

# SMF to SMAF Converter for MA-1 User's Manual

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Yamaha Corporation

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# 1 Outline

This document is an user's manual for SMF to SMAF converter for MA-1

This tool is an application software for conversion of SMF into SMAF for terminals equipped with MA-1. The SMAF, a conversion of SMF, can be played on the terminal models equipped with YAMAHA LSI MA-1 (YMU757)

## 1.1 Outline of functions

- Format conversion function: Can load SMF files and save them in SMAF files.
- Music information edition function: music information can be edited through dialog box. The music information in this document means the following information that can be saved in Contents Info Chunk.  
Copy Status, vendor name, carrier name, category name, title of music, artist's name, composer, arranger, Copyright(c), date of creation, date of update
- Music information initialization file: Default music information can be set by using music information initialization file.
- File size check function: Size of SMAF files after conversion can be confirmed. The size of MA-1 files when converting SMAF files into MA-1 files (type of files that can be interpreted by MA-1 directly) can also be confirmed.
- Log: The results of conversion can be recorded in the log file.

## 2 Operating environment

### 2.1 Matching personal computer

IBM PC/AT compatible machines

### 2.2 OS (Operating System)

Microsoft Windows 98 / 98SE / Me

### 3 Files to be handled

This tool is able to handle the following types of files.

Type of file	File name and extension	I/O	Contents
Standard MIDI file	*.mid	Input	Data including score of source of conversion
SMAF files	*.mmf	Output	Data of format of SMAF converted
Music information initialization file	songinfo.dat	Input	Text file in which default value of music information is described. This file exists in the same file as execution file.
Log file	SscMA-1.log	Output	Text file in which the results of conversion are recorded. The file is opened in addition mode and log is added.

### 4 How to use conversion tool

#### 4.1 Setting up

Copy an execution file "SscMA-1.exe" to an arbitrary directory.

#### 4.2 Starting up

Double-click on the execution file or select "Run" to start up this tool and the application window as shown in Figure 4 1 appears.

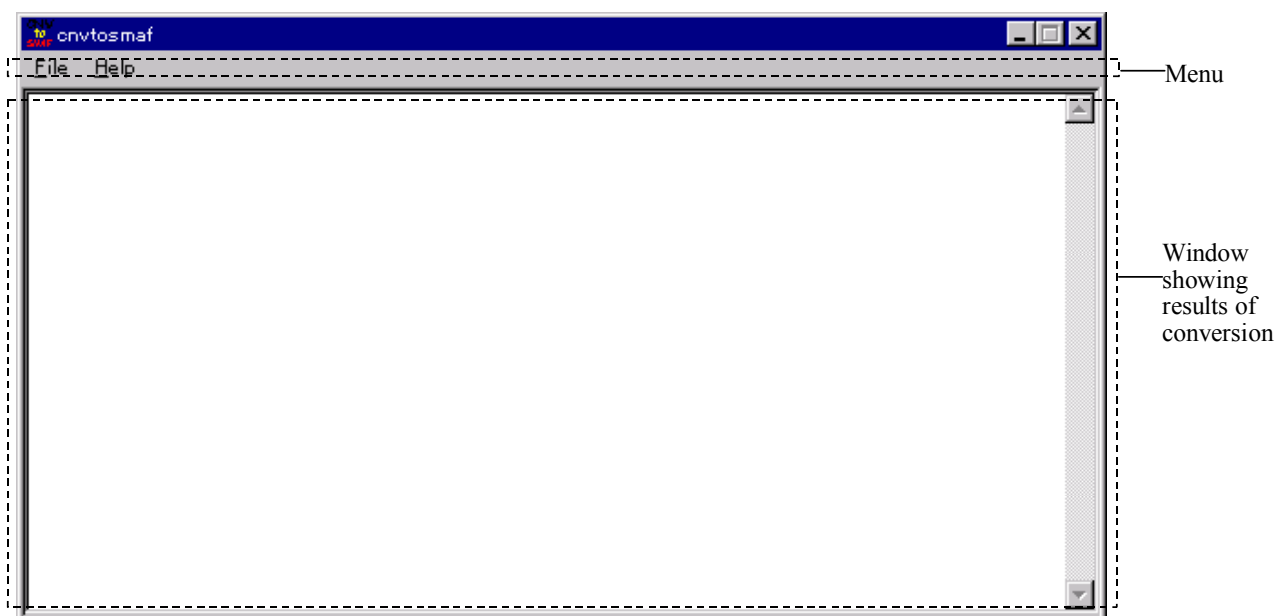


Figure 4 1 Starting up window

## 4.3 Conversion to SMAF

After starting up this tool, SMAF file can be created by going through the following steps.

