**Quilcom SIM-MBIRA**



**Design**

The Quilcom SIM-MBIRA is a synthesiser for simulating the sound of the African Mbira and the western-designed Kalimba, which is derived from the Mbira. The instrument is sometimes referred to as a “thumb piano” based on the way it’s held in the hands and played by flicking the tines with the thumb nails and sometimes an index finger.

Mbiras produce a rattling or buzzing sound generated by objects attached loosely to the sound board/box and mounted on a metal plate. These “rattlers” were traditionally shells but are now often bottle caps or beads. Sometimes the Mbira is wedged inside a large dried and hollowed gourd housing to act as a resonating chamber.

Kalimbas don’t use rattlers and feature either a solid sound board or a hollow box to amplify and sustain the sound.

The tines are made from steel and can be kept in tune by tapping them forward or backwards in the clamping bridge. The most common tuning is equal temperament diatonic, but they can also be pentatonic. Kalimbas are normally diatonic but so-called Array Kalimbas are made which cover a fully chromatic scheme.

If you are interested in more detail you’ll find a lot more information and links in the background info folder.

My “SIM” series of synths follows a common philosophy, namely to use only synthesiser techniques and no sample players. Apart from me loving a challenge, the upside is having control over many parameters to shape the sound as you wish, which is generally not possible even with huge sample sets. Of course the synth is free too, whereas sample sets, of necessity, involve a colossal amount of work to accurately capture a whole range of sounds, not to mention the articulations provided by professional musicians. That costs a lot of time and money, so I guess *good* sample sets can never be free.

The downside to using pure synthesis is that authenticity to the modelled instrument will rarely be as convincing as real instrument samples, so you balance authenticity and cost with flexibility.

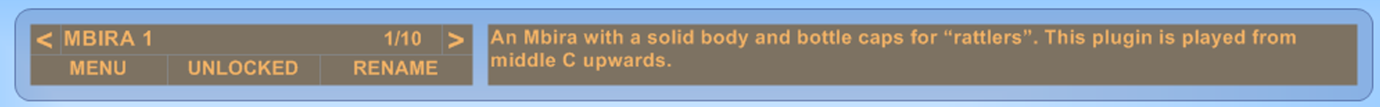
**Overview**



At the top is the preset manager which features starting-point presets for variations of instrument type.

The central instrument image will show the type of instrument being simulated. On the left side are the controls for adjusting the timbre. Below that you have controls for pitch-related settings and stereo width. On the right side are 2 environment effects, a volume control and a sound recorder for making samples.

What follows is a detailed description of all the controls, including some references to the real instrument.



The preset manager contains several presets for different classes of Mbira-type instruments. These are provided as easy starting points for you to tweak as you wish.

On the left side is the small section where you select the preset by clicking on the preset name or paging though them using the arrow buttons.

The **MENU** selector is where you operate on presets or banks. You can save, load, copy or paste presets, or save and load a bank from this menu.

All changes made to any settings will be stored with the DAW song file unless the switch **UNLOCKED** is changed to **LOCKED**. This locking feature is to avoid losing settings if you just want to mess with editing but want to keep the original default parameters.

The **RENAME** button allows you to name or rename a preset providing the preset manager is **UNLOCKED**. Otherwise the **RENAME** button is dimmed.

On the right side is a free text area for adding comments to the preset. These comments are saved with the song and preset, providing the preset manager is **UNLOCKED**. Please be aware that you shouldn’t use a carriage return (Enter) in this text because the system won’t store any text after that. Also please be aware that when you **RENAME** a preset this text will clear, so if you want to keep it and just rename the preset, highlight the text, copy it then paste back in after you’ve renamed.



The **TINES** section has 3 knobs.

**LENGTH** controls the decay time. This is key-tracked because higher notes have shorter decays. When the **LENGTH** is set to 1.0 it matches the decay times I measured on my own Kalimba.

A **TINE** can be played with a softer stroke from the thumb end, a harder flick from the thumb nail or even plucked with a wire plectrum attached to the thumb. So the **PLUCK** knob adjusts from a softer pluck to a hard pluck. The most common method is to use thumb nails, so this is simulated when the knob is in the centre position.

When any tine is plucked, other tines will be excited to some degree. The longer tines close to the centre of the instrument will ring more than the shorter ones. The level of these is controlled using the **SYMPATHY** knob. If a simulated microphone is placed further away, this setting should be reduced. The tines chosen are diatonically spaced, but I think the effect is sufficient for an Array Kalimba.



As mentioned before, an important and valued part of the Mbira sound is the rattling or buzzing sound produced by items loosely fixed to the sound board or box. These objects can be shells, bottle caps or beads. The **SIZE** knob adjusts the timbre of these objects rattling. Turning the knob up goes from beads at minimum, through shells, to bottle caps (and beyond!).

