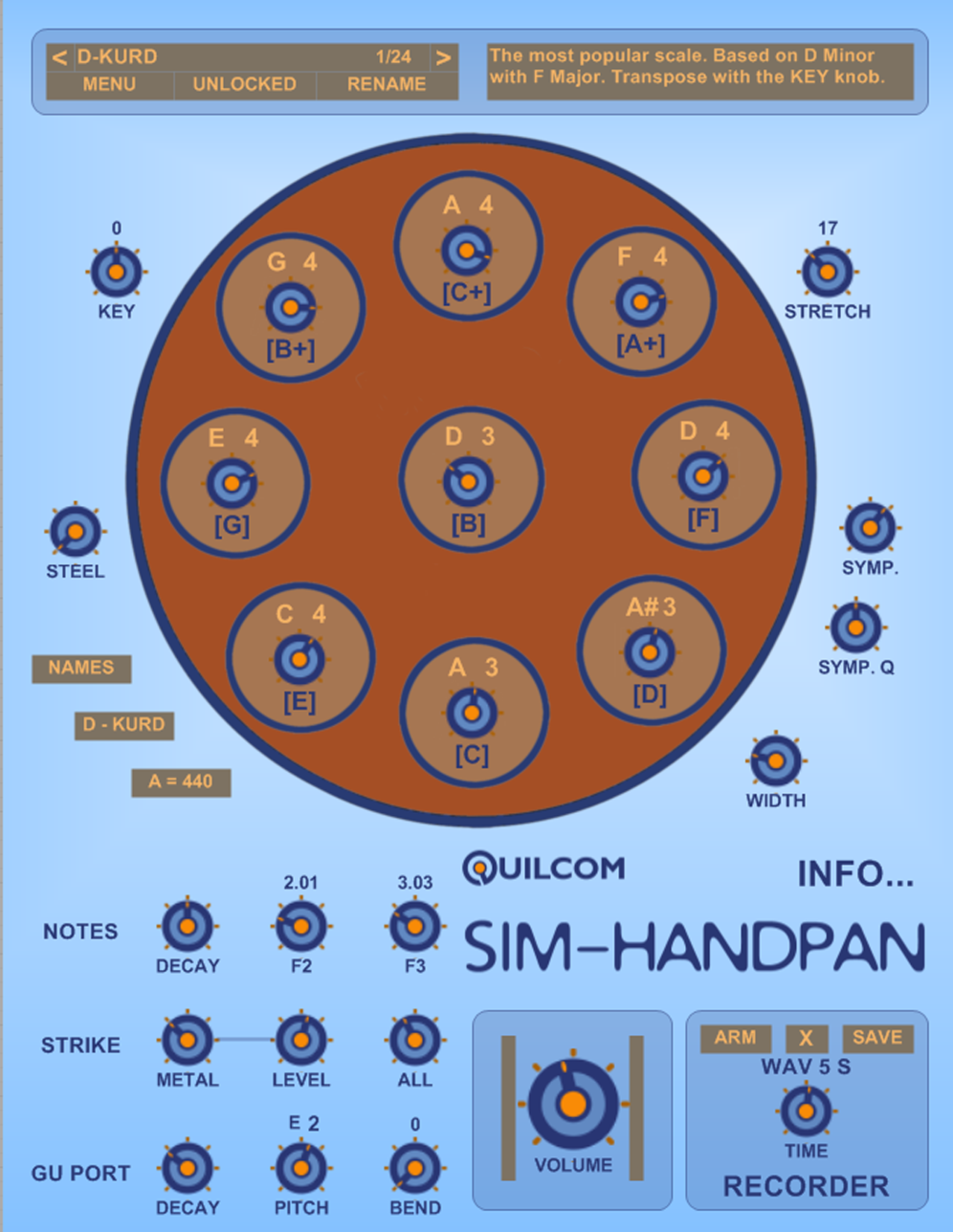
**Quilcom SIM-HANDPAN**



**Design**

The Quilcom SIM-HANDPAN uses synthesiser techniques, without sampling, to simulate this very modern and increasingly popular type of instrument.

The original “Hang” (not Hang *drum*!) was created by PANArt in 2000 and was derived from the Caribbean steelpan instrument, but to be played by hand instead of mallets. It also offered a more limited range of notes which were derived from chosen scales in order to make a creative instrument that was very intuitive to play and meant that no “wrong” combinations or sequences of pitches can occur. Every note usually fits with all the others!

