

# Ringling Melody Authoring Guidelines

for

MA-2 Authoring Tool ATS-MA2-SMAF

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< Revision history >

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1.0.0	2002/12/16	Newly release.

## 1 Overview

This document defines guidelines for using the ATS-MA2-SMAF to create ringing melody content for the MA2.

## 2 Cautions for SMF (Standard MIDI File) creation

### 2.1 SMF format

About conversion from SMF to ringing melody format, only SMF Format 0 can be used. Please save file as SMF Format 0 after editing by the general sequencer.

### 2.2 Polyphony

A maximum of 16 notes can be sounded. (When all voices used are 2-operator.)  
If 4-operator voices are used the polyphony will decrease.

### 2.3 MIDI channel which can be used.

Any channel among MIDI 16 channels can be used.

### 2.4 Tempo

Tempo, designated by the SMF, is reflected.  
Tempo cannot be changed once the data is converted into the ringing melody contents for MA-2.  
If Tempo was not designated, a quarter note is interpreted as “120”.  
Tempo can be changed during the music play.

## 3 MIDI events to use

MIDI events other than the following cannot be used. A warning will be issued if this is done.  
Some events must be designated.

### 3.1 Channel Reserve **0xBn 0x37(55) ss**

n :	MIDI channel	0~15
ss :	Number of MA2 channels to reserve	

This MIDI event must be designated.

Use control change 55.

This is a control message specific to the ATS-MA2-SMAF. Its significance differs between a normal channel (BankSelectMSB=0x7A) and a drum channel (BankSelectMSB=0x7B).

Location for insertion: Insert at the beginning (1:1:0) of each MIDI channel.

A warning will be issued if this message is not present for a MIDI channel that is used.

In the case of a normal channel, this specifies the number of MA2 channels to be allocated. In most cases, this value will be the maximum number of the notes simultaneously played on that MIDI channel.

When a number over the maximum number of the notes simultaneously played on that channel is set, voices with long release can be used.

Use this function when sustaining a release for long time. This function is disabled when voices with short release is used.

If <number of MA2 channels to reserve> is set to 1, it will operate in monophonic mode. Thus, slurs are possible. If this is set to 2 or higher, it will operate in polyphonic mode, and slurs will not be possible.

If <number of MA2 channels to reserve> is set to 0, this MIDI channel is ignored.

(Example) To allocate four MA2 channels on MIDI channel 1, the command would be 0xB0 0x37 0x04.

In the case of a drum channel, this will be the number of voices used on that MIDI channel; i.e., this indicates the type of note.

(Example) If you wish to use the four types of voices, Bass Drum L (Note#33), Snare H (Note#40), Hi-Hat Closed (Note#42), and Hi-Hat Open (Note#46) on a certain drum channel, you would set this to ss=4.

Designate 4 even if these voices will not be played simultaneously.

When the number of channels to reserve for drum channel that has been set to a proper value is converted, an error message “Channel Reserve should be xx” appears, showing the value to be set. Then, designate the value.

### 3.2 BankSelectMSB 0xBn 0x00 aa

### 3.3 BankSelectLSB 0xBn 0x20 bb

N :	MIDI channel	0~15
aa :	Bank number MSB	122 or 123
bb :	Bank number LSB	0~9

These MIDI events must be designated.

Set aa and bb to the bank number for the voice to be used.

BankSelectMSB and BankSelectLSB are used as a pair, and after them you must also designate the ProgramChange described below.

Normal voice banks are designated by BankSelectMSB=0x7A (122) and BankSelectLSB=0x00~0x09.

The drum voice (drum kit) bank is designated by BankSelectMSB=0x7B (123) and BankSelectLSB=0x00.

A warning will be issued if banks other than above are designated.

By default, BankSelectMSB=0x7A and BankSelectLSB=0x00 for MIDI channels 1~9 (n=0~8) and 11~16 (n=10~15).

For MIDI channel 10 (n=9), the default is BankSelectMSB=0x7B and BankSelectLSB=0x00.

### 3.4 ProgramChange 0xCn pp

n :	MIDI channel	0~15
pp :		0~127
For a normal channel (BankSelectMSB=0x7A, BankSelectLSB=0~9)		
pp :		0~9
For a drum channel (BankSelectMSB=0x7B, BankSelectLSB=0)		

This MIDI event must be designated.

