
EM61.ist File

Procedure

Application Notes

ELAN MICROELECTRONICS CORP.

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1.0 Introduction

This Application Notes is applicable to EM61000 Series Integrated Development Environment (EM61IDE) Version 2.0. This tool supports all series of EM61000 chips (EM61001 ~ EM61500).

2.0 Overview

An Instrument Map (*.ist) file is automatically generated when you create a new MIDI project with the EM61IDE program. The file, which bears the same filenames as that of your project; is located under the project folder. You can always modify these files to suite the requirements of your project. An example of a modified Instrument Map file (TUTOR.IST) is shown below.

The file consisted of three major sections, namely:

1. [General] Section
2. [Instrument List] Section
3. [Template List] Section

See following pages for the detailed descriptions of the contents of each section.

```
[General]
title=EM61000 Instrument File
version=2.0
$WORKDIR=D:\Work61\C61_0001\0927\TWF

[Instrument List]

tone group=1
tone group 0=T010 T024 T033 T046 T072 T073 T074 T091

percussion group=3
percussion group 0=P035
percussion group 1=P040
percussion group 2=P050

[T010]
name=Music Box
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T010_0 %NORMAL %100
G4-F#5=T010_1 %NORMAL %100
G5-B6=T010_2 %NORMAL %100

[T024]
name=Acoustic Nylon Guitar
scale=C2-F#3 G3-F#4 G4-F#5 G5-F#7
C2-F#3=T024_0 %NORMAL %100
G3-F#4=T024_1 %NORMAL %100
G4-F#5=T024_2 %NORMAL %100
G5-F#7=T024_3 %NORMAL %100
```

```
[T033]
name=Electric Bass Fingered
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T033_0 %NORMAL %100
G4-F#5=T033_1 %NORMAL %100
G5-B6=T033_2 %NORMAL %100

[T046]
name=Harp
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T046_0 %NORMAL %100 DT046_0 %DETUNE %60
G4-F#5=T046_1 %NORMAL %100 DT046_1 %DETUNE %60
G5-B6=T046_2 %NORMAL %100 DT046_2 %DETUNE %60

[T072]
name=Piccolo
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T072_0 %NORMAL %100 DT072_0 %DETUNE %85
G4-F#5=T072_1 %NORMAL %100 DT072_1 %DETUNE %85
G5-B6=T072_2 %NORMAL %100 DT072_2 %DETUNE %85

[T073]
name=Flute
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T073_0 %NORMAL %100
G4-F#5=T073_1 %NORMAL %100
G5-B6=T073_2 %NORMAL %100

[T074]
name=Recorder
scale=A2-F#4 G4-F#5 G5-B6
A2-F#4=T074_0 %NORMAL %100
G4-F#5=T074_1 %NORMAL %100
G5-B6=T074_2 %NORMAL %100

[T091]
name=Chord Voice
scale=A2-B6
A2-B6=T091_0 %NORMAL %100

[P035]
name=Acoustic Bass Drum
template=P035f

[P040]
name=Electric Snare
template=P040f

[P050]
name=High Tom
template=P050f
```

[Template List]

```
t010_0=% DEFAULT 010_0.twf %0
t010_1=% DEFAULT 010_1.twf %0
t010_2=% DEFAULT 010_2.twf %0

t024_0=% USER $WORKDIR\024_C3.twf %0
t024_1=% USER $WORKDIR\024_C4.twf %0
t024_2=% USER $WORKDIR\024_C5.twf %0
t024_3=% USER $WORKDIR\024_C6.twf %0

t033_0=% DEFAULT 033_0.twf %0
t033_1=% DEFAULT 033_1.twf %0
t033_2=% DEFAULT 033_2.twf %0

t046_0=% USER $WORKDIR\046_C4.twf %0
DT046_0=% USER $WORKDIR\046_C4_D10.twf %0
t046_1=% USER $WORKDIR\046_C5.twf %0
DT046_1=% USER $WORKDIR\046_C5_D10.twf %0
t046_2=% USER $WORKDIR\046_C6.twf %0
DT046_2=% USER $WORKDIR\046_C6_D10.twf %0

t072_0=% USER $WORKDIR\072_C4.twf %4
DT072_0=% USER $WORKDIR\072_C4_D15.twf %4
t072_1=% USER $WORKDIR\072_C5.twf %4
DT072_1=% USER $WORKDIR\072_C5_D13.twf %4
t072_2=% USER $WORKDIR\072_C6.twf %4
DT072_2=% USER $WORKDIR\072_C6_D10.twf %4

t073_0=% USER $WORKDIR\073_C4.twf %4
t073_1=% USER $WORKDIR\073_C5.twf %4
t073_2=% USER $WORKDIR\073_C6.twf %4

t074_0=% USER $WORKDIR\074_C4.twf %4
t074_1=% USER $WORKDIR\074_C5.twf %4
t074_2=% USER $WORKDIR\074_C6.twf %4

T091_0=% USER $WORKDIR\091_G4.twf %0

p035f=% DEFAULT p035.twf %0
p040f=% DEFAULT P040.twf %0
p050f=% DEFAULT p050.twf %0
```

2.1 [General] Section

This section of the Instrument Map file defines the title and version information of the file and provides the path to your twf file.