Which actual object rattles and by how much will vary from tine to tine. The **VARY** knob does 2 things: It determines the *amount* of variation between objects and the pseudo-random *distribution* of this variation.

The **LEVEL** knob sets the volume of the rattling sound added to the tines’ sound. I’ve heard a lot of variation between instruments in this respect, so you have the capability to simulate this.

If you turn the **LEVEL** fully down the instrument image will change to a Kalimba since they have no rattlers.



The body of the instrument can be solid or hollow, and these have different sonic qualities. The **SOLID** knob, when fully down, will disable the resonance created by a guitar-like sound box. As in the image above, the **SIZE** knob has no effect and a solid bodied instrument will be displayed.

When you turn up the “**SOLID**” knob it will change to “**HOLLOW**” and the **SIZE** knob will become available to set the capacity of the sound box. The **HOLLOW** knob will then set the amount of sound box resonance added to the tines’ sound.



**OCT**, **SEMI** and **FINE** tune the whole instrument.

Unlike a wooden Xylophone instrument, an Mbira can be tuned by tapping the tines forward or backwards. However, on several YouTube videos I’ve watched the tuning seems rarely perfect. I think this may be due to getting the *whole* key range perfectly in tune is really difficult (as I found on my own Kalimba). Also there may be variations caused by temperature and humidity changes affecting the wooden parts. Whatever the reason, in my opinion the tuning errors add something to the “ethnic” feel of the sound. For this reason I’ve recycled the tuning error system from my Quilcom SIM-GYIL so you have the option.

The **BAD** knob does 2 things. It controls the *amount* of detuning variation and also selects from over 1000 different pseudo-random *distributions* of tuning deviations. If you want perfect equal temperament tuning, turn the knob fully down. Increasing the **BAD** value will introduce more detuning.



An Mbira is generally a small instrument so unless very close microphone placement is simulated the sound will not be wide, even for the player. However, there exists “Array Kalimbas” and these are wider with a chromatic tuning usually spanning a wider range than regular thumb pianos. On these the low notes are on the left and the higher ones on the right, so the **STEREO** **WIDTH** knob allows you to go from mono, when fully down, to stereo when turned fully up.



The first optional effect is a **ROOM** simulator. This and the **REVERB** can be turned on/off with the orange LED switches. When turned off, no CPU is used.

**SIZE** is a macro control for a triple delay system and sets the reflection delay for all three delays. **REFLECT** is a macro that adjusts the simulated sound absorption of the walls etc. **LEVEL** sets the volume of the reflections heard which are added to the dry sound. If the microphone is close to the instrument, the reflections will be at a lower level against the instrument’s sound, so the **LEVEL** knob can adjust the balance.



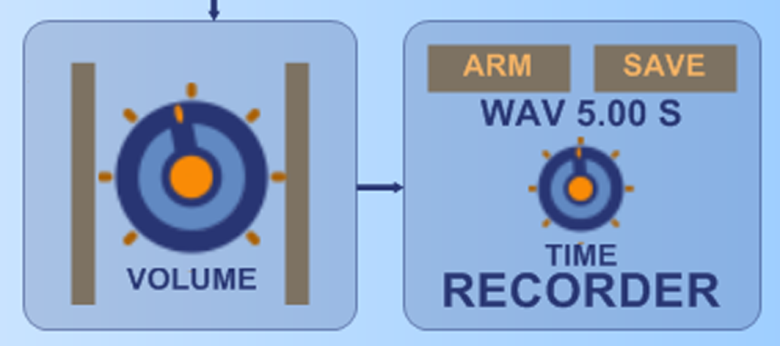
The **REVERB** uses the excellent MVERB 7B engine made by Martin Vicanek.

**TAIL** sets the length of the reverb tail for it to fall to T60 (-60dB below initial).

**DAMP** simulates a more absorbent environment and turning it up will progressively attenuate the higher frequencies in the tail.

**WIDTH** sets the stereo width of the reverb tail (not to be confused with the **STEREO** width of the Mbira itself).

**MIX** adjusts the balance between dry and reverb sound.



The output **VOLUME** control has 2 vertical bar graphs which indicate average peak levels. If even short clipping occurs the inner pale blue ring will turn red for 1 second.

The **RECORDER** on this synth can record sounds or a short performance up to 10 seconds.

To make a recording, set the anticipated maximum **TIME** then click **ARM**. When a midi note is played the recording starts and a progress bar appears. Click on **SAVE** to open a regular Windows save file dialogue where you can save your recording as a WAV at 44100 Hz 16 bit stereo.

If you don’t get it right, just start again because the buffer will be cleared and overwritten. The processing in memory is simple so you can’t stop a recording once started; you have to wait until the progress bar disappears. Also, it can take a few seconds to create the wav file and write it to disk once saved.