Designate the program number in pp. For a drum channel, this indicates the drum kit number.

ProgramChange must be inserted after BankSelect at the beginning of each channel.

ProgramChange messages during the song are not accepted while that channel is sounding, so make sure that the sound has ended before inserting them.

During a song, program changes for a normal channel (BankSelectMSB=122) have the limitation that the number of operators must be the same for the previous and the next voice. If these differ, a warning will be issued.

4-operator voice -> 2-operator voice Prohibited.

2-operator voice -> 4-operator voice Prohibited.

4-operator voice -> 4-operator voice OK.

2-operator voice -> 2-operator voice OK.

Program changes during a song are prohibited for a MIDI channel that uses BankSelectMSB=123 (i.e., drum kit).

### 3.5 Channel Volume 0xBn 0x07 vv

n :	MIDI channel	0~15
vv :	Volume	0x0~0x7f (0~127)

Use control change 7.

This specifies the volume for each channel.

You can designate a value of 0~127, but there are ranges in which the volume does not change.

For example the volume does not change for vv=0~3.

Refer to the following table when designating the value.

vv	Volume (dB)	vv	Volume (dB)
0~3	- ∞	64~67	- 11.11
4~7	- 47.95	68~71	- 10.10
8~11	- 42.49	72~75	- 9.14
12~15	- 37.10	76~79	- 8.25
16~19	- 33.00	80~83	- 7.38
20~23	- 29.67	84~87	- 6.56
24~27	- 26.91	88~91	- 5.79
28~31	- 24.49	92~95	- 5.04
32~35	- 22.38	96~99	- 4.34 (default)
36~39	- 20.51	100~103	- 3.63
40~43	- 18.82	104~107	- 2.98
44~47	- 17.27	108~111	- 2.34
48~51	- 15.84	112~115	- 1.71
52~55	- 14.53	116~119	- 1.13
56~59	- 13.31	120~123	- 0.56
60~63	- 12.19	124~127	0

### 3.6 Modulation (Vibrato) 0xBn 0x01 vv

n :	MIDI channel	0~15
vv :	Vibrato depth	0x0~0x7f (0~127)

Use control change 1.

Designate the vibrato depth for each channel.

You can designate a value of 0~127, but the MA2 internally recognizes only five levels.

vv	Function
0	Turn vibrato off for all operators.
1~31	Vibrato will be as designated by the sound.
32~63	Add +1 to the VibratoDVB value of the sound.
64~95	Add +2 to the VibratoDVB value of the sound.
96~127	Add +3 to the VibratoDVB value of the sound.

If adding to the DVB value would cause DVB to exceed +3, the result will be +3.

VibratoDVB value is a value that means the depth of Vibrato of voice parameter.

Vibrato is effective on some voices and is not effective on the other voices. Note that designating modulation for voices to which vibrato is not effective is invalid.

### 3.7 Channel Pan

**0xBn 0x0A vv**

n : MIDI channel 0~15  
 vv : Pan location 0~127

Use control change 10.

Designate the pan for each channel. It can be used during music. Moreover, it can be used also during Note-on.

Center is 0x40 (64).

vv	Pan Lch (dB)	Pan Rch (dB)	vv	Pan Lch (dB)	Pan Rch (dB)
0	0	- ∞	58~ 70	- 3.0	- 3.0
1	0	- ∞	71	- 4.5	- 3.0
2	0	- 37.5	72~80	- 4.5	- 1.5
3	0	- 31.5	81~88	- 6.0	- 1.5
4	0	- 28.5	89~94	- 7.5	- 1.5
5	0	- 25.5	95	-7.5	0
6	0	- 24.0	96~100	- 9.0	0
7	0	- 22.5	101~104	-10.5	0
8	0	- 21.0	105~108	-12.0	0
9~10	0	- 19.5	109~111	-13.5	0
11~12	0	- 18.0	112~113	-15.0	0
13~14	0	- 16.5	114~115	-16.5	0
15~16	0	- 15.0	116~117	-18.0	0
17~19	0	- 13.5	118~119	-19.5	0
20~23	0	- 12.0	120	-21.0	0
24~27	0	- 10.5	121	-22.5	0
28~32	0	- 9.0	122	-24.0	0
33	0	- 7.5	123	-25.5	0
34~39	- 1.5	- 7.5	124	-28.5	0
40~47	- 1.5	- 6.0	125	-31.5	0
48~56	- 1.5	- 4.5	126	-37.5	0
57	- 3.0	- 4.5	127	- ∞	0

### 3.8 NoteOff

#### 0x8n kk vv

n :	MIDI channel	0~15
kk :	Note number for normal voice	13~108
	Note number for drum voice	13~91
	Note number for ADPCM voice	0~12, 92~127
vv :	Note-off velocity	Ignored.

