either FM voice or PCM voice.
 Insert the Program Change message next to Bank Select message [cf. “8.3.1. Bank Select MSB/LSB”].

Argument

n Channel number (0..15)
 pp Program number (0..127)

Initial Value

0

8.5.Pitch Bend

EnH, ll, mm

Description

This message shifts the pitch in the designated channel.
 The initial value of the shift-width (Pitch Bend Sensitivity) is 200[cent], and the value can be changed by “8.3.14.1. Pitch Bend Sensitivity”

Argument

n Channel number (0..15)
 ll Bend amount (LSB : 0..127)
 mm Bend amount (MSB : 0..127)
 mm/ll : 0/0 (-Max)..64/0 (0[cent])..127/127 (+Max)
 Cent-linearly shift curve

Initial Value

mm = 64 (40H), ll = 0 [Center]

Note

The combined value of Pitch Bend, Fine Tune, Coarse Tune, Master Fine Tune, and Master Coarse Tune is restricted within ± 3 [oct].
 Not applicable on Audio.

8.6.Meta Event

This section defines the standard use meta-events. All meta-events which are not defined here are ignored.

8.6.1.Texts

FFH, 01H, Size, Text

Description	The information items of Song Name, Composer, Lyricist, Arranger, Performer, Programmer, can be embedded with using the Meta Event of XF Information Header. (c.f. “10.1. XF Information Header -- Language Specific”) The control characters, which are defined by XF Information Header, e.g. “,”, “[”, “/”, are handled as characters as they are.	
Argument	Size	Size length of the Text.
	Text	Describe as referring “10.1. XF Information Header -- Language Specific.”
Note	This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song. This setup also can be placed by Authoring tool.	

8.6.2.Copyright Notice

FFH, 02H, Size, Text

Description	Copyright information can be details with this Meta Event.	
Argument	Size	Size length of the Text.
	Text	Detail of copyright.
Note	This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song. This setup also can be placed by Authoring tool.	

8.6.3.Start Point and End Point

FFH, 07H, Size, 53H, 54H, 41H, 52H, 54H (START)

FFH, 07H, Size, 53H, 54H, 4FH, 50H (STOP)

Description	This message designates the start point and the end point. When setting the start point, the range between time0 to the setting time of the start point becomes set-up measure. The set-up measure which is set by the start point has the priority over the definition in set-up measure.	
Argument	Size	Size length of the Text. (“START”: 5, ”STOP”: 4)
	Text	Start point is specified by “START” in ASCII. Stop point is specified by “STOP” in ASCII.
Note	Only one event can be implemented for one song. This setup also can be placed by Authoring tool.	

8.6.4.Track End Point

FFH, 2FH, 00H

Description	This message designates the playback end point. Data after the end point is ignored. Without designating, it becomes the data end. The first setting is effective.	
Argument	None	

8.6.5.Tempo Designation

FFH, 51H, 03H, hh, mm, ll

Description

This message changes the playback speed (basic time = 1-TickTime).
 Standard time [us] = Tempo / resolution
 The resolution is indicated by the data included in the top of SMF.
 default : 500,000

Argument

hh/mm/ll $\text{BasicTime} [\mu\text{s}] = (\text{hh} \times 65,536) + (\text{mm} \times 256) + \text{ll}$

Initial value

500,000 [μs]

8.6.6.Rhythm Designation

FFH, 58H, 04H, nn, dd, cc, bb

Description

This message designates the rhythm.
 The message does not affect to the pronunciation except in the Setup Measure.

Argument

nn Numerator.
 dd Denominator. 2 indicates a crotchet (quarter note), and 3 indicates a quaver (eighth note).
 cc Metronome designation.
 bb The number of demisemiquaver (thirty-second note) in one MIDI crotchet.

8.7.Native Meta Event

This is the Yamaha extend message starting with FFH, 7FH, *Size*, 43H, or 02H.

8.7.1.Channel Status Setting

FFH, 7FH, *Size*, 43H, 02H, 02H, 03H, Ch0, Ch1, ..., Ch31

Description

This message sets the channel status. Vibration and LED can be set in each track.

Argument

Size

Data length (fixed as 36)

Ch0..31

Channel information

Choose channel setup from the following table.

Value	VS(Vibration Status)	LED-B (blue)	LED-G (green)	LED-R (red)
0 (00H)	OFF	OFF	OFF	OFF
4 (04H)	OFF	OFF	OFF	ON
8 (08H)	OFF	OFF	ON	OFF
12 (0CH)	OFF	OFF	ON	ON
16 (10H)	OFF	ON	OFF	OFF
20 (14H)	OFF	ON	OFF	ON
24 (18H)	OFF	ON	ON	OFF
28 (1CH)	OFF	ON	ON	ON
32 (20H)	ON	OFF	OFF	OFF
36 (24H)	ON	OFF	OFF	ON
40 (28H)	ON	OFF	ON	OFF
44 (2CH)	ON	OFF	ON	ON
48 (30H)	ON	ON	OFF	OFF
52 (34H)	ON	ON	OFF	ON
56 (38H)	ON	ON	ON	OFF
60 (3CH)	ON	ON	ON	ON

Initial Value 0

Note

This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song.

This setup also can be placed by Authoring tool.