Since then, many builders have been making variations of the original Hang but since the name “Hang” is registered the general term “Handpan” arose.

The Background folder contains several useful links if you want to learn more about this instrument and also you can find an excellent sound analysis PDF.

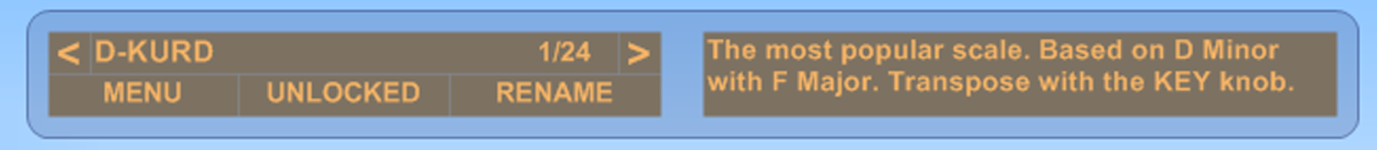
**Playing**

The MIDI keys B (59) to C (72) play the tone fields (notes) and respond to velocity. B (59) corresponds to the centre note or “Ding”. On the underside of the shell is a sound port called the Gu and on a real instrument slapping this port sets up a Helmholtz resonance. This is simulated by playing the MIDI note A (57) and this also responds to velocity.

On a high quality instruments the tone fields are carefully tuned so the player can create “harmonics” by holding a finger on one point while tapping a different point on the same field. This can give an octave or compound fifth (1 octave plus a fifth). The MIDI key F (53) changes tone to an octave higher and MIDI key G (55) changes the tone to the compound fifth. Timing of these keyswitches is critical since they must be hit ideally just before the actual note is played. This takes a little practice but of course is easy to program or correct in your DAW.

The black notes within the range simulate tapping the body in the interstitial area (not on a note field) which I often heard on YouTube. All the black notes trigger the same sound so you can do rapid finger rolls by using several black notes in sequence.

If you click on the **INFO…** label you get a brief reminder.



The included presets cover a wide range of the more popular scales. These “scales” have unusual names because often they’re notes selected to fit together and selected from “normal” scales. The Links document in the Background folder can lead you to lots of information about these pitch structures.

All the presets have the same settings on the rest of the synth, so I would say choose a scale you like and *then* adjust the timbre you like, in that order.

Of course you can make your own scales and save the presets for further use later.

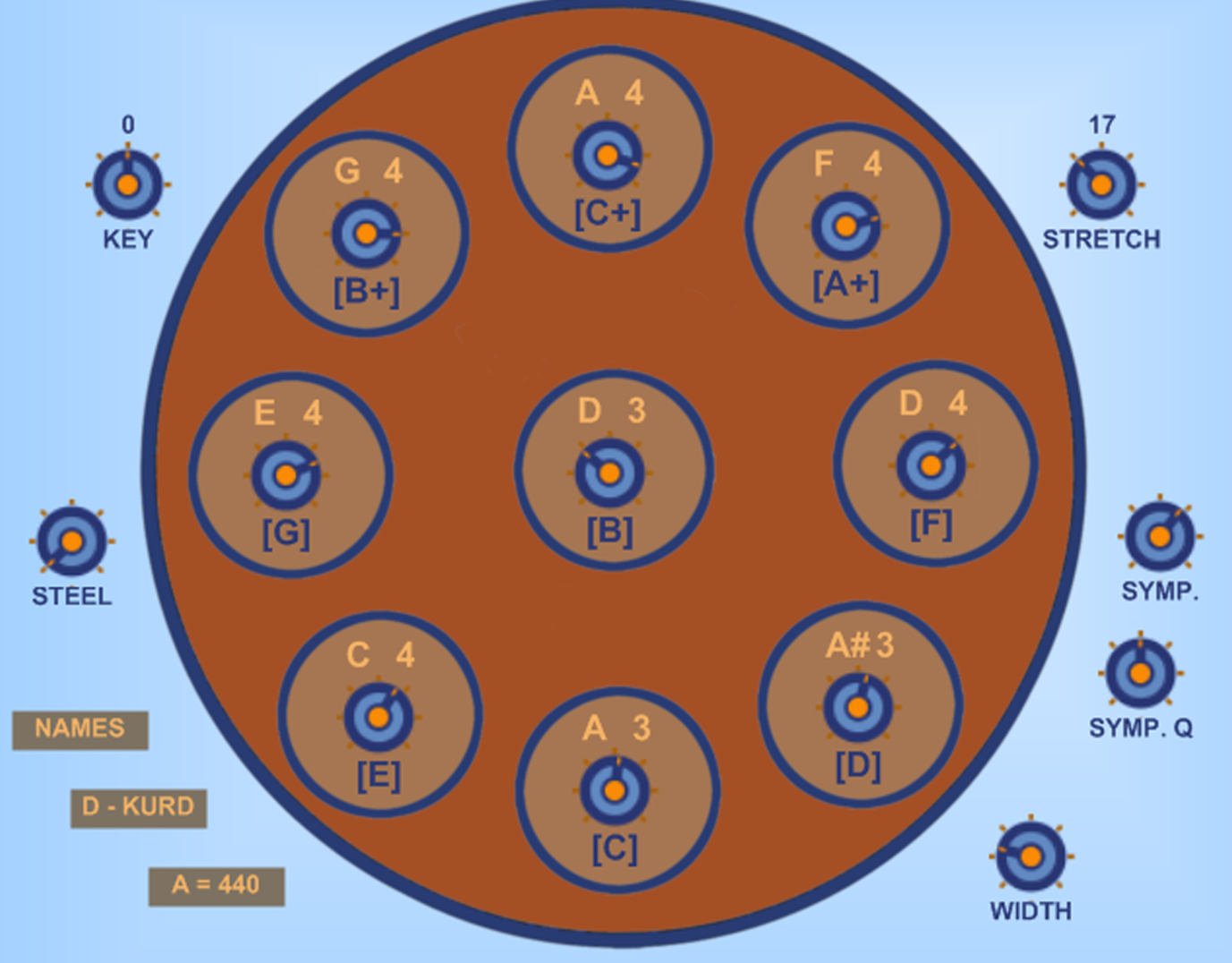
On the left side of the preset manager is the small section where you select the preset by clicking on the preset name or paging though them using the arrow buttons.