This MIDI event must be designated.

### 3.9 NoteOn

#### 0x9n kk vv

n :	MIDI channel	0~15
kk :	Note number for normal voice	13~108
	Note number for drum voice	13~91
	Note number for ADPCM voice	0~12, 92~127
vv :	Note-on velocity	1~127 (However, it is ignored in ADPCM part.)
	Note-off	0 (in ADPCM part also.)

This MIDI event must be designated.

Velocity values 1~127 are converted into Expression control messages, and inserted in front of the note message.

However, in the ADPCM part, velocity value 1 ~ 127 is ignored and it is pronounced with certain volume.

If you vary the velocity for each note, a large amount of Expression data will be generated, increasing the file size.

Be aware of this when creating data. Velocity 0 is interpreted as Note-off. In ADPCM part also, Velocity 0 means Note-off.

Velocity is converted into Expression messages that indicate the Volume (dB) as shown in the following table. If there is no change in the converted volume values, expression messages will not be generated. For example, vv=1~3 will not change the Volume.

vv	Volume (dB)	vv	Volume (dB)
1~3	- ∞	64~67	- 11.11
4~7	- 47.95	68~71	- 10.10
8~11	- 42.49	72~75	- 9.14
12~15	- 37.10	76~79	- 8.25
16~19	- 33.00	80~83	- 7.38
20~23	- 29.67	84~87	- 6.56
24~27	- 26.91	88~91	- 5.79
28~31	- 24.49	92~95	- 5.04
32~35	- 22.38	96~99	- 4.34
36~39	- 20.51	100~103	- 3.63
40~43	- 18.82	104~107	- 2.98
44~47	- 17.27	108~111	- 2.34
48~51	- 15.84	112~115	- 1.71
52~55	- 14.53	116~119	- 1.13
56~59	- 13.31	120~123	- 0.56
60~63	- 12.19	124~127	0

#### NoteOn designation of Velocity:

When the Velocity value of note on at the beginning of music is small, a sound like click may be



attached to the attack section. This occurs because it takes long time for the volume to change from default Expression value of MA-2, 127, to smaller Expression. To prevent this, make Velocity larger. When making Velocity smaller and then designating larger Velocity, the tone of attack section of the sound may be changed. This also occurs because the volume change take long time. Avoid changing the volume of Velocity rapidly.

### 3.10 DataEntry(MSB) 0xBn 0x06 vv

n :	MIDI channel	0~15
vv :	Control value	0~24

Use control change 6.

Only RPN(0:0) bend sensitivity is supported.

This specifies the maximum bend value (absolute value).

Default: 2

### 3.11 DataEntry(LSB) 0xBn 0x26 vv

n :	MIDI channel	0~15
vv:	Control value	0~127

Use control change 38.

Only RPN(0:0) bend sensitivity is supported.

However, since bend sensitivity is set up only by vv of DataEntry (MSB), it is not necessary to designate this event.

Even if this event is designated, it is ignored.

### 3.12 RPN(MSB) 0xBn 0x65 vv

### 3.13 RPN(LSB) 0xBn 0x64 vv

n :	MIDI channel	0~15
-----	--------------	------

Use control change 101, 100.

Only RPN(0:0) bend sensitivity is supported.

vv : Control value 0

ww : Control value 0

Designate this message by the set (MSB, LSB) before using DataEntry.

### 3.14 Pitch Bend 0xEn ll mm

n :	MIDI channel	0~15
ll :	Bend value LSB	
mm :	Bend value MSB	

The change width of pitch bend is designated by DataEntry(MSB). Please be aware that using this message significantly increases the size of the data generated by Pitch Bend. Especially if ChannelReserve is set to 2 or larger, pitch bend data for the channels that don't require pitch bend will also be inserted; and thus the data size becomes far larger than expected.

