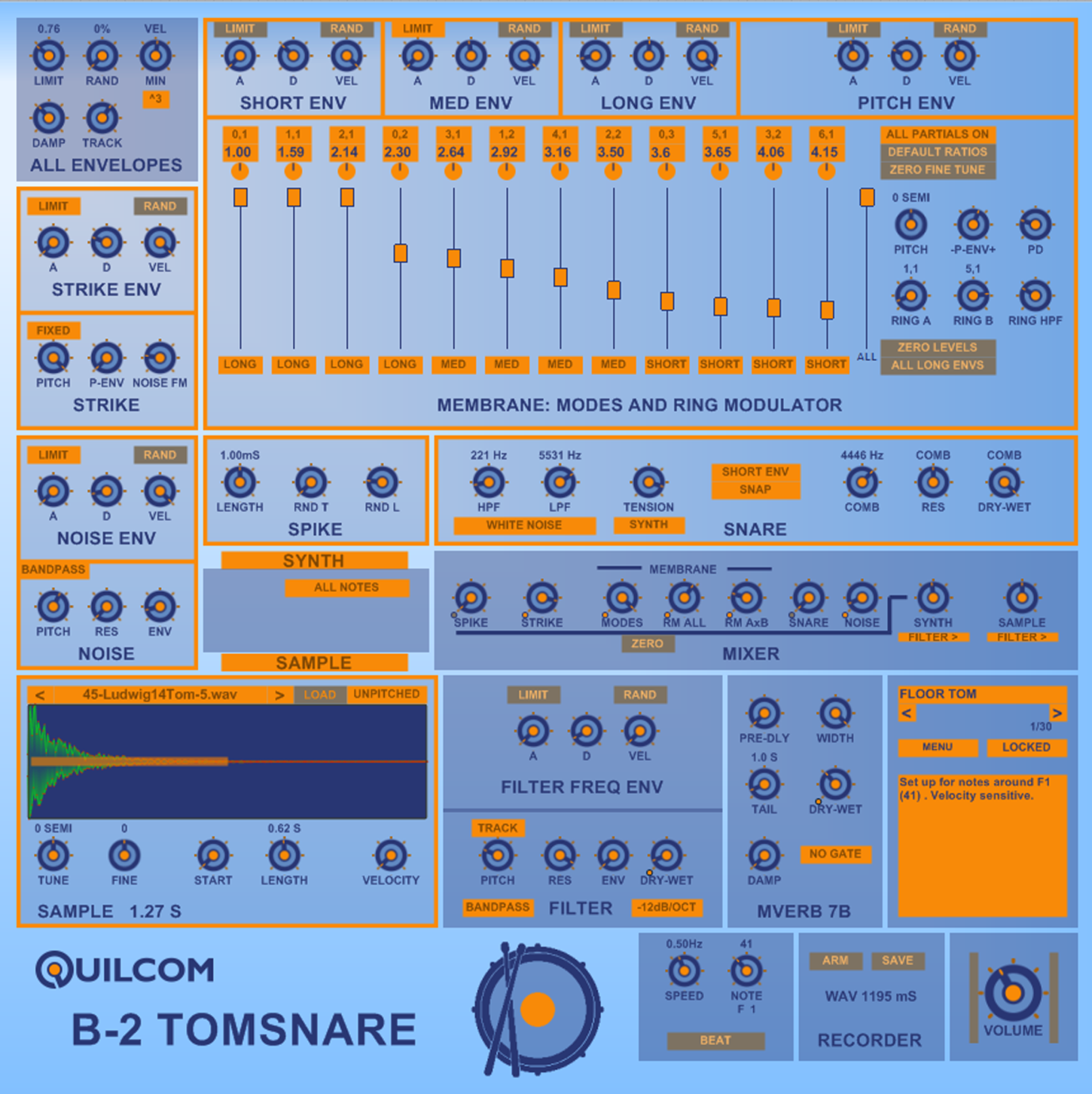
**The Quilcom B-2 TOMSNARE**



**Design**

The Quilcom B-2 TOMSNARE adds to the range of B-2 (Beater 2) plugins. I developed it to simulate the sound of “membranophones”; instruments which rely on rigidly supported circular membranes to create pitched drums and more. Additionally, a section is devoted to simulating the sound of snares, which can be layered with the drum sound and interact with it.