8.7.2.HV Channel Setting

FFH, 7FH, Size, 43H, 02H, 02H, 1AH Ch vv

Description	This message designates the channel to make HV pronunciation.	
Argument	Size	Data Length (fixed as 6)
	Ch	Channel Number (0...15)
	vv	Control Number (0 or 1)
		0: without specifying HV pronunciation channel
		1: specify the <Ch> channel as HV pronunciation channel
Initial Value	0 [Not specified.]	
Note	This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song. This setup also can be placed by Authoring tool.	

8.7.3.3D Initial Path Setting

FFH, 7FH, Size, 43H, 02H, 02H, 22H, Ch0, ..., Ch31

Description	This message reserves the resources for virtual sound generators (ID0 to 3). Initial values of output path setting for each Ch can be specified. If path information is not within the following range, it is replaced by 0 (LR output). For cautions for 3D resource reservation, see “9.7.2. 3D Resource Reservation.”	
Argument	Size	Data Length (fixed as 36)
	Ch0~31	Path Information
		0 : LR output
		2 : 3D ID0 output
		3 : 3D ID1 output
		4 : 3D ID2 output
		5 : 3D ID3 output
Initial Value	0 [LR output]	
Note	This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song. This setup also can be placed by Authoring tool.	

8.7.4.Karaoke Guide Channel Setting

FFH, 7FH, Size, 43H, 02H, 02H, 2CH, Data1, Data2

Description

This message determines which track is used as Karaoke Guide Channel. (One or more tracks can be assigned.) Whether to use multiple guide channels is dependent on application's implementation.

Argument

Data1 Karaoke Guide Channel Setting #1: 15ch (MSB) to 08ch (LSB)
Flags the channel from 0 to 7 channels as bit position. "1" means assigned as Karaoke Guide Channel, "0" means dismissed.

b7	b6	b5	b4	b3	b2	b1	b0
15ch	14ch	13ch	12ch	11ch	10ch	9ch	8ch

Data2 Karaoke Guide Channel Setting #2: 07ch (MSB) to 00ch (LSB)
Flags the channel from 0 to 7 channels as bit position. "1" means assigned as Karaoke Guide Channel, "0" means dismissed.

b7	b6	b5	b4	b3	b2	b1	b0
7ch	6ch	5ch	4ch	3ch	2ch	1ch	0ch

Initial Value Null
Note

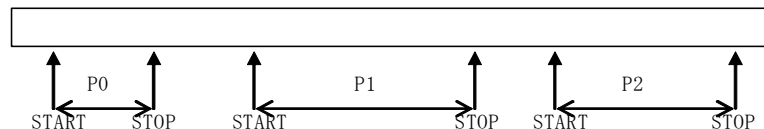
This event needs to be placed on the set-up measure. Be sure to place only one on the top of a song.

8.7.5.Karaoke Scoring Section Setting

FFH, 7FH, Size, 43H, 02H, 02H, 2DH, 00H (START)**FFH, 7FH, Size, 43H, 02H, 02H, 2DH, 01H (STOP)**

Description

This message designates the start point and the end point of Karaoke Scoring section. 16 sections can be designated. From the beginning of the song, periods can be assigned as the order of P0, P1, P2, P3, P4, P5, P6, P7, P8, P9, Pa, Pb, Pc, Pd, Pe, and Pf. Periods shouldn't be overlapped.



There are 16 tag names for Karaoke Scoring Section Setting;

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

Argument None
Initial Value Non-specified

8.8.Universal System Exclusive

8.8.1.Master Volume

F0H, Size, 7FH, 7FH, 04H, 01H, ll, hh, F7H

Description	This message changes Master volume in the music.	
Argument	Size	Data Length (fixed as 7)
	ll	Master volume lower level (0..127) is ignored.
	hh	Master volume higher level (0..127)
		Gain[dB] = $40 \times \text{Log10}(\text{hh}/127)$ [dB]
Initial Value	100 (64H)	

8.8.2.Master Fine Tune

F0H, Size, 7FH, 7FH, 04H, 03H, ll, mm, F7H

Description	This message sets the master fine tuning. The tuning from A440Hz in cents can be designated. Refer to “8.3.14.2 Fine Tune” for the formula.	
Argument	Size	Data Length (fixed as 7)
	ll	Data value LSB(0..127)
	mm	Data value MSB(0..127)
Initial Value	mm = 64 (40H), ll = 0 [Center]	
Note	The combined value of Pitch Bend, Fine Tune, Coarse Tune, Master Fine Tune, and Master Coarse Tune are restricted within ± 3 [oct].	

8.8.3.Master Coarse Tuning

F0H, Size, 7FH, 7FH, 04H, 04H, 00H, vv, F7H

Description	This message sets the master coarse tune. The tuning from A440Hz in 100 cents can be designated. Refer to “8.3.14.3 Coarse Tune” for the formula.	
Argument	Size	Data Length (fixed as 7)
	vv	Data value (0..127)
Initial Value	64(40H) [Center]	
Note	The combined value of Pitch Bend, Fine Tune, Coarse Tune, Master Fine Tune, and Master Coarse Tune are restricted within ± 3 [oct].	

8.9.Native Exclusive

This is the Yamaha extend message starting with F0H, Size, 43H, or 79H.