### 3.15 Set Tempo ( Meta Event ) 0xFF 0x51 0x03 aa bb cc

aa bb cc	Length of a quarter note (μsec)
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Tempo changes during the song are also supported.

### 3.16 Text ( Meta Event ) 0xFF 0x01 len text

Len : Number of bytes of text (variable length expression)

By describing the XF information header (see <APPENDIX>) using this meta-event, you can input the song name, composer, lyricist, arranger, and performer/singer.

**However, usually, mobile terminal do not recognize the control symbols such as ”(“, “[“, and “/” defined by the XF information header. If these symbols are included, they will be displayed as plain characters.**

### 3.17 Cue Point (Meta Event ) 0xFF 0x07 0x05 0x53 0x54 0x41 0x52 0x54 (START)

### 3.18 Cue Point (Meta Event ) 0xFF 0x07 0x04 0x53 0x54 0x4F 0x50 (STOP)

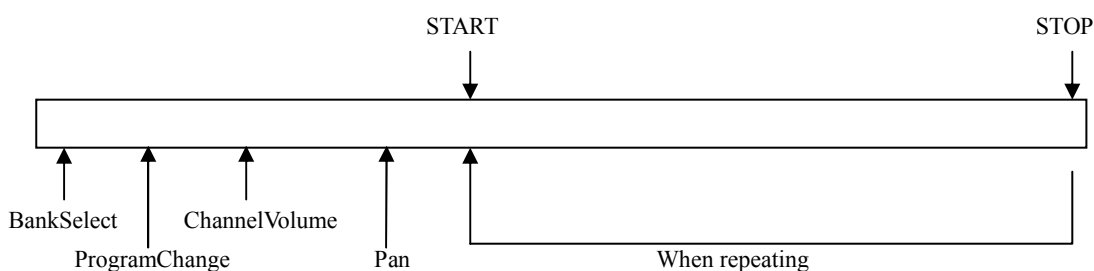
Designate the starting location and the ending location of the playback as Cue Point meta-events.

Bytes 4~8 of START (0x53 0x54 0x 41 0x52 0x54 ) signify "START" in ASCII.

Bytes 4~7 of STOP (0x53 0x54 0x 4F 0x50 ) signify "STOP" in ASCII.

Use START and STOP that consist only of capital letters.

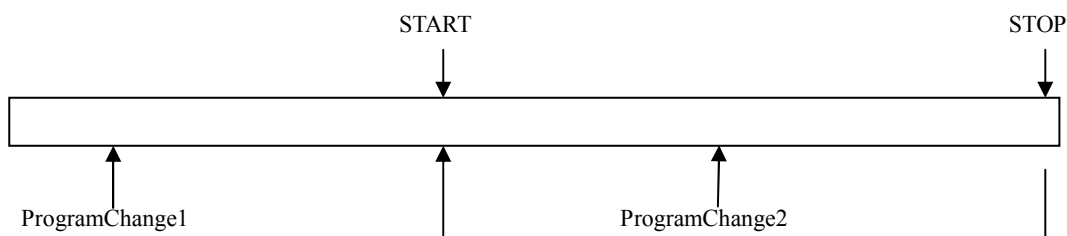
START must be inserted at the same point as the first Note-on or before it, and STOP must be inserted at the same point as the last Note-off or after it.



As described above, the play returns from STOP point to START point when repeating. Therefore, control data such as ProgramChange, ChannelVolume or Pan is inserted before the START point is not executed.

The state at repeating can be made the same as that of the initial replay by setting a control message after START or by setting these control data before STOP.

For example, when ProgramChange 2 is executed during a play as shown below, the voice changes to the one corresponding to ProgramChange 2. However, the voice of ProgramChange 2 is used for replaying when the play returns to START point due to a repeat. But, the voice of ProgramChange 1 has to be used in the period from START point to ProgramChange 2. In this case, insert ProgramChange 1 immediately before STOP point.



When finishing up a music, input a message so that the first replay becomes completely the same as the second replay by performing repeat replay.

