

Ringling Melody Authoring Guidelines

for

SMAF Authoring Tool ATS-SMAFPhraseL1

Ver. 1.0.0

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Yamaha Corporation

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1.0.0	2003/03/20	Newly release.

1 Overview

This document defines guidelines for using the ATS-SMAFPHRASEL1 to create SMAF/Phrase content.

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 4 tones can be sounded simultaneously. Even when 2-operator voices and 4-operator voices are mixed, the maximum of 4 tones can be sounded.

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-SMAFPhraseL1. 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 designates 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	16~91
	Note number for UserEvent	0~15
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	16~91
	Note number for UserEvent	0~15
vv :	Note-on velocity	1~127
	Note-off	0

This MIDI event must be designated.

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

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 converted into 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, 127, to smaller Expression according to the synthesizer hardware. 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 designates 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.

Don't set NoteOn immediately after a pitch bend (0 TimeBase). Be sure to set it more than 1 TimeBase backward or move it after NoteOff.

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

aa bb cc	Length of a quarter note (μsec)
----------	---------------------------------

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)

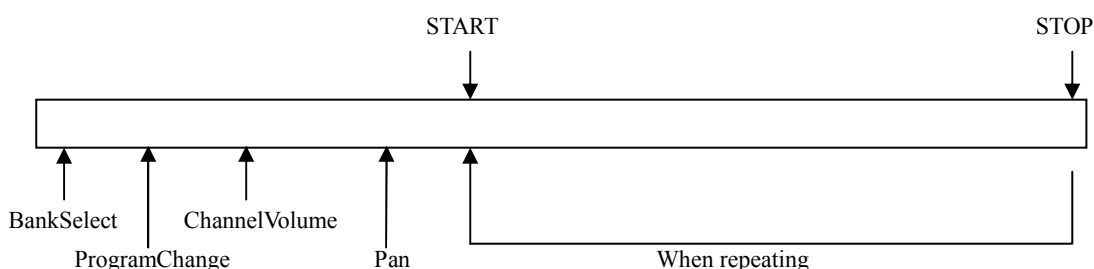
Designate the starting location and the ending location of the playback as Cue Point meta-events.

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.

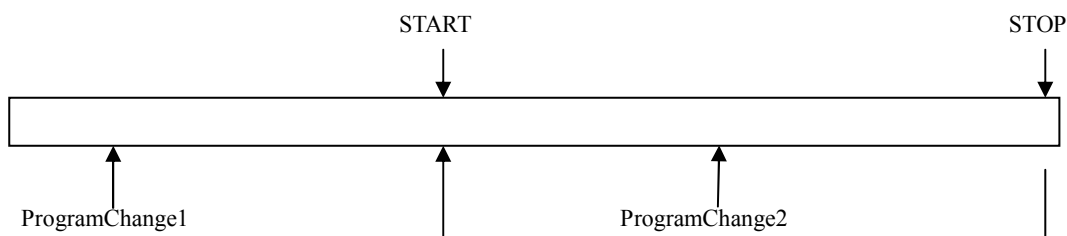
START must be inserted at the same point as the first Note-on or before it, and STOP must be inserted at the same point as the last Note-off or after it.



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 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. Since Time Base value is 20msec, the maximum of gate time is 330.220 seconds.

5 Musical expression on the MA2

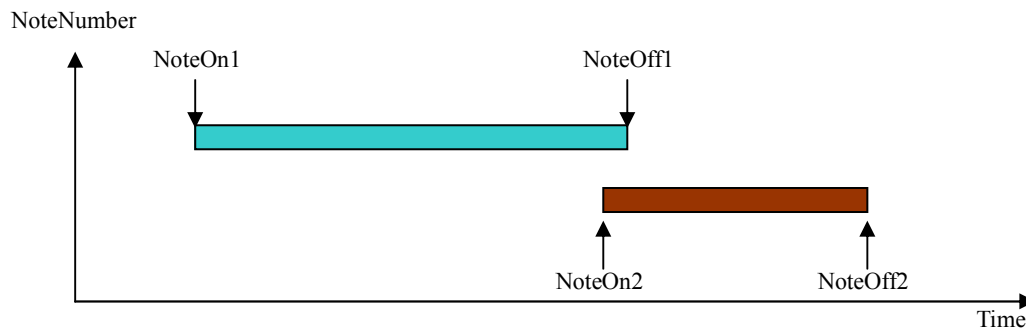
5.1 Slur

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 UserEvent

UserEvent is to acquire the call-back event which synchronizes with SMAF Phrase playback.

6.1 NoteOn and NoteOff

Designate Note number of drum bank in the range from 0 to 15.

UserEvent is inserted in the place of NoteOn. Note numbers from 0 to 15 correspond to UserEvents 0 to 15 respectively.

The time of NoteOff is not affected. When inputting it, use the length approximately equal to that of eighth note or sixteenth note. UserEvents 0 to 15 cannot be made NoteOn at the same time.

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 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 Differences from ATS-MA2 with respect to the creating

8.1 Limitation on the number of channels and voices that can be used

The maximum number of channels that can be used is four, and the maximum number of tones that can be used is also four, without regard to the number of operator tones, four or two.

8.2 Limitation on TimeBase

TimeBase is fixed to 20ms. (For ATS-MA2, it can be set to 4, 5, 10 or 20ms.)

8.3 The channel which synchronizes with Vibration or LED

Vibration or LED synchronous channel cannot be set.

8.4 Limitation on Drum channel

According to the UserEvent input, the usable minimum of NOTE for drum channel has been changed from 13 to 16. Note that preset tone uses the note range of 24 to 84 and User tone is affected by it.

8.5 UserEvent

For SMAF/Phrase, ADPCM cannot be used. Instead, UserEvent can be used.

9 APPENDIX

9.1 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.

9.2 No. 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
20	20	4
20	30	5
20	40	7
20	50	8
20	60	10
20	70	12
20	80	13
20	90	15
20	100	16
20	110	18
20	120	20
20	130	21
20	140	23
20	150	24
20	160	26
20	170	28
20	180	29
20	190	31
20	200	32