It’s a popular practice to mix sampled sounds with synthesised sound, so there is a flexible sample player provided which can optionally be routed through a dynamic filter. Individual hits within a loop can be isolated for this purpose, and the hits can be played at their native pitch or chromatically across the keyboard.

A sound can comprise any or all elements provided: Spike, Strike, Membrane modes, Ring Modulators, Noise, Snare and Sample. These are described in detail later.

When you have the sound you like, you can export it by using the inbuilt recorder and save the result as a WAV file for use in your favourite drum machine and/or DAW. This means you aren’t compelled to use the plugin live in a DAW and could thus save CPU.

For anyone interested in the physics and theory of membranes and drum synthesis I have included several papers and links in the download. You will also find a small selection of acoustic samples of different types to play around with right away.

**Overview**

Most of the upper section is the synthesiser. The lower left is the sample player. You have large buttons to turn the Synth and/or Sample sections on and off. When these are ON the relevant panels get an orange border.

The darker panels are all *global* settings which can affect the whole sound.

I made a range of generic presets of different classes of instrument sound and type. These are intended to be used as *starting points* for you to tailor a sound to your exact needs.

You can watch my video demo here:

[URL]

What follows is a detailed description of the function of each panel or section, together with some background and tips.



Here you see the 2 buttons for turning the SYNTH and SAMPLER on and off.

The panel is where you set which MIDI note will trigger the sound. The ONE NOTE switch can be changed to show ALL NOTES, in which case the whole MIDI keyboard span becomes available. The NOTE knob is where you set the note to respond to, and the readout C 1 will change accordingly. If you click on the note name, you can choose whether middle C is classified as C3, C4, or C5 since there is no universally accepted octave numbering system.



For ease of use you don’t have to keep hitting the keyboard, or have the DAW running, to audition the sound as you tweak away. You can click on the drum icon which will trigger the note set on the BEAT panel. This note setting is independent from the main set note. Alternatively (or as well) you can turn BEAT on with the BEAT switch. This gives a repeating trigger at the SPEED you set. This is independent from the DAW’s tempo and the actual speed will not be as accurate; it’s there for convenience only.

Tip: If you leave the BEAT running you can page through your presets and hear them as you go.



Any sound you create or modify in the B-2 KICK can easily be exported, to use in your favourite drum machine. This is done with the RECORDER section. It makes a one-shot recording of a hit which you can then save as a WAV file. The duration of the recording is determined automatically by taking the *longest* time currently set on the system. This could come from the SAMPLE or from the longest total envelope time adjusted, or from the reverb tail time. This means the recording will always contain the whole sound with no added silence at the end of the file.

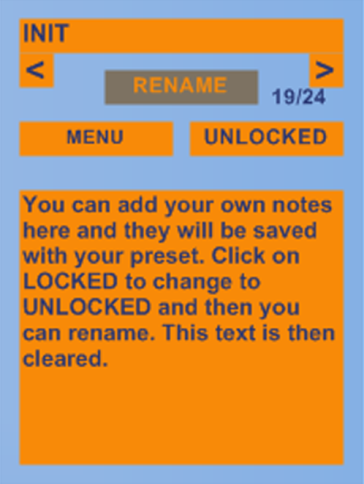
Once you have the sound you like, click the ARM button then trigger the sound from the keyboard or drum icon. A progress bar will appear for the duration of the recording and the ARM button will then go dark again. Click on SAVE and use the usual Windows dialogue to save it.

Tip: The time taken to write the file can be longer than its duration, so wait for a few seconds before using the wav file you just saved.

Tip: The reverb tail time will not be taken into account if the DRY-WET mix is fully set to DRY, in which case the reverb is OFF.



This is the VOLUME knob for the whole plugin. The 2 vertical strips are bar graphs which indicate the average peak level. If a peak goes into clipping (which might be desirable!), the inner ring of the knob will turn red for 1 second. Since drum sounds are very short and “peaky” this red is a useful indication, because the bars will typically appear somewhere in the mid-range when clipping starts.



This is the preset manager section. The top line is a selector where you choose the preset. You also have arrows to page through them. MENU gives you the file management options so you can save/load individual presets or banks and copy/paste presets to a new slot.

You can only rename a preset when the right hand button is showing UNLOCKED as above. While unlocked, the DAW will save any new adjustments in the song file. If you just wish to experiment but keep the original settings, change the button to LOCKED.