## 4 Limitations

### 4.1 TimeBase

The time base is selected from the operating panel of the ATS-MA2-SMAF. One of 4ms, 5ms, 10ms, and 20ms can be designated. Setting the time base to a small value will allow note timing to be designated in greater detail, but has the disadvantage that the amount of data will increase.

The default time base on the ATS-MA2-SMAF is 4 ms.

### 4.2 GateTime

The interval between note-on and note-off is called the gate time. The gate time is expressed by a value in the range of 1~16511. The actual gate time will be this time multiplied by the Time Base value. With the default time base value of 4 ms, a maximum of 66.044 seconds can be expressed. This is the same for ADPCM. An ADPCM waveform data of 66.044 seconds is 264 kbytes at 8 kHz, or 132 kbytes at 4 kHz.

## 5 Musical expression on the MA2

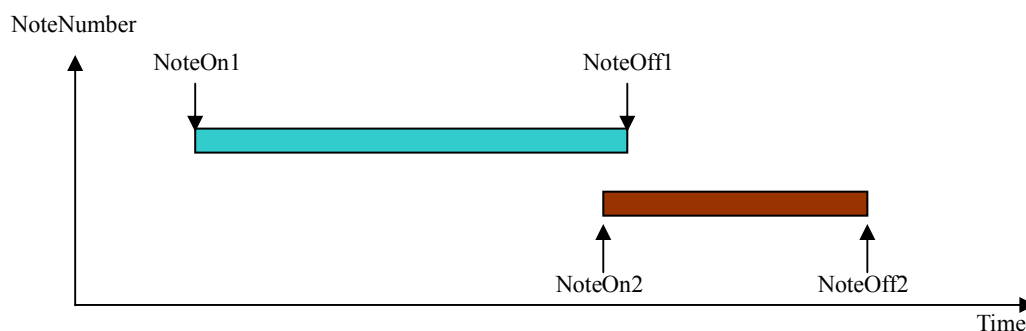
### 5.1 Slur

This is possible only in monophonic mode. Monophonic mode is selected by setting ChannelReserve to 1.

Designate a note-on for a different note before designating note-off for the previous note.

The overlap time is a length corresponding to at least 1 GateTime. Refer to appendix 8.2.

For a drum channel slur cannot be expressed because changing the notes means changing the voices on a drum channel.



## 6 ADPCM

There are restrictions applied only to ADPCM. Refer to 6.4 Time limit between events.

### 6.1 Note-on, Note-off

Use the voice editor (MA2 Voice Library dialog) to designate the ADPCM data that will be assigned to drum bank note numbers 0~12 and 92~127.

For the designated note number, use Note-on and Note-off to play the ADPCM. It can be played with the same method as for the drum channel. However, Note-on velocity value 1 ~ 127 is ignored and it is pronounced with certain volume. Note-on velocity 0 is interpreted as Note-off.

The gate time is limited as described earlier. When generating two or more tones, there is a limit for the time interval between a Note-off and the next Note-on. Designate TimeBase 2 or more.

### 6.2 Channel Volume (0xBn 0x07 vv)

Channel volume can be used. By using this, you can control the volume of the ADPCM channel. You can also change the volume during sounding.

When setting channel volume before Note-on message, set it at least 1 TimeBase before the message. When setting channel volumes consecutively, place 1 TimeBase between the settings.

When MIDI channels that use ADPCM are the same as MIDI channels that use FM drum voices, the channel volume takes effect on both tones. Therefore, for MIDI channels that uses ADPCM, it is recommended to use other MIDI channels than FM drum channels.

### 6.3 Sampling frequency

When using multiple ADPCM, you must unify the sampling frequency. All must be either 8 kHz or 4 kHz.

If these are not consistent, a warning will be issued.

### 6.4 Limit of time between events

This limit applies only to the case ADPCM is used. Take care about it only when using drum channel notes 0 to 12, and 92 to 127.

- The time interval between events is 1 TimeBase or longer.
- The first event is required to have interval 1 TimeBase or longer from the head position (1:1:0) of a music.
- Time interval of 2 TimeBase is required from Note-off to the next Note-on.
- Time interval of 2 TimeBase is also required from the last Note-off of a music to the first Note-on of the music. This is because the system interprets that the last moment of a music continues to the first moment of the music when performing repeat replay. Adjust the locations of START point and STOP point so that total of time intervals of "START to the first Note-on" and "last Note-off to STOP" becomes 2 TimeBase or more.
- Since the start point is also regarded as an event, channel volume or Note-on message cannot be placed at the time of START point.