Example:

```
[General]
title=EM61000 Instrument File
version=2.0
$WORKDIR=D:\Work61\C61_0001\0927\TWF
```

; The first two lines show the title and version of the file.

; The “\$WORKDIR” (upper case) line is where you define the directory path of your twf file.

2.2 [Instrument List] Section

Instrument List is where you prescribe the instruments for your tone and percussion groups of sound. Architectures of its contents are explained below.

2.2.1 Tone/Percussion Instrument Group Field Contents

Field	Description
Tone group	Tone type instrument can be divided into several groups, or Tone group = n, where n is the tone group number.
Tone group n =	List the number used in the nth tone group. The values following the equal sign (=) states the instrument type (or MIDI patch number), prefixed with ‘T’ (ex: T010, T024. etc.). The numbers are separated by a space. Each instrument number represents one type of tone instrument and must be unique from others.
Percussion group	Percussion type instrument can be divided into several groups, or Percussion group = n, where n is the percussion group number.
Percussion group n =	List the number used in the nth tone group. The values following the equal sign (=) states the instrument number (or MIDI patch number), prefixed with ‘P’ (ex: P035, P040, etc.). The numbers are separated by a space. Each instrument number represents one type of percussion instrument and must be unique from others.

Example:

NOTE

For formatting convenience, some portions of the example Instrument Map file shown below are displayed in two lines instead of the correct single line format as shown under Section 2.0 (Overview). When writing your file, follow the formatting under Section 2.0.

```
[Instrument List]
tone group=1
tone group 0=T010 T024 T033 T046 T072
T073 T074 T091
```

; Assign a required tone group for your project and collect the needed tone type instruments for such group i.e., Group 0 = T010 (Music Box); T024 (Acoustic Nylon Guitar); etc., or as you have defined for the project).

```
percussion group=3
percussion group 0=P035
percussion group 1=P040
percussion group 2=P050
```

; Define the required percussion type instruments (in 3 groups) and assign each with the needed instrument; i.e., Group 0 = 035 (Acoustic Bass Drum); Group 1 = 040 (Electric Snare); and Group 2 = 050 (High Tom), or as you have defined for the project).

NOTE

1. Tone group should only contain Tone type instruments and is prefixed with "T." Likewise, Percussion group should only contain Percussion type instruments and is prefixed with "P."
2. All instrument numbers enumerated in the tone or percussion group should have their respective instrument name and contents separately listed in the [Instrument List] section. Any omission will result to erroneous compilation of EM61IDE.

2.2.2 Tone Instrument Pitch Scale Field Contents

Field	Description
[Tn]	Field name with tone instrument number (prefixed with "T") as defined by MIDI.
Name	The corresponding Instrument name for the above instrument number.
Scale	This field defines the full pitch range (gamut) in used and monitors the start and end points of each range (separated by a dash "-"). There can be more than one segment in a full pitch range. Each segment is separated from others by a space (ex: A2-F#4 G4-F#5 G5-B). Total number of segment in a pitch range cannot exceed 256.
pitch_scale	The individual segment of the above full pitch range (gamut). The information following the equal sign (=) states the corresponding properties of the particular segment (ex: A2-F#4=T010_0 %NORMAL %100).

2.2.2.1 Pitch Scale Format

```
pitch_scale = var(0) type weight [var(1) type weight]
```

Where:

pitch_scale is the name of the individual segment for the full pitch range (gamut) as defined in the "Scale" field.

Example: A2-F#4; G4-F#5, G5-B

var(0), var(1)... are the instruments (template waveform) variables for each pitch scale (segment). These variables serves as indexes that link to the corresponding tone instruments properties defined in the Template List section.