8.9.1.Audio Panpot Settings

F0H, Size, 43H, 79H, 08H, 7FH, 0BH, ID, CL, Data, F7H

Description

This message sets Audio Data Panpot in the specified AudioID is set.
By receiving this message, Channel Panpot becomes invalid. If a Waveform doesn't have any specification with this message, the setting of Channel Panpot is superiorly utilized. Although a Channel Panpot is received after receiving this message, wave Panpot specification is made priority unless a cancel by this message is issued.
By designating 1 (01H) to "CL," all wave Panpot received before then is returned to Channel Panpot. In addition, by specifying 2 (02H) to "CL," Panpot specification is made "OFF" and sound is generated in 0dB.

Argument

Size	Data Length (fixed as 9)
ID	Audio ID (0...31)
CL	Clear Setting (0: Panpot specified, 1: Clear, 2: Panoff)
Data	Control Number (0...127) $Lch[dB]=20 \times \log(\cos((\pi/2) \times Data/127))$, < Lch = MUTE if Data = 127 > $Rch[dB]=20 \times \log(\sin((\pi/2) \times Data/127))$, < Rch = MUTE if Data = 0 >

Initial Value 64 (40H)

Note If a note event is already in the same time, the implemented event will be sorted before the note event.
This event will be ignored on .mld version.

8.9.2.User Event

F0H, Size, 43H, 79H, 06H, 7FH, 10H, vv, F7H

Description

When this message is issued, the event number is notified to the system. Only one UserEvent can be designated at the same time.
The effective range is 0 to 15, and the messages exceeding this number are ignored.

Argument

Size	Data Length (fixed as 7)
vv	UserEvent number (0..15)

Initial Value -

8.9.3. 3D Movement

F0H, Size, 43H, 79H, 08H, 7FH, 29H, ID, D0, D1, D2, D3, Azm, Elv, T0, T1, T2, T3, F7H

Description	<p>This message updates the position information of four virtual sound sources.</p> <p>Once this message is issued, the current position will be moved to the specified position after the specified movement time. The way to move shall be straight movement.</p> <p>The actual processing is to update the position information per 20msec.</p> <p>3D effect of each channel can be obtained, but the output must be assigned to 3D by using 3D setting message in order to obtain the actual effect.</p>	
Argument	Size	Data Length (fixed as 17)
	ID	Virtual sound source number (0..3) When a number other than the specified is used, the message is ignored.
	D[0..3]	Distance information. The position of a listener is defined as 1000. The effective value range of D0 to D3 is from 0 to 127. $\text{Distance [mm]} = (D0 \times 2,097,152) + (D1 \times 16,384) + (D2 \times 128) + D3$
	Azm	Azimuth information. Horizontal direction angle from a listener. Front of a listener is 0 degree. Set a clockwise angle The effective value range of Azm is from 4 to 124. $\text{Azimuth angle } [^\circ] = (\text{Azm} - 64) \times 3$
	Elv	Elevation angle information. This is information of vertical direction angle from a listener. The angle starts from 0 degree of listener's front, and upward angle is defined as positive. The effective value range of Elv is from 34 to 94. $\text{Elevation angle } [^\circ] = (\text{Elv} - 64) \times 3$
	T[0..3]	Movement time information. This value is always interpreted as 0. The tool automatically sets it based on duration with the last event.
Initial Value	D : 1000 (1000mm) Azm : 64 (0°) Elv : 64 (0°)	
Note	This setup also can be placed by Authoring tool. An interval of 3D position change for same virtual sound source should be taken at least 20 msec.	

8.9.4. SFX Setting Change

F0H, Size, 43H, 79H, 08H, 7FH, 2AH, ID, F7H

Description	<p>This message changes the SFX setting can be changed during a song.</p> <p>In authoring contents, be aware to avoid generating noise while changing a setting.</p> <p>For the point to remember when changing the setup, see 9.6. SFX Setting Change.</p> <p>When the SFX Param ID is out of the range, it is deleted.</p>	
Argument	Size	Data Length (fixed as 7)
	ID	SFX Param ID 0 to 31: Param0 to 31 of MA-7 SFX1 setting 64 to 95: Param0 to 31 of MA-7 SFX2 setting
Initial value	<p>The initial value of SFX1: 0 (Param0)</p> <p>The initial value of SFX2: 64 (Param0)</p>	
Note	This setup also can be placed by Authoring tool. An interval of 3D position change for same virtual sound source should be taken at least 20 msec.	

9.Points to Remember

Due to constraints on specification, points to remember are as follows.
Create your contents in consideration of these points to avoid effect on sound.
And, be sure to check the sound of contents created.

9.1.SMF

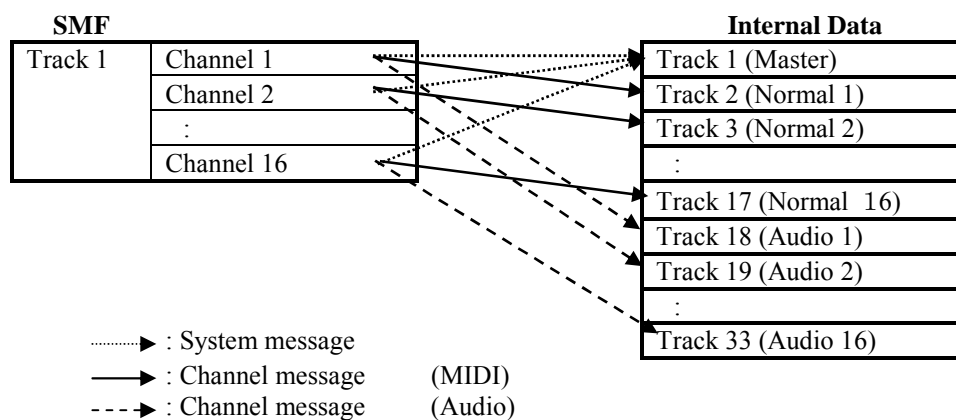
Authoring Tool holds data in Format 1 configured by 33 tracks.