The **MENU** selector is where you operate on presets and 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 the preset if saved, 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 instrument area is laid out as a 9 note handpan with some other controls surrounding it. The notes are assigned to each MIDI key using the knobs in the note fields. The pale orange readout shows the pitch actually heard. The dark blue label is the name of the note you play on the MIDI keyboard. If you click on **NAMES** it changes the labels to **NUMBERS** and the scheme I chose gives the number 1 to the Ding. I’ve seen other numbering systems but this seems the more popular and logical to me.

The Kurd scale in D is easily the most popular choice for real handpans, so the **D-KURD** button sets this as a quick default scale.

Some folk say that the best tuning for meditational playing or healing is A=432 so if you click the **A=440** button it will change to **A=432**.

Once you have a scale you like it can be transposed into other keys by using the **KEY** knob which provides a range of +/- 1 octave (far more than God intended!). On some occasions the upper or lower note can’t be reached with the **KEY** knob at zero so you can change the **KEY** knob to get the range you need.

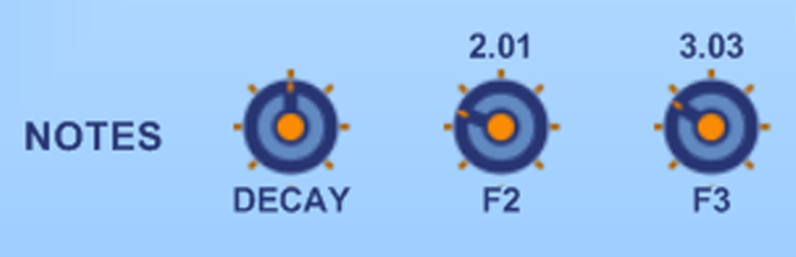
Some handpan tuners like to stretch the tuning so higher notes are slightly sharper. This can be simulated with the **STRETCH** knob. The readout indicates the number of cents the highest note is above the lowest. In practice I read that this is usually a maximum of 17 cents but you can go further if you wish. The **STRETCH** adjustment might be useful if you are creating an ensemble to simulate more separation of instruments.

Originally handpans were made from nitrided steel but more recently stainless steel has been used as an option. These two types of steel give a subtly different timbre. The **STEEL** knob allows you to morph between these two simulated timbres. Fully down is nitrided and fully up is stainless.

