

# MUSIC MAKER

## INTRODUCTION

MUSIC MAKER was designed with the following objectives in mind:

- Simplify the task of music creation for software developers
- Cater for multiple tunes and sounds effects
- Provide flexibility by manipulation of variable length note sequences
- Produce a compact machine code module which can be relocated
- Allow control from BASIC and/or machine code
- Allow mixing and independant control of music and sound effects
- Provide compatibility with BASIC firmware sounds and other sound utilities
- Run at frame-flyback time so as not to interfere with graphics programming

Special programming techniques have been employed to achieve these objectives: the sound module runs as a second process with a higher priority than any foreground program so as to maintain correct timing. The sound module also performs resource management for the three channels of the sound chip allowing any combination of channels for music and sound effects: music channel(s) will 'cut-out' for the duration of an effect which uses the channel(s).

Other features include:

- Up to 31 tunes (Scores) each using up to 3 channels
- Up to 255 variable length note sequences
- Fifteen instruments + normal tone
- Up to 255 Tracks (Tracks define how to play note sequences)
- Volume control for each Track
- Tempo control
- Vibrato & noise controls
- Beat tracks (using percussion instruments)
- Instructions include explanations of basic musical terms

### Modules & Loading Instructions:

Type RUN\*DISC and choose the appropriate module or...

Type RUN\*STAVE to run the Stave Editor.  
The Stave Editor is used to enter musical notation.

Type RUN\*PLAYER to run the Music Player.  
The Music Player is used to change attributes and play note sequences created by the Stave Editor. Music can then be saved as code to be used by the Loader.

Type RUN\*LOADER to run the Loader program.  
The Loader is used to load, relocate and install the music code created in the Player program. Once installed, the RSX's can be used to control the sounds.

### Controls for Stave Editor & Music Player:

- |  |   |
|--|---|
| Cursor Keys & COPY / Joystick :                | Used throughout to move and select features.  |
| Dec. pt. on numeric keypad :                   | Used to return to the application following a filing error (e.g. invalid filename / disc full).   |
| ESC, DEL, ENTER/RETURN & other keyboard keys : | Use the main keyboard for filename entry followed by ENTER/RETURN, ESC aborts the filename entry & returns to the menu, DEL deletes the last character. |

### TERMS USED IN MUSIC MAKER:

**NTS FILES** are note sequence files (file extension .NTS) created in the Stave Editor and manipulated in the Music Player.

**SCORE** - all the parts needed in a piece of music shown with a separate Stave for each instrument. In Music Player, a SCORE comprises of three channels, each channel can play a Track.

**TRACK** - In Music Player a TRACK contains data describing which note sequence to play, the attributes of the instrument, and which TRACK to play next (if any).

### **IMPORTANT NOTES:**

**Filing errors (e.g. invalid filename, disc full) will cause a BASIC 'BREAK' error and a return to the BASIC prompt. At this point you should press the decimal point key on the numeric keypad to return to the application.**

**The QUIT option performs a machine reboot so use with care.**

**Although there is room for up to eight notes/rests in each Bar try to use less than eight to allow for corrections / insertions (you do not need to have the same number of notes in a bar as appears in the sheet music).**

**The stave editor saves up to the 1st unused Bar, that is the 1st Bar neither viewed or changed in the Stave Editor.**

**Always use |SOUNDS.OFF before performing disc/tape operations.**

**Don't worry about running out of space in Music Player - a warning message will appear if you get close to maximum capacity.**

**The conversion guide should help you to transfer musical scores onto the Music Maker stave.**

## STAVE EDITOR

### Stave Editor Menu Options:

All the Stave Editor operations can be performed using the cursor and COPY keys or Joystick. To select an icon move the highlight to the icon & press FIRE or COPY.

#### **EDIT**

This allows you to create/amend a note sequence using musical notation. On selecting this option a sub-menu will appear giving the following options:

**CONTINUE:-** Edit from the current (displayed) BAR number.

**CHANGE BAR:-** Edit from a different BAR number. On this option use cursor/joystick up & down to change, FIRE/COPY to select.

**MENU:-** Returns to the main menu.

**CLEAR ALL:-** Completely clears the stave of musical notation. Use this option when creating a new note sequence.

#### **SAVE**

Save a note sequence file.

#### **LOAD**

Load a note sequence file.

#### **CAT**

Performs the BASIC 'CAT' command.

#### **QUIT**

Aborts the application (performs a machine reboot).

### **Editor icons & functions**

#### **Notes & Rests**

You will not be able to select a note/rest if the current and next positions are used. On selecting a note or rest, a horizontal line will appear on the stave. Move up or down to the required position and press FIRE or COPY.