Track 1	Master	Master track (conductor track) System messages (Meta Events, System Exclusive, etc.) are collectively stored in this track.
Track 2	Normal 1	Channel messages of Normal 1 (NoteOff, NoteOn, Control Change, Program Change, etc.) are stored. Channel information in the channel message (low-order 4 bits of the status byte) is updated to 0H.
Track 3	Normal 2	Channel messages of Normal 2 are stored. Channel information in the channel message is updated to 1H.
		:
Track 17	Normal 16	Channel messages of Normal 16 are stored. Channel information in the channel message is updated to FH.
Track 18	Audio 1	Channel messages of Normal Audio1 are stored. Channel information in the channel message is updated to 0H.
		:
Track 33	Audio 16	Channel messages of Normal Audio16 are stored. Channel information in the channel message is updated to FH.

Create a SMF in consideration of track distribution that is performed in the SMF import.

9.1.1. Format 0

System messages of track 1 to 16 are collectively stored in the head track.
Normal-related channel messages of track 1 to 16 are assigned to track 2 to 17 one by one.
And, audio-related messages of each channel are copied onto track 18 to 33 (Note events are moved).



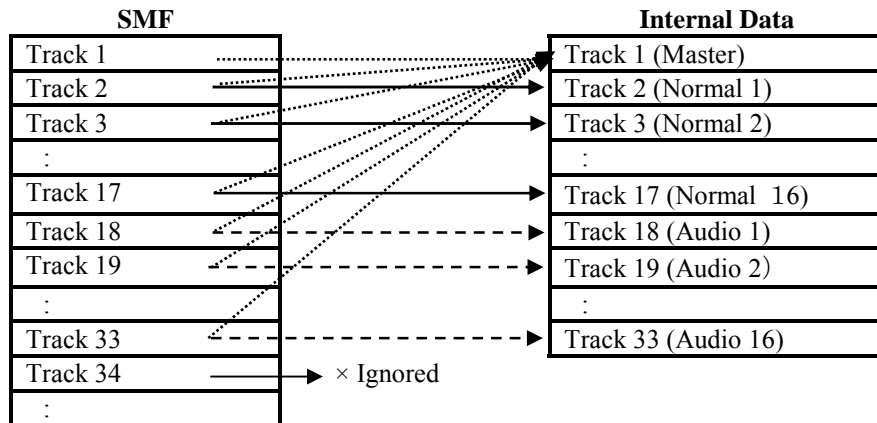
9.1.2.Format 1

System messages of track 1 to 33 are collectively stored in the head track.

Channel message of track 1 is abandoned.

Channel messages of track 2 to 33 are stored in the track 2 to 33 as it is.

Channel messages of track 34 or more are abandoned.



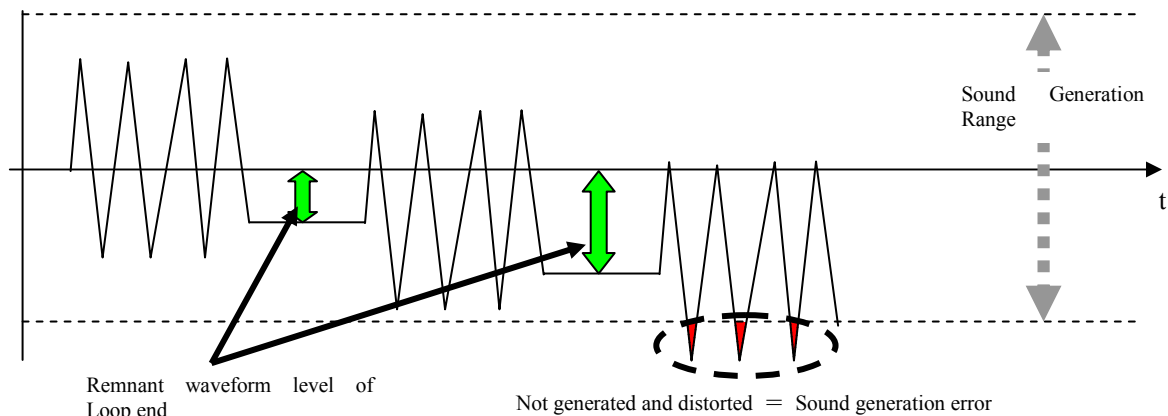
With Yamaha SOL/SOL2/XGWorks ST, a track without event will be left-justified without being output to SMF. Be sure to set any event to a track without event such as a template data (format1_template.mid).

9.2. Output Residue on PCM Voice Waveform

Pay attention to the following phenomenon when creating a voice with using PCM User Waveforms.

With no waveform loop (loop point equals to loop end), a waveform value is consecutively read based on the hardware specification when waveform read reached at the loop end. Therefore, if voice parameters are set: XOF = 1 or SR = 0 (or a setting for long decay time), or XOF = 0 and RR = 0 (or a setting for long decay time), this value is kept even after the NoteOff.