- Reading SMF file
- Editing music information

Detailed procedure follows.

### 4.3.1 Reading SMF file

Select “File” and then “Convert” on the menu or drag and drop an SMF file onto this tool to designate an SMF file to be converted.

This tool opens the designated SMF file to perform processing as described below.

- Reads score data.
- Reads title, player / singer, writer, composer and arranger of XF Information \*1 to change the music information.
- Reads Copyright of meta event to change the music information.
- Transfers to edition of music information

\*1 For XF Information, refer to Appendix B.

### 4.3.2 Edition of music information

After an SMF file is read, a dialog box for edition of music information as shown in Figure 4 2 opens.

Information - D:\AutoringToolforMA1\tag\_test\Tag\_test.in.MID

ContentsType: Melody Save/OK Copy/OK OK Cancel

Vendor

Carrier

Category

Title

Artist

Lyricist

Composer

Arranger

Copyright(c)

Created Date

Updated Date

Load Option

Ch	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 4 2 Dialog box for edition of music information

The following items can be edited on this dialog box.

On dialog box	On SMAF 上	Value that can be inputted
Contents Type	(header section)	Only incoming melody can be inputted-
Copy Status	Copy Status	[Save:OK, Copy:OK],[Save:OK, Copy:No] or [Save:No, Copy:No] can be selected
Vendor	Vender name	Character string with 1024 characters or less
Carrier	Carrier name	Character string with 1024 characters or less
Category	Category name	Character string with 1024 characters or less
Title	Title	Character string with 1024 characters or less
Artist	Artist's name	Character string with 1024 characters or less
Lyricist	Writer	Character string with 1024 characters or less
Composer	Composer	Character string with 1024 characters or less
Arranger	Arranger	Character string with 1024 characters or less
Copyright(c)	Copyright(c)	Character string with 1024 characters or less
Creation date	Date of creation	Character string with 1024 characters or less
Update date	Date of update	Character string with 1024 characters or less

Table 4 1 music information

The dialog box for edition of music information dialog box have the following functions.

- The length of each item is to be as defined in Table 4 1 or less.
- As a load option, four channels out of 16 channels of SMF that are to be converted can be designated.

#### 4.3.3 Saving SMAF file

After edition of music information, SMAF file is saved automatically by using the file name of SMF file except that the extension is replaced by mmf.

#### 4.3.4 Display of results of conversion and log file

After each conversion, the following message is displayed on the conversion results display window in accordance with the results of conversion, and at the same time, it is added to log file. The log file is given the name "SscMA1.log" and is saved in the same directory as that of execution file of this tool.

IN:<tab><input-file name><tab>SMF size = <SMFSIZE>[byte]

OUT:<tab><output-file name><tab>SMAF size = <SMAFSIZE>[byte]<tab>MA-1 size = <MA-1SIZE>[byte]

<tab> represents tab code.

<input-file name> represents full path of SMF file of input.

<output-file name> represents full path of SMF file of output.

<SMFSIZE>, <SMAFSIZE> and <MA-1SIZE> contains the size of SMF file before conversion, size of SMAF file after conversion, and size of MA-1 file when SMAF file is converted to MA-1 file respectively.

For example, the following message is displayed on the conversion results display window and is added to the log file when an SMF file with the size of 1422 bytes and named "C:\testset1\ene\_tr5.mid" is converted into SMAF file with the size of 529 bytes.

IN: C:\testset1\ene\_tr5.mid SMF size = 1422 [bytes]

OUT: C:\testset1\ene\_tr5.mmf SMAF size = 529[ bytes] MA-1 size = 810 [bytes]

However, if a warning state or an error occurs at conversion, a warning message or error message is displayed. The next section details the messages.