#### **Key Signature**

The key signature consists of Sharps and Flats immediately after the Clef. With POSITION=0 you can select the Sharp or Flat icons & set up a key signature. Select the DEL icon with POSITION=0 to delete the key signature.

#### **Arrow Icons**

Left and Right arrows change the current position. The current position is displayed at the top right of the display and is indicated by the chevron below the Stave.

Up and Down arrows change the current Bar. The current Bar is displayed at the top right of the display.

#### **DEL**

This deletes the note/rest at the current position or deletes the key signature for current position=0.

#### **CLEF**

This switches the Clef between Treble & Bass.

**Dot (.)**

A dot after a note or rest means it is to last half as long again, that is one and a half times its normal length.

**Pause/Hold**

The Pause or Hold sign over a note or rest means it is to last for more than its normal length. For our purposes, it extends the length by one third.

**Slur**

A curved line over (or under) several different notes means they are to be played smoothly.

**Entering a Slur:**

Use left/right arrow icons to select the 'start of Slur' position, select the Slur icon to produce a horizontal cursor above the Stave. Move this cursor to the 'end of slur' position (or to the end of the Bar if the Slur continues on the next Bar) & press FIRE or COPY.

**Deleting a Slur:**

Choose a position used by the Slur. Proceed as for entering a slur except instead of moving the cursor to an 'end of Slur' position simply press FIRE or COPY to delete the Slur.

**Extending a Slur:**

Slurs can easily be joined or extended using the same procedure as for entering a Slur: if the 'start of Slur' or 'end of Slur' positions overlap an existing Slur then the Slurs will merge together.

**MENU**

Returns to the main menu.

# MUSIC PLAYER

## Music Player Menu Options:

### **LOAD NTS**

Load a note sequence file (created by the Stave Editor).

### **CATALOGUE**

Performs the BASIC 'CAT' command.

### **PLAY SCORE**

Plays the current score (score number displayed at the top left of the screen).

### **EDIT SCORE**

Used to change the current Score &/or change the Tracks assigned to the three channels of the Score.

### **EDIT TRACK**

Used to change the current Track &/or change the attributes of the Track. The following attributes can be altered:

VIB - Vibrato or Tone variance.

INSTR - Instrument. On selecting an instrument other attributes will be set as required.

NOISE - Noise period.

VOL - Volume level (0-15) for INSTR=0, initial volume (0-5) for INSTR=1 to 15.

NEXT - The next Track to be played, 0=no next Track.

NTS - Note sequence to be played.

### **EDIT NTS**

Used to change attributes of note sequences. The following attributes can be changed:

TONE - Changes the tone of all notes in the sequence relative to the Stave. A change of +/-14 represents one octave.

LENGTH - Changes the length of every note in the sequence in steps of 1/50th of a second.

END ADJ - End adjustment. This adds a period of silence to the end of a sequence.

SLURS - This option will delete all Slurs within the note sequence, use with care as this operation can not be undone. Many tunes written with Slurs sound better played without them. This feature is also useful for converting sequences to be used for a drum beat.

*TIP:* For sequences using Slurs or containing long notes try deleting the Slurs and play with instrument 6 (Synth2).

### **SAVE ALL**

Save all Music Player data in a '.ALL' file. You can thus resume the Music Player session later by loading this file.

### **LOAD ALL**

Load all Music Player data from a '.ALL' file.

### **SAVE CODE**

Saves the music as code to be used by the BASIC Loader program.

### **QUIT**



Quit the application (performs a machine reboot).

# CONVERSION GUIDE



Use the following in conjunction with the Timings to convert other notation into Music Maker format.

## Notes connected by strokes

The number of strokes indicates the type of note, hence:



 is equivalent to ... 

and

 is equivalent to ... 


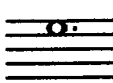
## Triplet

Three notes which fit into the time of two notes of the same type are shown grouped together by a curved line and the figure 3, hence:



 is equivalent to ... 

## Tie or Bind

A curved line connecting notes at the same position on the Staff. It lengthens a note by joining it to the next note. Use the timings and try to replace with a single note of equal length to the tie, hence:



 is equivalent to ... 

and

 is equivalent to ... 

## Chord

The sound of two or more notes being played together. Either play different notes on different channels (which requires careful timing) or simply use the top note from the chord, hence:

 should be interpreted as ... 

## GUIDE TO MUSIC MAKER NOTATION

Shown below is a description of symbols/terms used in the Stave Editor.

Diagram illustrating musical notation symbols and terms on two staves:

- Top Staff (Treble Clef):**
  - Labels: Treble Clef, Key Signature (one sharp), Flat (B $\flat$ ), Sharp (D $\sharp$ ), Pause or Hold (indicated by a fermata), Sharp (F $\sharp$ ), Half Note Rest.
- Bottom Staff (Bass Clef):**
  - Labels: Bass Clef, Key Signature (one flat), Sharp (F $\sharp$ ), Dot (quarter note), Natural (C).