In this state, if a number of NoteOn with loud volume are overlapped, sound is subject to be distorted. And, when a voice with these kinds of waveform is generated many times, a value that is kept after the NoteOff becomes bigger by the number and causes distortion more easily.



To prevent this phenomenon, we recommend you to set waveform level as “0” at loop-end of the waveform when creating it, or to adjust the Voice’s Envelope to lose sound pressure level before the loop ends. Creation Guide Line of PCM Voices is shown in **Table 9**.

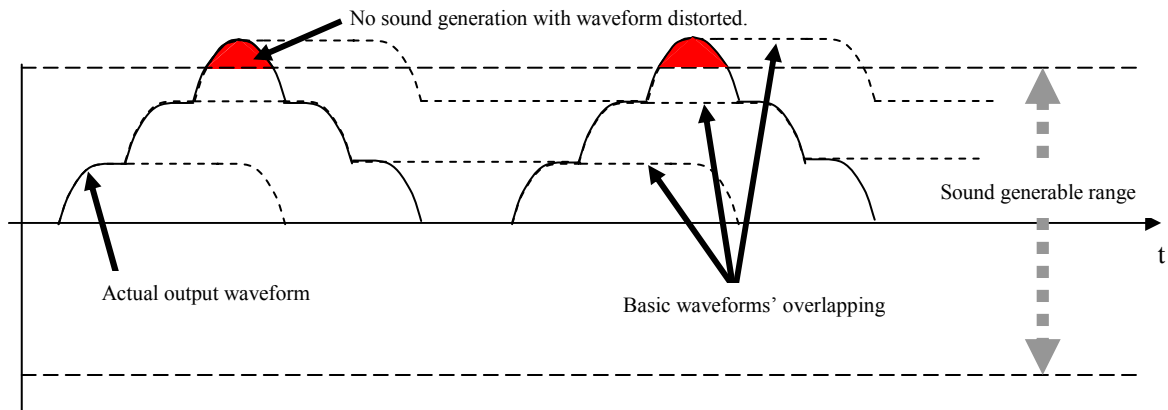
Table 9 PCM Voice Authoring Guide Line

Waveform Loop	What kinds of voice ?	Waveform level at the Loop end	XOF	DR	SR	RR	SUS	Point
×	One –shot or intermittent	0	free	free	free	free	free	No error occurs.
		not 0	on	not 0	not 0	free	off	Troubles may occur. Adjust DR and SR so that sound generated is muted before the loop end.
			off	free	free	not 0 the shorter, the better	off	Troubles may occur. Adjust RR so that sound generated is muted before the loop end.
○	Continuous	0	off	free	0	not 0	free	No error occurs.
		not 0	off	free	0	not 0	free	No error occurs.
	Decay with Loop	0	free	free	free	free	free	No error occurs.
		not 0	free	free	Free	free	free	No error occurs.

Free: Any setting can be made.

9.3.FM Voice Output Deflection

Waveforms of No.1, 2, 3, 5, 9, 10, 11, 13, 14, 17, 18, 19, 21, 22, 25, 26, 27, 29, and 30 out of the basic FM Voice's waveforms have a waveform that is made up of only positive components. When using these waveforms a lot, be sure to check its actual sound because the output waveform will be significantly distorted and this may cause noises.



9.4.Filter EG

When a cutoff frequency is low or a resonance is more effective, DC components may remain even after the NoteOff. Check the actual sound generated because this condition may cause sound distortion. As for the filter EG parameters, the change rate should be set as "31" to make the level of adjacent EGs same. Unless the change rate is "31," the sound may not be generated correctly.

9.5.Pitch EG

As for the pitch EG parameters of PCM voice, the change rate should be set as "0" to make the level of adjacent EGs same. Unless the change rate is "0," the sound may not be generated correctly.

9.6.SFX Setting Change

9.6.1.Setup Notice

Noise may be generated when SFX setting is changed during sound generation. Set the relevant Send Level (Reverb /Chorus) to "0" before the change and insert this message after 50 ms. And, be sure not to generate sound during 50 ms after changing SFX settings.

9.6.2.Event Intervals

Irregular sound may be generated when SFX setting is changed in a short time for the same SFX block. If you change SFX setting for the same SFX block, make sure to have an interval at least 20msec for each event. In addition, these events should be placed 20msec from start point or end point.

9.7. 3D

9.7.1.3D Path Setting Change

When 3D path setting has changed during sound generation of a note, the sound is muted.
Mute the all sound of note before changing the 3D path setting.

9.7.2.3D Resource Reservation

3D Resource Setup, which employed in a song, should be prepared in the 3D Initial Path Setting message (cf. “8.7.3. 3D Initial Path Setting”). Unless this message has been placed on the beginning of the song, LR path is utilized though denoted to use 3D Resource path. Don't forget to reserve all of 3D resources on the beginning of the song.

9.7.3.Event Intervals for 3D positioning

Irregular sound may be generated when 3D position setting is changed in a short time on the same 3D image.