(Example) When events are the head position (1:1:0) of a music and channel volume: 1 TimeBase or more is required.

When events are the head position (1:1:0) of a music and Note-on: 1 TimeBase or more is required.

When events are channel volume and Note-on: 1 TimeBase or more is required.

When events are note and channel volume: 1 TimeBase or more is required.

When events are channel volume and channel volume: 2 TimeBase or more is required.

When events are Note-off and Note-on: 2 TimeBase or more is required.

When events are the last Note-off of a music and the first Note-on of the music:2 TimeBase or more is required.

When events are start point and channel volume or Note-on: 2 TimeBase or more is required.

## 7 Caution

### 7.1 Caution at a program change

---

If the release of a previously-silenced note still remains when a program change occurs, unintended sound may be heard. In this case, insert the program change after the release has decayed.

### 7.2 Consecutive similar events

---

Inserting messages such as channel volume, pan, modulation and program change consecutively into the same MIDI channel that is not generating tone not only takes no effect but also causes increase of data. Therefore, avoid inserting these events consecutively.

### 7.3 Caution at using Vibration synchronous function

---

When ATS-MA2-SMAF has the setting function of vibration synchronous channel and portable telephone also has the function of vibration synchronization, vibration can be synchronized with a specific channel.

Vibration works at the pronunciation (during Gatetime) of synchronous channel.

Select the channel from 1 ~ 12 which can be synchronized. For the detail, refer to ATS-MA2-SMAF users manual.

#### (Cautions on creation)

**1. When Gatetime of note of a synchronous channel is short, it may be unable to check the effect.**

**And, when the interval of notes is short, it may be unable to check the vibration stop.**

**These are based on the response property of vibrating motor. Setup the interval of notes and the length of Gatetime in consideration of them.**

**2. When there is no note for a long time, it does not vibrate in the meantime. In this case, the original purpose of telephone calling can not be performed. Be sure to choose the channel in which the note exists constantly as the whole music.**

**3. When the note, which uses Pitch Bend in the synchronous channel of Vibration, exists, Vibration does not work to that note. We recommend not using the Pitch Bend in the synchronous channel.**

**4. When either of channel 9, 10, 11, 12, or 9-12 is selected for vibration control, vibration may not work as expected. This occurs when more than 4 operator voice is used at 4 channels. In this instance, select either 1, 2, 3 or 4 for vibration control, or only use 4 operator voice equal or less than 3 channels.**

### 7.4 Caution at using LED synchronous function

---

When ATS-MA2-SMAF has the setting function of LED synchronous channel and portable telephone also has the function of LED synchronization, LED can be synchronized with a specific channel.

LED lights at the pronunciation (during Gatetime) of synchronous channel.

Select the channel from 1 ~ 12 and ADPCM channel which can be synchronized. For the detail, refer to ATS-MA2-SMAF users manual.

#### (Cautions on creation)

**When there is no note for a long time, LED does not light in the meantime. Be sure to choose the channel in which the note exists constantly as the whole music.**

**When the note, which uses Pitch Bend in the synchronous channel, exists, LED does not light and not blink to that note. We recommend not using the Pitch Bend in the synchronous channel.**

## 7.5 Caution to use 4 operator voice

---

Only when GrandPiano (4 operators) BankSelectMSB122, BankSelectLSB 1 or ProgramChange 1, other part may not played back properly or noise may be mixed. In this case, copy GrandPiano at other than Program change 1 of user bank. Similar problem may occur when program change 1 is used at user bank. Don't use 4 operator voice at ProgramChange1.

When 4 operator voice is required to use at ProgramChange 1, meet both of followings:

1. Insert the first ProgramChange of all the parts into the head of music (before START point)
2. Make the total number of channels using 2 operator voices to an even number.

## 8 APPENDIX

### 8.1 XF information header (language specific)

Information or attributes of a song can be expressed as text meta-events within the SMF format.

0xFF 0x01 len <text>

Separate each item of information with a colon ":" and give the items successively.

Do not input anything for information items that are not listed.

Add new items after the last item. If there is no more text when the data is processed, subsequent data items will be considered blank even if no colons are found.