## OTHER NOTATION & MUSICAL SHORTHAND

It is beyond the scope of this document to describe all forms of musical notation. However, one of the most important is the REPEAT SIGN - a double bar with two dots. This tells us to return to a similar sign facing the other way around (or else the beginning) and repeat the music. Create note sequences in separate files so that sequences can easily be repeated in Music Player.

Diagram illustrating the REPEAT SIGN:

- First time - play up to the sign** (indicated by an arrow pointing to the first double bar line with two dots).
- Second time - repeat from reversed sign then carry on** (indicated by an arrow pointing to the second double bar line with two dots, which is reversed).

## TIMING

Getting the timing right is very important if you want your tunes to sound as they were meant to. Let's say you have a musical score written for two instruments using a Treble and a Bass Clef. You create two note sequence files, one for the Treble Clef and one for the Bass Clef.

Once loaded into Music Player, if these sequences have different duration times then you have a problem - either:

1. you have made an error in the Stave Editor (the times for each Bar displayed when loading the NTS file might indicate where the error occurred).
2. Notation used in the musical score does not exactly match that used in Music Maker. The most likely cause of this will be 'Pause or Hold' for which a definitive timing rule is not defined.

A music score is broken up into a number of Bars (a vertical line on the Stave denotes the end of a Bar) each of which should use the same amount of time. The following figures give the note/rest durations (in hundredths of a second) used in Music Maker:

Whole(Semibreve) note/rest	192
Half(Minim) note/rest	96
Quarter(Crotchet) note/rest	48
Eighth(Quaver)	24
Sixteenth(Semiquaver) note/rest	12
Thirty-second(Demi-Semiquaver) note/rest	6

Pause or Hold increases the length by one third, hence a Quaver with a Pause will last  $24+8 = 32$  hundredths of a second.

A dot increases the length by a half, hence a Quaver with a Dot will last  $24+12 = 36$  hundredths of a second.

A Quaver with both a Pause and a Dot will last  $24+8 = 32$ ,  $32+16 = 48$  hundredths of a second.

## TIME SIGNATURES AND BEAT TRACKS

A Time Signature consists of two numbers or a sign on the Stave at the beginning of music. The top number gives the number of beats in a bar, the bottom number gives the type (or value) of the beats - 2 for Half Notes, 4 for Quarter Notes, 8 for Eighth Notes, and so on. The Four-Four Time Signature is often written as a 'C', and Two-Two as a 'C' with a vertical bar through it.

The following note sequence files have been supplied in order to be used with the percussion instruments to produce 'beat tracks' which beat in time with the music (as defined by the Time Signature):

*Files containing one half note beat:*

CYMBAL12.NTS, BASS12.NTS, TOM12.NTS, SNARE12.NTS

*Files containing one quarter note beat:*

CYMBAL14.NTS, BASS14.NTS, TOM14.NTS, SNARE14.NTS

*Files containing 3 quarter note beats:*

CYMBAL34.NTS, BASS34.NTS, TOM34.NTS, SNARE34.NTS

*Files containing one eighth note beat:*

CYMBAL18.NTS, BASS18.NTS, TOM18.NTS, SNARE18.NTS

*Files containing five eighth note beats:*

CYMBAL58.NTS, BASS58.NTS, TOM58.NTS, SNARE58.NTS



For example, create a beat track for music with a Six-Eight Time Signature using two Tracks which have each others Track numbers as the NEXT value. On one Track use the CYMBAL18 note sequence (& instrument 12), on the other Track use the SNARE58 note sequence (& instrument 15).

## TEMPO

To make small changes to the speed of your music (Tempo), edit the NTS file in Music Player and change the LENGTH parameter. Use values -1 or -2 to increase Tempo, 1 or 2 to decrease. Values outside the range -2 to 2 are not recommended as they might lead to music sounding 'out of tune'. For note sequences containing only one type of note (e.g. beat tracks), the full range of LENGTH values may be used.

Changing tempo is trickier when you have different note sequences on different channels - changing the LENGTH parameter for each note sequence usually leads to different durations (duration is the TIME value displayed at the bottom of the EDIT NTS window). If this difference is small then simply change the END ADJ values for the shorter note sequences to equate the durations.

For large differences in duration try editing the shorter note sequences in the Stave Editor and replace the longer notes with a slightly less long note followed by a rest (use the Timings for correct replacement). The objective here is to obtain a similar number of notes in each note sequence. If note sequences contain the same number of notes then changing the LENGTH parameter will result in equal changes in duration.