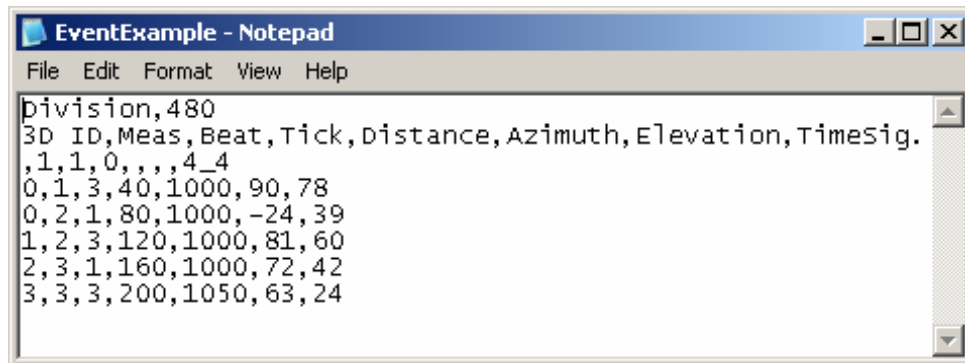
If you change 3D position setting on the same 3D image, make sure to have an interval at least 20msec for each event. In addition, these events should be placed 20msec from start point or end point.

9.7.4.3D Pattern CSV File

3D pattern can be input/output from 3D pattern edit dialog as a file in CSV format.

9.7.4.1.File Format

CSV files in the following format can be interpreted.



- 1st line is for Division declaration. Range: 12 to 960.
- 2nd line should be described as "3D ID,Meas,Beat,Tick,Distance,Azimuth,Elevation,TimeSig.". The execution results as an error unless this description.
- After 3rd line, 3D motion event or time signature event can be described. One line corresponds to one event. A blank line shall be ignored.
- Use comma (,) for delimiter character. Enclosing character, such as Double quote ("), is unnecessary for each data item. If there is other character between each data item except comma, it results as Format Error.
- Use ASCII character set.
- The loaded file is treated as 4/4 meter on the first measure unless no time signature event on the first measure.
- If each data item involves character except any single digit, it results as an error. However, the use of a minus character (-) for Azimuth and Elevation is allowed. Upper number and lower number for time signature should be separated by a space character ().
- The value for Distance shall be rounded in 50mm steps automatically.
- The value for Azimuth and Elevation shall be rounded in 3 degree steps automatically.
- Available input range for each parameter is as following. If values are loaded by Authoring Tool, the values shall be rounded according to UI's restriction.

Item	Range	Unit	When a value exceeds the range	Note
3D ID	0 to 3		Adjusted to 0	
Meas	1 to 99999		Ignored	
Beat	1 to 99999		Ignored	Changed to 1 if used for TimeSig. (*)
Tick	0 to 99999		Ignored	Changed to 0 if used for TimeSig. (*)
Distance	0 to 12750	mm	Adjusted within the range	
Azimuth	-360 to 360	deg	Adjusted to -180 to 177 in 3 steps	
Elevation	-360 to 360	deg	Adjusted to -90 to 90 in 3 steps	
TimeSig. Upper num.	1 to 64		Ignored	
TimeSig. Lower num.	2, 4, 8, 16, 32		Ignored	

*: If TimeSig. is set between measures, TimeSig. is moved to the beginning of next measure. I.E., when TimeSig. setup is Beat ≠ 1 and Tick ≠ 1; the event is changed as Beat = 1, Tick = 0, and Meas is incremented by 1.

9.7.5.Caution for ATS version

In ATS-MA7-SMAF, in order to reduce the processing load, 3D movement is simulated by Panpot and volume control. Be sure to check the actual sound on a mobile phone because the sound created differs from the actual sound.

9.8.HV

9.8.1.How to specify a HV track

HV track specification on the tool has been made available.

HV track can be specified on Tr.Status tab of Contents window.

However, if the HV track setup is canceled, no voice would be assigned on this track.

When canceling the HV track setup, make sure to delete all note events on the track previously.

9.8.2.HV Note On Interval

Prepare the time interval of different HV Note-On from one HV Note-On 100msec or more.

A warning message will be displayed when content that has time interval of less than 100ms is used

9.8.3.HV-Script Restrictions

There are following restrictions to create a HV-Script.

- The maximum byte number in one clause quoted by the clause bound symbols shall be 100 bytes.
- In the clause bound symbols, both “?” and “*” are also contained besides punctuation marks.
- The numerical value attached to “?” or “*” among a clause punctuation marks or a clause punctuation mark, and comment about a copyright information are contained in one clause.
- When a clause punctuation mark exists continuously, it is calculated as a respectively different clause.
- A header is not included in one clause. However, when clause mark does not exist, a header is included in a clause.
- Although one byte character is used for Long-vowel symbol or Silent symbols, it is calculated as a two bytes character.
- When a linefeed code exists in one clause, it is calculated as a one bytes character or two bytes character.
- When the 100 bytes numbers of symbol is a head byte of full-size character, or it is a symbol which comes up with a number or “#” symbol, read operation is made possible to the low rank byte which a maximum of 105 bytes accompanies, a number, a mark, and etc.
- The HV-Script Data that exceeds 2147483647 (7FFFFFFF) bytes cannot be played back.

In addition, pay attention to the following points to create date.

- Do not use the following, Speed “S”, Utterance length “L”, and Degree of rhythm change of a clause “W” during a long-vowel symbol.
- The alphabet used in a control character sequence should use a full-size letter.

Tool issues a warning message according to the above restrictions when the maximum bytes in one clause surrounded by the clause punctuation mark are more than 101byte.

9.9.Audio

9.9.1.Maximum Sound Generation Number

Maximum number of audio sound generation is up to 2.

When the number is 2 or more, new audio sound starts generating after stopping the previous sound generation.