**Note:** The log file is saved when it is written additionally. Therefore, when saving the information in a new file, make backup of the log file if it is needed and then delete the log file. When no log file exists, this tool makes a new file automatically.

#### 4.3.5 Error messages

When an error or warning state occurs at the conversion from SMF to SMAF, one of the following messages is displayed and is saved in the log file at the same time.

	Message	Meaning	Action to be taken
Error	"ERROR: The generated SMAF is not converted to the MA-1 format."	SMAF has been created by could not be converted into MA-1 format.	This tool may be faulty. Contact Yamaha.
	"ERROR: Could not read <input-file name>"	Reading of SMF file was unsuccessful.	Check the file name. Check if it is a normal SMF file.
	"ERROR: Could not save <output-file name>"	Writing of SMF file was unsuccessful.	Check the remaining space of disk. Check if it is write-protected.
Warning	"WARNING: MA-1 can not play one or more notes in the generated SMAF, because of 3 octaves."	The created SMAF file contains a note that cannot be generated by MA-1.	Adjust the notes at the stage of SMF so that they can be placed in the three octave range.

Table 4 3 Error and warning messages

#### 4.4 Ending

To end this tool, select "File" and then "Exit" or click "x" located on the upper right corner of the window.

## 5 Music information initialization file

The initial value of “Edition of music information” window that is displayed at the conversion can be set by using the text file provided by the user (file name is fixed to “songinfo.dat”). Use this function to eliminate the labor of inputting information such as copyright that are scarcely changed for individual music.

This file is called “Music information initialization file” in this document.

The music information initialization file consists of tag name that designates music information to be set and a line consisting of a value that follows the tag name.

For example, when making the title to be put in SMAF “これは曲名。(This is a title.)”, copyright indication “YAMAHA Corporation (C) 2000” and CopyStatus “Save:OK, Copy:OK”, and when a text file as shown below is provided with the file name of “songinfo.dat”, this tool reads the file automatically at starting up and uses it as a default for the conversion.

```
[ST]これは Title。
[CR]YAMAHA Corporation (C) 2000
[CS]0
```

The relationship between music information and tag name is as described in the following table. This table also presents default values that are used when there is no music information initialization file or no items are described although there is a music information initialization file.

SMAF		Music information initialization file		SMF
Item	Tag name	Tag name	Default value	meta event
Copy Status	—	[CS]	1([Save:OK, Copy:No])	—
Vender name	VN	[VN]	NULL	—
Carrier name	CN	[CN]	NULL	—
Category name	CA	[CA]	NULL	—
Title	ST	[ST]	NULL	XF InfoTitle
Artist's name	AN	[AN]	NULL	XF Infoplayer • singer
Writer	WW	[WW]	NULL	XF Infowriter
Composer	SW	[SW]	NULL	XF Infocomposer
Arranger	AW	[AW]	NULL	XF Infoarranger
Copyright(c)	CR	[CR]	NULL	Meta Event 02
Creation date	CD	[CD]	NULL	—
Update date	UD	[UD]	NULL	—

Table 5 1 Music information tag name

The name of music information initialization file must always be “songinfo.dat”, and it has to be present in the directory where the execution file of this tool is stored. This tool reads the music information initialization file that is present in the directory where the execution file of this tool is stored only once at the start up, and uses the contents as initial value of “Edition of music information” window.

This application follows the rules as described below when interpreting the contents written in the music information initialization file.

- Music information initialization file distinguishes between capital letters and small letters.
- The line of Copy Status is interpreted as a hexadecimal value that is represented with two or one ASCII characters.
- For all items except Copy Status, a line(s) of which the length of character string exceeds specified value is ignored.
- As defined in format, the order of individual information is not defined. It can be omitted.
- If there are two or more lines with the same tag, the first one is made valid.

The relationship between the value written in [CS] on music information initialization file and actual value of Contents Info Chunk of SMAF is as described below.

	Music information initialization file	SMAF
Copy Status[CS]	00	00(Save:OK, Copy:OK)
	01	01(Save:OK, Copy:No)
	02	03(Save:No, Copy:No)
	03 to FF	00(Save:OK, Copy:OK)

Table 5 2 Values to be set in [CS]

## 6 Rule of conversion

This chapter describes the rule of conversion from SMF to SMAF performed by this tool.