ASCII is used to express Items 1) and 2), and control characters.

<Information items>

- 1) XF Information Header – Language Specific -- ID XF Information Header (Language specific) ID  
XF Information Header – Four-character ID of "XFln" indicates Language Specific.

- 2) Language

This data specifies the character code set used in the XF information header. This does not designate the character code set used for the lyrics. The character code set of the lyrics is designated by the XF lyric header. It does not indicate the country where the song was produced.

The authoring tool supports only the following languages.

Symbol	Character code	Supported languages
L1	Latin 1(ASCII(7bit) + ISO 8859-1)	English, French, German, Italian, Spanish, Portuguese, etc.
JP	Shift-JIS	Japanese
KR	EUC-KR	Korean
HZ	HZ-GB-2312	Chinese (simplified)
B5	Big5	Chinese (traditional)
CY	KOI8-R	Russian, etc.
VN	TCVN-5773:1993	Vietnamese

- 3) Song Name

Language-specific display for the song name.

If you wish to display the song name in multiple lines, insert a single-byte slash "/" where you wish to change lines.

- 4) Composer

The composer of the original song. Use a single-byte space " " to separate the last name and first name. If listing more than one, use a single-byte slash "/" to divide entries.

- 5) Lyricist

If the original song has lyrics, this is the name of the lyricist.

The format is the same as for the composer.

- 6) Arranger

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

The format is the same as for the composer.

- 7) Performer (or singer)

The name of the person or group who performed or sang the original song.



The format is the same as for the composer.

#### 8) Programmer (music data producer)

The name of the person who produced the music data.

The format is the same as for the composer.

**Note: However, usually mobile terminal do not recognize the control symbols such as “(”, “[”, and “/” defined by the XF information header. If these symbols are included, they will be displayed as plain characters.**

## 8.2 Number of ticks per TimeBase

The number of ticks of MIDI sequencer in one TimeBase of SMAF data are shown below.

These values depend on the TimeBase value and the Tempo value.

When the setup of MIDI sequencer is “quarter note =480 ticks”, this table can be used as it is.

TimeBase	Tempo	Tick	TimeBase	Tempo	Tick
4	20	1	5	20	1
4	30	1	5	30	2
4	40	2	5	40	2
4	50	2	5	50	2
4	60	2	5	60	3
4	70	3	5	70	3
4	80	3	5	80	4
4	90	3	5	90	4
4	100	4	5	100	4
4	110	4	5	110	5
4	120	4	5	120	5
4	130	5	5	130	6
4	140	5	5	140	6
4	150	5	5	150	6
4	160	6	5	160	7
4	170	6	5	170	7
4	180	6	5	180	8
4	190	7	5	190	8
4	200	7	5	200	8

TimeBase	Tempo	Tick	TimeBase	Tempo	Tick
10	20	2	20	20	4
10	30	3	20	30	5
10	40	4	20	40	7
10	50	4	20	50	8
10	60	5	20	60	10
10	70	6	20	70	12
10	80	7	20	80	13
10	90	8	20	90	15
10	100	8	20	100	16
10	110	9	20	110	18
10	120	10	20	120	20
10	130	11	20	130	21
10	140	12	20	140	23
10	150	12	20	150	24
10	160	13	20	160	26
10	170	14	20	170	28
10	180	15	20	180	29
10	190	16	20	190	31
10	200	16	20	200	32