9.9.2.Sampling Frequency (Fs) Limitation

The Sampling Frequency of audio data should be within 24 k Byte per seconds because this is the maximum rate of the audio byte unit limitation. The data cannot be saved if exceeds this limitation.

The byte unit can be calculated as followings;

The byte unit for 4 bit ADPCM monaural...	$F_s / 2$ (kHz)
The byte unit for 8 bit PCM monaural...	F_s (kHz)
The byte unit for 16 bit PCM monaural...	$F_s \times 2$ (kHz)
The byte unit for 4 bit ADPCM stereo...	F_s (kHz)
The byte unit for 8 bit PCM stereo...	$F_s \times 2$ (kHz)
The byte unit for 16 bit PCM stereo...	$F_s \times 4$ (kHz)

Figure 2 is the example for calculation. The period while two wave over wrapped exceeds 26k Byte per seconds and cannot be saved.

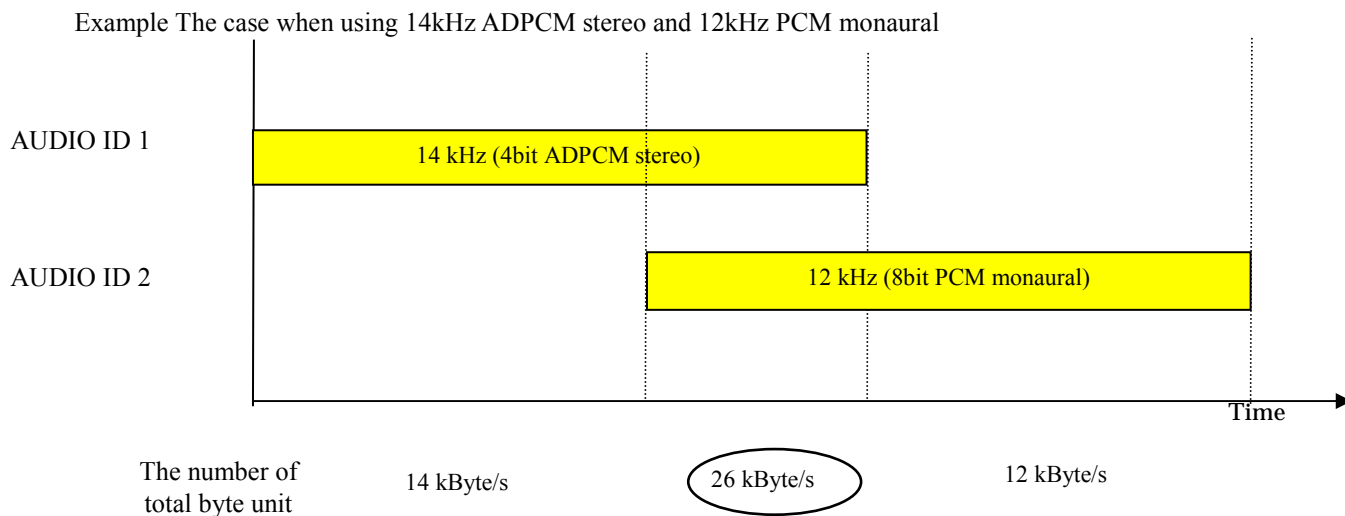


Figure 2 The example to calculate the number of the maximum audio byte unit

9.9.3.NoteOff command under using Audio

Adaptation of NoteOff command may delay when muting Audio by NoteOff command.

If delay happens, Audio won't be muted immediately, however, remains for a while instead.

To avoid this phenomenon, adjust the length of Audio wave data with gating time of note event, or apply NoteOff at less level transient point of the wave data.

Also, a sound generation test is strongly recommended by the actual mobile devices.

9.9.4.Change Send Level during a playback

Since SMW Ver. 1.6.0, message change under Audio playback is supported for Send Level messages, “8.3.11. Dry Send Level”, “8.3.12. Reverb Send Level”, and “8.3.13. Chorus Send Level”.

According to target terminals, there is a few case that Send Level messages, “8.3.11. Dry Send Level”, “8.3.12. Reverb Send Level”, and “8.3.13. Chorus Send Level”, are ignored.

As following message appears if Send Level message is found during Audio playback, above phenomenon should be in consideration when making a contents application.

Message:

Guideline violation.

- Send level exists during audio note.

Same as previous version, SFX Setting Change requires insertion of Send Level messages before and behind its message. As following message also appears in this case, above phenomenon should be in consideration when making a contents application.

Message:

Guideline violation.

- Effect setting change exists during audio note.

9.10.Vibration and LED

Vibration and LED in each track can be controlled.

We recommend you to use this function in not a channel in which a note is always produced but a channel in which a note is not frequently produced. And, if you want to use this vibration and LED effectively, create a track in which only the specific note is entered (e.g. only a high-hat part of drum).

For vibration, the effect could not be confirmed when a gate time of a note in a channel specified as sync channel is short due to response characteristics of a vibration motor. Likewise, when interval between notes is short, stop of the vibration could not be confirmed. Set the length of gate time and the interval of notes in consideration of these things.

Check the operation of a vibration and a LED by playing contents actually.

9.11.Volume Specification and Note Event

Do not place the note event on the same time as the volume designation with the Authoring Tool. If you do, noise may be generated and the attack of sound may disappears. If this becomes a concern, put a delay between a volume designation event and a note event.

The relevant volume designation events are master volume, channel volume, expression and panpot. This problem easily occurs especially when volume shifting is larger.