### 6.1 Number of channels

The maximum number of channels for SMAF that can be created by this tool is four. It converts four of channel 1 to 16 of SMF that are designated. This tool ignores the channels exceeding four.

### 6.2 Note message

A pair of Note On and Note Off of SMF is converted to one note event of SMAF.

All notes that can be presented with compass of SMAF can be converted. But, since each tone of MA-1 has its specific three octave compass from C#n to Bn+2, MA-1 is not able to generate tones of notes that are out of the range of the three octave compass. For the compass of each tone, refer to Appendix.A. (If SMAF that contains such note is created, a warning message is displayed at conversion.) The maximum compass ranges from C#2 to C8.

SMAF has no Velocity presentation. For this tool, Note On events of which velocity for SMF is 1 or over is interpreted as Note On on SMAF. Note On events of which velocity for SMF is zero is interpreted as Note Off on SMAF.

### 6.3 Resolution

As for SMAF, the resolution is represented with real time, and for the capability of presentation of the format, any of the four times, 1ms, 2ms, 4ms and 5ms, can be selected. However the time is fixed to 4ms for SMAF that is created by the conversion tool. Moreover, the conversion tool quantizes the events of SMF to resolution of 24 ticks per one beat, and then converts it to the time unit of SMAF. Therefore, SMAF that is created finally has practical resolution of 24.

### 6.4 Tempo

Although SMAF has no idea of tempo, when playing SMAF with MA-1, the tempo that is set in SMF is recorded in SMAF because the conversion can be made more accurately if tempo is present.

However, for MA-1, the value of tempo is defined according to the resolution. Therefore, for the value of tempo that is designed for SMF, the value nearest to the one specified by SMF is selected from the values described in Appendix.D that are available.

## 6.5 Program Change

Tone number of Program Change of SMF becomes tone number on SMAF.

Although Program Change is inserted into other than the head of each channel (0 Tick), the conversion tool is inserted into the head. Even when there are several events per each channel, the conversion tool judges only initial event and ignores rest of them.

Moreover, tone parameters for MA-1 that coincides with correspondence between tone number of GM and the tone is buried with Exclusive Message for MA-1.

## 6.6 Control Change #1(Modulation)

Control Change #1(Modulation) of SMF is converted to standard type modulation of SMAF.

The correspondence of modulation is as shown in the following table.

Modulation	SMAF Modulation
0 to 63	0(OFF)
64 to 127	127(ON)

Table 6 1 Control Change #1

## 6.7 Control Change #7 (Volume)

For each of all channels, the value of Control Change #7 (Volume) is inserted into time 0 of SMAF in accordance with the volume conversion table in Appendix.C. When there is no Volume immediately before the head note, the volume value 127 is inserted into time 0 of SMAF.

## 6.8 Meta event #1 (Text)

The conversion tool writes the information of XF information header to an applicable place in Contents Info Chunk tag of SMAF.

SMF XF Information	SMAF Contents Info Chunk
Title	ST: Title
composer	SW: composition
writer	WW: song writing
arranger	AW: arrangement
player・singer	AN: name of artist

Table 6 2 Correspondence of XF information header

## 6.9 Meta event #2( indication of copyright)

If Meta Event 02 is present in SMF, the conversion tool writes the contents of Meta Event 02 into Copyright(c) of Contents Info Chunk and sets Copy Status to "Save:OK, Copy:No".

## 6.10 Meta event #7 (cue point)

It is possible to set a play starting time and a play ending time at arbitrary point. When the words "START" and "STOP" as shown in the following table are present, Start Point and Stop Point are inserted respectively into SMAF.

However, if there is a note before Start Point or Stop Point, it is kept in SMAF. Therefore, it is necessary to delete notes that are placed before and after it when making the file size smaller.

SMF Cue Point	SMAF
START	Start Point
STOP	Stop Point

Table 6 3 Correspondence of cue point

## 6.11 Other events

Channel messages and system messages that are not described in this chapter, such as after touch and pitch bend, are ignored.

## 7 Appendix A: Compass

For MA-1, the compass of notes that can be generated in one part is limited to three octaves. The limitation is that the tone can be generated by selecting one of three-octave ranges, C#2 to C5, C#3 to C6, C#4 to C7, and C#5 to C8.