## COMPATIBILITY

The RSX's allow a great deal of compatibility with other 'sound' software, e.g.

```
|CHANNEL.SILENT,&X111:CALL &BCA7:|SPEECH,12000,1600:|CHANNEL.SILENT,0
```

The above example shows how Music Maker can be used with Neil Hopkinson's excellent RSX SPEECH package (the call &BCA7 performs a sound reset).

BASIC sounds are also catered for (see 'SOUND EFFECTS' and 'RESTRICTIONS ON BASIC SOUNDS').

## SOUND EFFECTS

The philosophy employed in Music Maker is that music is 'background' sound and effects are 'foreground' sounds. Thus, if music is playing, sound effects will override music on channels used by the effects. Furthermore, any subsequent effects override current ones for conflicting channels.

Any of the 31 Scores can be played as an effect, however, it is intended that short tunes should be used. BASIC sounds are also treated as sound effects (hence |EFFECTS.OFF will disable BASIC sounds).

*Example BASIC sound effects:*

```
ENT 1,20,-100,3
SOUND 2,638,30,7,0,1
```

```
ENV 1,8,7,10
SOUND 5,200,80,15,1
```

Note that MUSIC MAKER is completely independant of the firmware & hence there is no conflict with BASIC's ENV's and ENT's.

## RESTRICTIONS ON BASIC SOUNDS

After |SOUNDS.ON, all BASIC sounds will be intercepted by MUSIC MAKER which will issue the SOUND command with the following restrictions:

- All SOUND commands will be issued with flush
- a maximum duration of 5.1 seconds is imposed

If you wish to use other features of the firmware sound routines (holds, rendezvous, queues etc.) then you should use

```
|CHANNEL.SILENT,channel_byte
```

to free channel(s) from MUSIC MAKER before issuing the SOUND commands.

## THE RSX COMMANDS

On installing the sound module (by running the LOADER program), the following RSX's are installed:

```
|SOUNDS.ON
|SOUNDS.OFF
|MUSIC.ON
|MUSIC.OFF
|EFFECTS.ON
|EFFECTS.OFF
|MUSIC.RESET,tune_number
|MUSIC.SILENT,channel_byte
|EFFECTS.PLAY,tune_number
|CHANNEL.SILENT,channel_byte
```

These commands (explained below) give you full control over your music and sound effects.

### |SOUNDS.ON

Switches on the (multi-tasking) MUSIC MAKER sound system. Also performs |MUSIC.OFF, |EFFECTS.ON, |MUSIC.RESET,1 and |CHANNEL.SILENT,0.

### **|SOUNDS.OFF**

Exits the MUSIC MAKER sound system.

### **|MUSIC.ON**

Plays music from the current position in the current tune. The current tune is set by |MUSIC.RESET.

### **|MUSIC.OFF**

Pauses the music. Use |MUSIC.ON to un-pause & continue from the current position.

### **|EFFECTS.ON**

Switches effects on.

### **|EFFECTS.OFF**

Switches effects off.

### **|MUSIC.RESET,tune\_number**

Sets the current position to the start of the tune specified. Valid range for tune\_number is 1..31.

### **|MUSIC.SILENT,channel\_byte**

This command allows the music to play silently on one or more channels. The channel\_byte parameter is similar to the first parameter in BASIC's SOUND command, where 7=all channels, 0=no channels, 2=channel 2, 5=channels 1 and 3 and so on. It is much easier to understand if you use the binary representation via the prefix '&X', hence:

|MUSIC.SILENT,&X110  
will cause the music on channel 3 and 2 to play silently.

### **|EFFECTS.PLAY,tune\_number**

Plays the tune specified as an effect. Valid range for tune\_number is 1..31.

### **|CHANNEL.SILENT,channel\_byte**

Disables channels from MUSIC MAKER allowing you to use the firmware sound system on them (rendezvous, queues, etc.). See |MUSIC.SILENT above for an explanation of channel\_byte.

## CALLING RSX'S FROM ASSEMBLER

Calling an RSX routine requires:

- the A register should contain the number of parameters
- the IX register points to an area of memory where the parameters are stored in the reverse order

If you do not know the address of the RSX routine then call the firmware routine, KL FIND COMMAND to obtain it.

*Example:* |EFFECTS.PLAY,3

The following subroutine calls EFFECTS.PLAY using the parameter value (FXPPAR:).

```
FXPLAY:    LD HL,FXPNAM:
           CALL &BCD4
           LD DE,OUTFXP:
           PUSH DE
           LD A,1
           LD IX,FXPPAR:
           JP (HL)
OUTFXP:    RET
FXPNAM:    DEFM "EFFECTS.PLA"
           DEFB "Y"+&80
FXPPAR:    DEFW 3
```



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