9.12.Event Density

When the number of events per unit time (event density) is high, the pronunciation may become abnormal.

Check it on the actual mobile phone, and adjust the event density if concern.

9.13.Restriction for Event Density

Event Density is a definition of the number of events in a fixed period, and calculated with NoteOn (3 bytes), NoteOff (3 bytes), Program Change (2 bytes), Control Change (3 bytes), Pitch Bent (3 bytes), Exclusive Message (the number of data part in byte unit, and 2(F0,F7) bytes. The unit of expressed number is in Byte per seconds.

The type of Event Density and its corresponding reference value on Authoring Tool is shown on Table-8.

Table 10 The type of Event Density and its reference value

Event Density	Definition	Reference Value (Bytes / s)
Average Event Density	The averaged Event Density through a music	500
Maximum instantaneous Event Density	The maximum Event Density in time through a music	1000

Authoring Tool has a restriction for saving data if the value is higher than above reference value on **Table 10**.

9.14.Total Length after Conversion

The total length after conversion is restricted within 20 msec to 2000 sec.

When exceeding this range, the tool treats it as an error and cannot convert to SMF.

When authoring SMF, make sure total length to keep within 20 msec to 2000 sec.

9.15.SMAF File Size

The maximum file size to evaluate / verify with this Authoring Tool is up to 2 Bytes.

If the file size exceeds 2 MBytes, a file could not be normally played back.

9.16.Channel Status

The **Channel Status** message is available to set from **Tr.Status** tab in **Contents** window of Authoring Tool, or on “8.7.1. Channel Status Setting.”

9.17.Key Control Status

The Key Control Status of the relevant channel is made into OFF when any of the following conditions are;

1. The specified value of Bank Select MSB is only 125 (7DH), and Program Change message comes after this event.
2. Channel is 10 (09H) channel, and Bank Select MSB whose value is 124 (7CH) or 122 (7AH) is not present.
3. No note event.

These are identified as Drum or Stream PCM channel by MA-7 Authoring Tool

In other channels, Key Control Status is made into as “non-specified.”

9.18.Excessive Message of Extremely Long

Virtual MIDI Device normally won't work if there is extremely long (1kbyte, approximately) Exclusive Message in the SMF.

This sort of message should be prohibited to involve in the SMF.

9.19.RAM Size Restriction

The consumption of RAM size is restricted as 16,382 bytes for the voice in the content.

When exceed this range, the tool treat as an error.

10. Appendix

10.1. XF Information Header -- Language Specific

This header implants noting feature and/or attribute information of a song as text meta-event in SMF format.

FF 01 len <text>

Each data item should be separated with ASCII-colon “:” and given in succession.

Leave the data item as blank if there is no information to fill with.

New categories are added following the last data item. The process interprets any following data items as blank at the end of the text, even if no colons are found.

First-two items of the Information Header (“XF Information Header -- Language Specific -- ID” and “Language”) and the various control characters should be given in ASCII code.

Followings are described about “XF Information Header -- Language Specific” in Japanese.

10.1.1. Data Items

10.1.1.1. XF Information Header -- Language Specific -- ID

ID letters (4 characters) which indicates this is the XF Information Header -- Language Specific. “XFln”

10.1.1.2. Language

Data that specifies the character code which used in the XF information header -- Language Specific.

This does not specify the character code system used for the lyrics. The character code system for the lyrics is specified by the XF lyric header. Nor does this specify the country in which the song data is produced.

Authoring Tool supports the following language codes;

Symbols	Character Codes	Supported Languages
L1	Latin 1(ASCII(7bit) + ISO 8859-1)	English, French, German, Italian, Spanish, Portuguese, etc.
JP	Shift-JIS	Japanese
KR	ISO-2022-KR	Korean

10.1.1.3.Song Name

This defines the language-specific printing of the song name.

Uses Zen-kaku (2-byte characters) when put in alphabet.

For search, put Yomigana (pronunciation guides) by the side with Zen-kaku Hiragana (2-byte hiragana characters) with using single-byte parenthesis, “(” and “)”

Do not use Katakana for Yomigana.

Ruby characters can be added using single-byte brackets “[” and “]”.

Ruby characters should be corresponded one by one with the character to be added.

If you expect to display the song name over multiple lines, insert a slash “/” at the desired line return locations.

Note: The designed process should interpret control characters as above example when displays a song-name list.

10.1.1.4.Composer

This defines the name of the composer of the original song.

Separate the first name and last name with a single-byte space “ ”.

If there are two or more names, separate them with a single-byte slash “/”.

Uses Zen-kaku (2-byte characters) when put in alphabet.

For search, put yomigana (pronunciation guides) by the side with Zen-kaku Hiragana (2-byte hiragana characters) with using single-byte parenthesis, “(” and “)”

Do not use Katakana for pronunciation guides.

Put Yomigana for each composer names when there are two or more names are written.

10.1.1.5.Lyricist

This defines the name of the lyricist if the original song has lyrics,

The format is the same as for the Composer.

10.1.1.6.Arranger

This defines the name of the person who arranged the original song or the song data.

The format is the same as for the Composer.

10.1.1.7.Performer (performer/singer)

This defines the name of the person or group performing or singing the original song.

The format is the same as for the Composer.

10.1.1.8.Programmer

This defines the name of the person who produced the song data.

The format is the same as for the Composer.