This tool has built-in tone parameters of tones of GM128 for MA-1, and has fixed compass of one three-octave compasses per each tone, and the parameters are written also into MAF files that are created with this tool.

The following table shows the compass of tones that can be generated by tones of GM128.

The compasses marked with ○ in this table can be generated.

A4 =440Hz

PC	name	C#2- C5	C#3- C6	C#4- C7	C#5- C8	P C	name	C#2- C5	C#3- C6	C#4- C7	C#5- C8
1	GrandPno		○			65	SprnoSax			○	
2	BritePno		○			66	AltoSax		○		
3	E.GrandP		○			67	TenorSax		○		
4	HnkyTonk		○			68	Bari.Sax	○			
5	E.Piano1		○			69	Oboe		○		
6	E.Piano2		○			70	Eng.Horn		○		
7	Harpsi			○		71	Bassoon	○			
8	Clavi		○			72	Clarinet		○		
9	Celesta				○	73	Piccolo				○
10	Glocken				○	74	Flute			○	
11	MusicBox			○		75	Recorder			○	
12	Vibes		○			76	PanFlute			○	
13	Marimba			○		77	Bottle		○		
14	Xylophon				○	78	Shakhchi		○		
15	TubulBel		○			79	Whistle			○	
16	Dulcimar		○			80	Ocarina			○	
17	DrawOrgn		○			81	SquareLd			○	
18	PercOrgn		○			82	SawLead		○		
19	RockOrgn		○			83	CaliopLd		○		
20	ChrchOrg			○		84	ChiffLd		○		
21	ReedOrgn			○		85	CharanLd		○		
22	Acordion			○		86	VoiceLd		○		
23	Harmnica			○		87	FifthLd		○		
24	TangoAcd		○			88	Bass&Ld		○		
25	NylonGtr		○			89	NewAgePd		○		
26	SteelGtr		○			90	WarmPad		○		
27	JazzGtr		○			91	PolySyPd		○		
28	CleanGtr		○			92	ChoirPad		○		
29	Mute.Gtr		○			93	BowedPad		○		
30	Ovrdrive		○			94	MetalPad		○		
31	Dist.Gtr		○			95	HaloPad		○		
32	GtrHarmo				○	96	SweepPad		○		
33	AcoBass	○				97	Rain		○		
34	FngrBass	○				98	SoundTrk		○		
35	PickBass	○				99	Crystal			○	
36	Fretless	○				100	Atmosphr		○		
37	SlapBas1	○				101	Bright		○		
38	SlapBas2	○				102	Goblins		○		
39	SynBass1	○				103	Echoes		○		
40	SynBass2	○				104	Sci-Fi		○		
41	Violin			○		105	Sitar		○		
42	Viola		○			106	Banjo		○		
43	Cello	○				107	Shamisen			○	
44	Contrabs	○				108	Koto		○		
45	TremStr		○			109	Kalimba		○		
46	PizzStr			○		110	Bagpipe		○		
47	Harp		○			111	Fiddle		○		
48	Timpani	○				112	Shanai		○		
49	Strings1			○		113	TnklBell		○		
50	Strings2			○		114	Agogo			○	
51	Syn.Str1			○		115	SteelDrm		○		
52	Syn.Str2			○		116	WoodBlk			○	
53	ChoirAah		○			117	TaikoDrm	○			
54	VoiceOoh		○			118	TaikoDrm		○		
55	SynVoice		○			119	Syn.Drum	○			
56	Orch.Hit		○			120	RevCymb1	○			
57	Trumpet			○		121	FretNoiz		○		
58	Trombone		○			122	BrthNoiz		○		
59	Tuba	○				123	SeaShore		○		
60	Mute.Trp		○			124	Tweet		○		
61	Fr.Horn		○			125	Telephone		○		
62	BrasSect		○			126	Helicptr		○		
63	SynBras1		○			127	Applause		○		
64	SynBras2		○			128	Gunshot		○		

## 8 Appendix B:XF Information

XF Information is information about music that is buried by utilizing text meta event of SMF. The format is as described below.

Information about features and attribute of music is set by using the type of text meta event in the format of SMF.