### 8.3 Normal voice list

BankSelectMSB: 122

BankSelectLSB: 0 --- 2 operator voice

BankSelectLSB: 1 --- 4 operator voice

PC#(Program Change number) 1 ~ 128

BankSelectMSB 122 BankSelectLSB 0,1		BankSelectMSB 122 BankSelectLSB 0,1		BankSelectMSB 122 BankSelectLSB 0,1	
PC#	Name	PC#	Name	PC#	Name
1	GrandPno	51	Syn.Str1	101	Bright
2	BritePno	52	Syn.Str2	102	Goblins
3	E.GrandP	53	ChoirAah	103	Echoes
4	HnkyTonk	54	VoiceOoh	104	Sci-Fi
5	E.Piano1	55	SynVoice	105	Sitar
6	E.Piano2	56	Orch.Hit	106	Banjo
7	Harpsi	57	Trumpet	107	Shamisen
8	Clavi	58	Trombone	108	Koto
9	Celesta	59	Tuba	109	Kalimba
10	Glocken	60	Mute.Trp	110	Bagpipe
11	MusicBox	61	Fr.Horn	111	Fiddle
12	Vibes	62	BrasSect	112	Shanai
13	Marimba	63	SynBras1	113	TnklBell
14	Xylophon	64	SynBras2	114	Agogo
15	TubulBel	65	SprnoSax	115	SteelDrm
16	Dulcimer	66	AltoSax	116	WoodBlok
17	DrawOrgn	67	TenorSax	117	TaikoDrm
18	PercOrgn	68	Bari.Sax	118	MelodTom
19	RockOrgn	69	Oboe	119	Syn.Drum
20	ChrchOrg	70	Eng.Horn	120	RevCymbl
21	ReedOrgn	71	Bassoon	121	FretNoiz
22	Acordion	72	Clarinet	122	BrthNoiz
23	Harmnica	73	Piccolo	123	Seashore
24	TangoAcid	74	Flute	124	Tweet
25	NylonGtr	75	Recorder	125	Telephone
26	SteelGtr	76	PanFlute	126	Helicptr
27	JazzGtr	77	Bottle	127	Applause
28	CleanGtr	78	Shakhchi	128	Gunshot
29	Mute.Gtr	79	Whistle		
30	Ovrdrive	80	Ocarina		
31	Dist.Gtr	81	SquareLd		
32	GtrHarmo	82	Saw.Lead		
33	Aco.Bass	83	CaliopLd		
34	FngrBass	84	ChiffLd		
35	PickBass	85	CharanLd		
36	Fretless	86	VoiceLd		
37	SlapBas1	87	FifthLd		
38	SlapBas2	88	Bass&Ld		
39	SynBass1	89	NewAgePd		
40	SynBass2	90	WarmPad		
41	Violin	91	PolySyPd		
42	Viola	92	ChoirPad		
43	Cello	93	BowedPad		
44	Contrabs	94	MetalPad		
45	Trem.Str	95	HaloPad		
46	Pizz.Str	96	SweepPad		
47	Harp	97	Rain		
48	Timpani	98	SoundTrk		
49	Strings1	99	Crystal		
50	Strings2	100	Atmosphr		

## 8.4 Drum voice list

BankSelectMSB: 123

BankSelectLSB: 0

ProgramChange: 1 --- 2 operator voice

ProgramChange: 2 --- 4 operator voice

NOTE# is Note number. (indicated as a numeric value which begins from 0.)

BankSelectMSB : 123		BankSelectMSB : 123	
BankSelectLSB : 0		BankSelectLSB : 0	
ProgramChange : 1,2		ProgramChange : 1,2	
NOTE#	Name	NOTE#	Name
24	SeqClick H	55	Splash Cymbal
25	Brush Tap	56	Cowbell
26	Brush Swirl L	57	Crash Cymbal 2
27	Brush Slap	58	Vibraslap
28	Brush Swirl H	59	Ride Cymbal 2
29	Snare Roll	60	Bongo H
30	Castanet	61	Bongo L
31	Snare L	62	Conga H Mute
32	Sticks	63	Conga H Open
33	Bass Drum L	64	Conga L
34	Open Rim Shot	65	Timbale H
35	Bass Drum M	66	Timbale L
36	Bass Drum H	67	Agogo H
37	Closed Rim Shot	68	Agogo L
38	Snare M	69	Cabasa
39	Hand Clap	70	Maracas
40	Snare H	71	Samba Whistle H
41	Floor Tom L	72	Samba Whistle L
42	Hi-Hat Closed	73	Guiro Short
43	Floor Tom H	74	Guiro Long
44	Hi-Hat Pedal	75	Claves
45	Low Tom	76	Wood Block H
46	Hi-Hat Open	77	Wood Block L
47	Mid Tom L	78	Cuica Mute
48	Mid Tom H	79	Cuica Open
49	Crash Cymbal 1	80	Triangle Mute
50	High Tom	81	Triangle Open
51	Ride Cymbal 1	82	Shaker
52	Chinese Cymbal	83	Jingle Bell
53	Ride Cymbal Cup	84	Belltree
54	Tambourine		