*Example: T046_0 / DT046_0; T046_1 / DT046_1,
T046_2 / DT046_2*

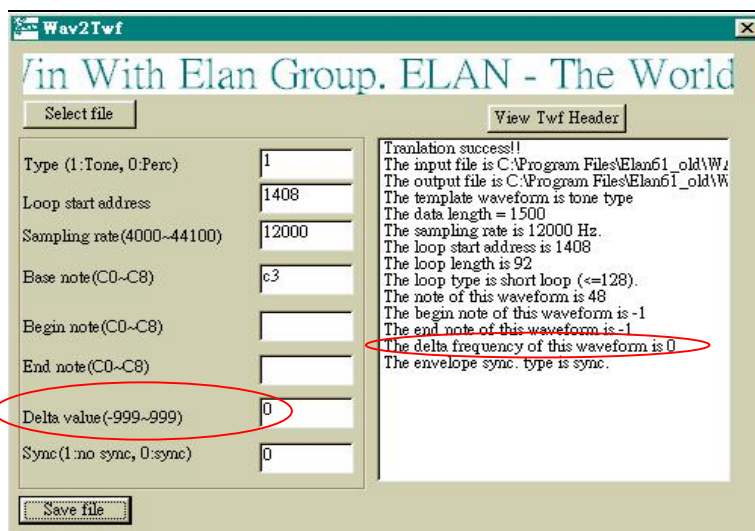
NOTE

For special effect and quality, no more than 2 template waveforms should be assigned for simultaneous playing per pitch scale (gamut).

type is either “%NORMAL” or “%DETUNE” (always in upper case). It specifies whether the waveform delta frequency compensation is required or not.

type = %NORMAL: when the tone instrument is played, waveform delta frequency is NORMAL (Delta value = 0, as set during conversion of WAV file into TWF file in the Wav2Twf tool. See figure below). Hence, no frequency compensation is required.

type = %DETUNE: frequency difference exists and frequency compensation is required when the tone instrument is played (Delta value \neq 0, but is any number between -999 to 999 as defined in the Wav2Twf).



weight specifies the percentage of volume (based on the original sound) required when specified tone instrument is played.

Examples: **%0** zero percentage or none of the original volume is required, i.e., no sound (mute).

%60 requires 60% of the original volume when the specified tone instrument is played.

%100 requires 100% of the original volume when the specified tone instrument is played.

Example:

```
[T010]
name=Music Box

scale=A2-F#4 G4-F#5 G5-B6
```

; This particular instrument number (***T010***) is the Music Box tone type instrument per MIDI.

; A2 ~ B6 is the defined full Scale range (gamut). It consisted of three pitch scales or segments, namely ***A2-F#4***; ***G4-F#5***; and ***G5-B6***.

NOTE

Number of segments in a full Scale range cannot exceed 256. Each segment should compose of a start pitch and an end pitch separated by a dash (-) A space separates the segments from others.

```
A2-F#4=T010_0 %NORMAL %100
G4-F#5=T010_1 %NORMAL %100
G5-B6=T010_2 %NORMAL %100
```

; Each of the 3 pitch scale (or segment) is assigned with a single tone instrument variable (***T010_0***, ***T010_1***, and ***T010_2***) respectively. These variables are linked to tone instrument names stated in the [Template List] section where the complete properties of the instruments are defined.

Hence, A2-F#4 becomes

A2-F#4=T010_0 %NORMAL %100.

Where:

A2-F#4 is the defined pitch scale (segment).

T010_0 is the tone instrument variable to be sourced from [Template List].

%NORMAL is the waveform delta frequency value (0 = Normal or no frequency compensation required) specified when converting WAV file into TWF file with Wav2Twf tool (see figure in Page 6).

%100 is the required percentage (100%) of the original volume to be executed when the specified tone instrument is played.

NOTE

***%NORMAL** or **%DETUNE** must be in upper case. The percent sign (%) has no function except to denote enclosure (open and close parenthesis).*

```
[T046]
name=Harp

scale=A2-F#4 G4-F#5 G5-B6
```

; This particular instrument name (***T046***) is the Harp tone type instrument according to MIDI.

; A2 ~ B6 is the defined full Scale range (gamut). It consisted of three pitch scales or segments, namely ***A2-F#4***; ***G4-F#5***; and ***G5-B6***.

NOTE

Number of segments in a full Scale range cannot exceed 256. Each segment should compose of a start pitch and an end pitch separated by a dash (-) A space separates the segments from others.

```
A2-F#4=T046_0 %NORMAL %100 DT046_0
%DETUNE %60
G4-F#5=T046_1 %NORMAL %100 DT046_1
%DETUNE %60
G5-B6=T046_2 %NORMAL %100 DT046_2
%DETUNE %60
```

; Each of the 3 pitch scale (or segment) is assigned with two tone instrument variables (*T046_0 / DT046_0*, *T046_1 / DT046_1*, and *T046_2 / DT046_2*) respectively. These variables link to tone instrument names stated in the *[Template List]* section where the complete properties of the instruments are defined.