FF 01 len <text>

The information items are separated individually by 8 bit colon ":" and listed.

No data is inputted in information items that are not described.

New items are to be inserted after the last item, and information items after no text are blanked out even if no 8 bit colon can be found in the processing system.

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

XF Information Header -- Language Specific by using Japanese is described below.

<Information items>

- 1) XF Information Header --Language Specific --ID XFinformation header (by language) ID  
XF Information Header – ID (4 letters) that means "Language Specific" "XFIn"

- 2) Language language information

Information that designates character code system used for XFinformation header (by language).

It does not designate character code system used for words. The character code system of words is designated with XF words header. It does not present the place of creation of music.

Authoring tool supports the following languages.

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

- 3) Song Name Name of music

Presents the language of the name of music.

When using alphabet, use 16 bit (2 byte) characters.

For referencing, reading with 16 bit hiragana that is enclosed by 8 bit parentheses "(" ")" is attached. Katakana is not used for the reading.

kana enclosed by 8 bit brackets "[" "]" is attached.

kana has to be attached to each character to which it is attached.

When presenting name of music in several lines, place 8 bit slush "/" in the place of carriage return.

Example :それいけ！Y[わい]マン/元[げん]気[き]いっぱい(それいけわいまん げんきいっぱい)

They are displayed as follows.:

わい  
それいけ！Yマン  
げんき  
元気いっぱい

When displaying name of music in the processing system, interpret the control codes as described in the above example.

## 4) Composer Composer

Name of composer of original music

Separate family name and given name by 8 bit space " ".

When describing a plurality of names, separate them with 8 bit slush "/".

When using alphabet, use 16 bit letters.

For referencing, reading with 16 bit hiragana that is enclosed by 8 bit parentheses "(" ") " can be attached.

Katakana is not used for the reading.

When describing a plurality of names, attach reading to each of them.

Example: 曲作 太郎(きょくづくり たろう)/曲作 次郎(きょくづくり じろう)

## 5) Lyricist Writer

The name of the writer when original music has words.

The format is the same as that of the composer.

## 6) Arranger Arranger

The name of person who arranges original music or music data

The format is the same as that of the composer.

## 7) Performer Player / Singer

The name of a person or a group who plays or sings original music

The format is the same as that of the composer.

## 8) Programmer Music data creator

The name of person who creates music data

The format is the same as that of the composer.

Example:

Name of music is “楽しい日曜日 (Tanoshii nichiyoubi)”, a Japanese eight beat pops music released in September 28, 1994.

In the music data, the melody is lead by a saxophone.

Vocal is female, solo, composer is “山葉太郎(Yamaha Taro)”, writer is “浜松花子’Hamamatsu Hanako”, and no arranger.

Player / singer is “中沢町子(Nakazawa Machiko)”, and music data creator is “豊岡次郎(Toyooka Jiro)”.

XFinformation header (by language) An example of header in Japanese:

FF 01 len <XFln:JP:楽しい日曜日(たのしいにちようび):山葉 太郎(やまは たろう):

浜松 花子(はままつ はなこ)::中沢 町子(なかざわ まちこ):豊岡 次郎(とよおか じろう)>

## 9 Appendix C: Volume conversion table

MA-1		SMAF値	SMF Control #7
Volume (dB)	SMAF conversion value		
0.00	127	127	127
0.00	127	126	126
0.00	127	125	125
-0.75	122	124	124
-0.75	122	123	123
-0.75	122	122	122
-0.75	122	121	121
-0.75	122	120	120
-1.50	116	119	119
-1.50	116	118	118
-1.50	116	117	117
-1.50	116	116	116
-1.50	116	115	115
-2.25	112	114	114
-2.25	112	113	113
-2.25	112	112	112
-2.25	112	111	111
-2.25	112	110	110
-3.00	107	109	109
-3.00	107	108	108
-3.00	107	107	107
-3.00	107	106	106
-3.00	107	105	105
-3.75	102	104	104
-3.75	102	103	103
-3.75	102	102	102
-3.75	102	101	101
-4.50	98	100	100
-4.50	98	99	99
-4.50	98	98	98
-4.50	98	97	97
-4.50	98	96	96
-5.25	94	95	95
-5.25	94	94	94
-5.25	94	93	93
-5.25	94	92	92
-6.00	90	91	91
-6.00	90	90	90
-6.00	90	89	89
-6.00	90	88	88
-6.75	86	87	87
-6.75	86	86	86
-6.75	86	85	85
-7.50	82	84	84
-7.50	82	83	83
-7.50	82	82	82
-7.50	82	81	81
-8.25	79	80	80
-8.25	79	79	79