Sympathetic resonance can occur on high quality handpans. This is when you have 2 notes with the same name but an octave apart. The lower pitched note causes the higher one to sympathetically resonate at its fundamental frequency. This is simulated using a resonant filter bank (created by martin Vicanek) with 2 parameter knobs:

**SYMP.** adjusts the level of the resonance and **SYMP. Q** sets the bandwidth of all the filters.

The sounds from the notes are panned left-right according to their position on the layout and this creates a stereo field. The **WIDTH** knob adjusts the width of this field. When fully down it’s mono, half way is regular stereo and above that the stereo field becomes extra wide.



The **DECAY** knob sets the amount of time taken for the sound to fade out. More clockwise increases the “sustain” of the notes. Better quality instruments have a longer sustain and can blend successive notes effectively into chords. The actual decay time is internally tracked so the higher notes decay faster than lower ones by a ratio I determined from YouTube videos.

In non-linear systems the partials are normally not in exact integer ratios, and this helps to give character to the timbre. Higher frequency partials are normally at higher ratio offsets. Partials **F2** and **F3** can be sharpened with their corresponding ratio knobs.



There are 2 components to the sound of the initial finger or thumb strike. The finger noise *itself* isn’t audible against the sound produced by the instrument.

The first component is caused by the metal around the note field vibrating and is of very short duration. The **METAL** knob sets the average pitch of the sound and can be adjusted beyond realistic. The **LEVEL** knob adjusts the volume of this metallic strike.

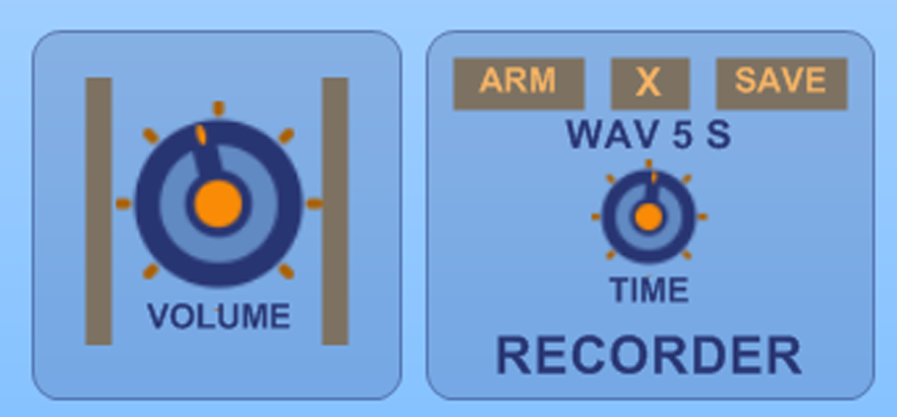
The second component is generated by the impact causing **ALL** notes to sound at a low level. I could hear this as a kind of tuned reverb on some videos and incidentally is far more pronounced on Steel Tongue Drums (I own one!). So the **ALL** knob adjusts the volume of this vibration.



As mentioned before, Gu is the name PANArt gave to the hole or port on the underside of the Hang. When this is slapped a Helmholtz resonance occurs which is deeper than any note field, typically one octave down from the Ding (note 1 or centre note). This works in a similar way to a Djembe which can produce a deep sound irrespective of skin tension. The **DECAY** knob sets the time the Gu sound lasts and this can vary between different makers, designs, port construction and materials.

On high quality (expensive) instruments the Helmholtz pitch will be tuned to fit with the chosen scale. The frequency range available is quite limited due to the volume of air contained in the handpan. The **PITCH** knob adjusts this frequency within the real range available and I’ve given it the note name readout for ease of matching.

On a real instrument it’s possible to actively bend this Helmholtz pitch upwards in two ways. One is to partially insert a hand into the port and the other is to alter the gap between the player’s legs. Either way gives the same result and this is simulated with the **BEND** knob. So the **BEND** adjustment increases the pitch and has a readout in cents. You could use this to statically detune the **PITCH** adjusted, or automate it in the DAW to add extra expression.



The master **VOLUME** control features a system to indicate even brief peak clipping by turning the inner blue ring red for 1 second. The bar graphs for left and right are an indication of the average peak level.

The **RECORDER** enables you to record and save wav files from what you play on the synth. The **TIME** can be set up to 10 seconds. Click on **ARM** and the recording will start when you play a note. The progress is indicated on a horizontal bar. Click on **SAVE** to store the wav file (stereo 44100 Hz 16 bit).

If you wish to cancel the recording click on the **X** button and the recording will be reset and cleared.

After saving a wav file please wait for several seconds before opening it because the creation and writing of the file isn’t instant.