Hence, *A2-F#4* becomes

```
A2-F#4=T046_0 %NORMAL %100 DT046_0
%DETUNE %60
```

Where:

A2-F#4 is the defined pitch scale (segment).

T046_0 / DT046

are the tone instrument variables to be sourced from *[Template List]* section.

%NORMAL is the waveform delta frequency value (0 = Normal or no frequency compensation required) specified when converting WAV file into TWF file with Wav2Twf tool (see figure in Page 6).

%DETUNE is the waveform delta frequency which value is -999 to 999, but NOT 0 (frequency compensation required when the tone instrument is played). This value is specified when converting WAV file into TWF file with Wav2Twf tool (see figure in Page 6).

%100/%60 are the output volume setting in percentage i.e., 100% for output without Delta_F change and 60% for output with Delta_F change.;

NOTE

1. For special effect and quality, no more than two tone instrument variables (template waveforms) should be assigned for simultaneous playing per pitch scale (gamut).
2. *%NORMAL* or *%DETUNE* must be in upper case. The percent sign (%) has no function except to denote enclosure (open and close parenthesis).

```
[T091]
name=Chord Voice
scale=A2-B6
A2-B6=T091_0 %NORMAL %100
```

; This shows an example of a scale with a single pitch segment.

2.2.3 Percussion Instrument Field Contents

Field	Description
[Pn]	Field name with the percussion instrument number (prefixed with "P") as defined by MIDI
name	Instrument name
template	Template waveform variable name

Example:

```
[P035]
name=Acoustic Bass Drum
template=P035f
```

; The percussion instrument (*P035*) is an Acoustic Bass Drum according to MIDI Channel 10. The *template=P35f* is linked to percussion instrument name stated in the *[Template List]* section where the complete properties of the instruments are defined.

NOTE

1. Percussion instrument does not have scale range. It links to its properties in the *[Template List]* section through the "template" line.
2. Only one "template" line is allowed per percussion instrument.

2.3 [Template List] Section

The Template List section defines the path of your twf file and the corresponding number of your tone instrument in the envelope file (*.env). These information are linked by the instrument parameters listed in the Instrument List section.

2.3.1 Field Contents

Field	Description
Var (n)	Assign a template waveform to this variable name and specify its file path and envelope index. The format is – var(n) = location file_name envelope_index.

2.3.2 Template Waveform Variable format

`var = location file_name envelope_index`

Where:

- Var** is the name defined by user for template waveform. Its length should not exceed over 32 characters and must be unique from others.
- Location** indicates the template waveform location in the default directory or otherwise.
- location = %DEFAULT** means template waveform is in the default directory (\instlib).
- location = %USER** means template waveform is not in the default directory. You must specify the full directory path.
- File_name** specifies the filename for the template waveform.
- location = %DEFAULT** need to specify the filename only.
- location = %USER** must specify the absolute path name or use **&WORKDIR**.
- envelope_index** specify the type of envelope for template waveform. The format is - **%n**, where *n* is any of the 32 types (0~32) envelope index available. Note that this applies to tone instruments only

Example:

[Template List]

`t010_0=% DEFAULT 010_0.twf %0`

; The tone instrument (music box) is to be sourced from **010_0.twf**, which is located in the DEFAULT folder **\Instlib**.

; “%0” is the Envelope index number as defined in the Envelop (*.env) file.

`t072_0=% USER $WORKDIR\072_C4.twf %4`

; The tone instrument (Picolo) is to be sourced from **072_c4.twf**, which is located in the USER defined **TWF** folder. Its path **D:\Work61\C61_0001\0927\TWF** is defined in the **[General]** section described in Section 2.1.1 above.

; “%4” is the Envelope index number as defined in the Envelop (*.env) file.

```
p035f=% DEFAULT p035.twf %0  
p040f=% DEFAULT p040.twf %0  
p050f=% DEFAULT p050.twf %0
```

- ; The percussion instruments Acoustic Bass Drum (P035f), Electric Snare (P040f), and High Tom (P050f), are to be sourced from ***p035.twf***, ***p040.twf***, and ***p050.twf***, respectively. These files are located in the DEFAULT folder ***\Inslib***.
- ; “%0” has no function in the Template List as unlike tone, percussion type instruments does not need percussion index. However, the value is needed to fill-in the program allocated slot. Otherwise, error will occur.

NOTE

1. **DEFAULT, USER, & \$WORKDIR** must be in upper case.
2. Envelope file index numbers are available from 0 to 31 only.
3. The parameter of each section is detailed in the *.env file of your Project folder.
4. The percent sign (%) has no function except to denote enclosure (open and close parenthesis).