MA-1		SMAF値	SMF Control #7
Volume (dB)	SMAF conversion value		
-12.00	64	63	63
-12.75	61	62	62
-12.75	61	61	61
-12.75	61	60	60
-13.50	58	59	59
-13.50	58	58	58
-14.25	56	57	57
-14.25	56	56	56
-14.25	56	55	55
-15.00	54	54	54
-15.00	54	53	53
-15.75	51	52	52
-15.75	51	51	51
-16.50	49	50	50
-16.50	49	49	49
-17.25	47	48	48
-17.25	47	47	47
-18.00	45	46	46
-18.00	45	45	45
-18.75	43	44	44
-18.75	43	43	43
-19.50	41	42	42
-19.50	41	41	41
-20.25	40	40	40
-20.25	40	39	39
-21.00	38	38	38
-21.75	36	37	37
-21.75	36	36	36
-22.50	35	35	35
-23.25	33	34	34
-23.25	33	33	33
-24.00	32	32	32
-24.75	31	31	31
-24.75	31	30	30
-25.50	29	29	29
-26.25	28	28	28
-27.00	27	27	27
-27.75	26	26	26
-28.50	25	25	25
-29.25	24	24	24
-30.00	23	23	23
-30.75	22	22	22
-31.50	21	21	21
-32.25	20	20	20
-33.00	19	19	19
-33.75	18	18	18
-34.50	17	17	17
-35.25			
-36.00	16	16	16

MA-1		SMAF value	SMF Control #7
Volume (dB)	SMAF conversion value		
-8.25	79	78	78
-9.00	76	77	77
-9.00	76	76	76
-9.00	76	75	75
-9.75	72	74	74
-9.75	72	73	73
-9.75	72	72	72
-9.75	72	71	71
-10.50	69	70	70
-10.50	69	69	69
-10.50	69	68	68
-11.25	66	67	67
-11.25	66	66	66
-12.00	64	65	65
-12.00	64	64	64

MA-1		SMAF value	SMF Control #7
Volume (dB)	SMAF conversion value		
-36.75	15	15	15
-37.50			
-38.25	14	14	14
-39.00	13	13	13
-39.75			
-40.50	12	12	12
-41.25			
-42.00	11	11	11
-42.75			
-43.50	10	10	10
-44.25			
-45.00			
-45.75	9	9	9
-46.50			
-47.25	8	8	8
-47.25	8	7	7
-47.25	8	6	6
-47.25	8	5	5
-47.25	8	4	4
-47.25	8	3	3
-47.25	8	2	2
-47.25	8	1	1
-47.25	8	0	0

## 10 Appendix D: Tempo

SMAF does not use the idea of tempo. However, it uses ExclusiveMessage to bury tempo for MA-1 in SMAF files. At this time, a tempo near to that of SMF is selected from the following table because tempo that can be played on MA-1 is limited.

MA-1 register value	Actual tempo	MA-1 register value	Actual tempo
4	437	51	42
5	364	52	41
6	312	54	40
7	273	55	39
8	243	56	38
9	218	58	37
10	199	60	36
11	182	61	35
12	168	63	34
13	156	65	33
14	146	67	32
15	137	69	31
16	129	72	30
17	121	74	29
18	115	77	28
19	109	80	27
20	104	83	26
21	99	86	25
22	95	90	24
23	91	94	23
24	87	98	22
25	84	103	21
26	81	108	20
27	78	114	19
28	75	120	18
29	73	128	17
30	70	136	16
31	68	145	15
32	66	155	14
33	64	167	13
34	62	181	12
35	61	198	11
36	59	217	10
37	57	242	9
38	56		
39	55		
40	53		
41	52		
42	51		
43	50		
44	49		
45	47		
46	46		
48	45		
49	44		
50	43		