Each preset can have a free descriptive or reminder text, and this is entered in the large lower box. The text is cleared when you RENAME a preset, but you can copy and paste it back in if you wish to keep the text.



This is the panel for *global* settings for all 7 envelope generators.

The LIMIT knob is similar to an audio level limiter but operates on the envelopes instead, so I think provides a better result. When set to 1.00 there is no limiting. With increased limiting, the envelopes have their level chopped off at the adjusted point, but their output range is compensated to give the same operating range. This results in a flattened peak, and the result is similar to having a hold period or short sustain. The effect is to give the sound more “punch” since maximum volume is held for a short time.

Each envelope can be set to receive the limit value or not. This means you can add punch to any sound source with an envelope generator you wish (so not the SPIKE or SAMPLE).

Tip: Limiting doesn’t sound good or better for *all* sounds, and the “hold time” will be affected by the total Attack and Decay times set. Just experiment! At extremes the sound can change considerably.

Tip: Start sculpting the sound with *no* limiting applied, only then turn up the limiting and decide if it helps or hinders.

The RAND knob provides a degree of randomisation available to all the ENVs. The idea is to provide subtle (or otherwise) variations to successive hits. You choose which ENVs respond to these variations with their RAND buttons on each ENV. There are actually 7 random numbers generated individually, 1 for each ENV, so this increases the randomness such that one Env may increase while another decreases.

Incoming velocity signals are processed by the VEL MIN system. The MIN knob sets the minimum velocity level so if you hit a key very softly you will still get a sound. The orange selector below it allows you to set the response curve to match you keyboard and playing style. You can choose between LIN (linear) and an exponential response of power 2, 3 or 4. The default values in the image above are a good starting point for having an easy-to-play accent note.

The DAMP knob setting comes into play when you step on the sustain pedal (its label turns orange). The pedal is configured not to sustain, but to *shorten* all the envelopes’ decay times proportionally. The idea is you can press the pedal to kill a longer sound, like a timpani, and can provide 2 expressions from one preset. When set to off there is no damping. When set half-way the decay times are approximately halved and so on.

The TRACK knob affects *all* the envelopes and determines the amount of shortening of decay times as you ascend the keyboard. When set to zero, the decay will be the same for all notes. As you increase this value, notes above C1 (36) will be shorter for higher notes. The maximum ratio is 50% reduction per octave (usually too much!).



The synth has 7 identical envelope generators. Since this is a percussion synthesiser there are only Attack and Decay adjustments. The Attack time is therefore shorter than you would get on an all-purpose synth. This makes fine adjustment of the initial slope steepness easier. The maximum Decay time range is much longer, going up to 4 seconds. As befits percussion instruments, the Attack stage is linear and the Decay stage is exponential (designed by Martin Vicanek). You set any ENV to receive the LIMIT value as adjusted on the global ALL ENVELOPES panel and similarly the Random amplitude range value as set on the same panel.

The VEL knob sets the amount by which the velocity (set on the global ALL ENVELOPES section) affects the level. At minimum, the Velocity has no effect and the level is always at maximum. As you increase the VEL, softer key hits will produce lower levels.



Early analogue drum machines like the TR 808 used a short trigger pulse to excite a Twin-T filter which would then ring and decay on its own. This was the basis for the classic electronic kick and tom sound. Of course the trigger pulse itself was heard at the very start of the kick, giving it an interesting “snap” transient.

The SPIKE generator simulates this trigger sound. The Roland trigger for the sound was 1mS long, which is the default duration on the SPIKE generator. Now it could happen that, with higher tempo rhythms or longer decay times of the filter, the filter would not have completely decayed when the next trigger pulse arrived. This could give rise to a variation in the amount of trigger click heard, since the waveform cycle could be at any level when re-triggered.

The SPIKE generator can simulate this effect by having adjustable random values for the SPIKE level and duration, set with the RND T (time) and RND L (level) knobs. The LENGTH knob sets the basic time value and this is varied more with higher settings of the RND T knobs.

Tip: Some producers actually used the trigger pulse itself as a sound source. The TR 808’s trigger *output* was set by Roland to 20mS however. This is the maximum setting of the LENGTH knob, so you *could* make this horrible sound with the B-2 TOMSNARE!



The STRIKE generator can be used to simulate the sound of the initial hit of the stick or mallet onto skin, or, of course, for other purposes.

The envelope at the top controls the amplitude contour of the STRIKE.

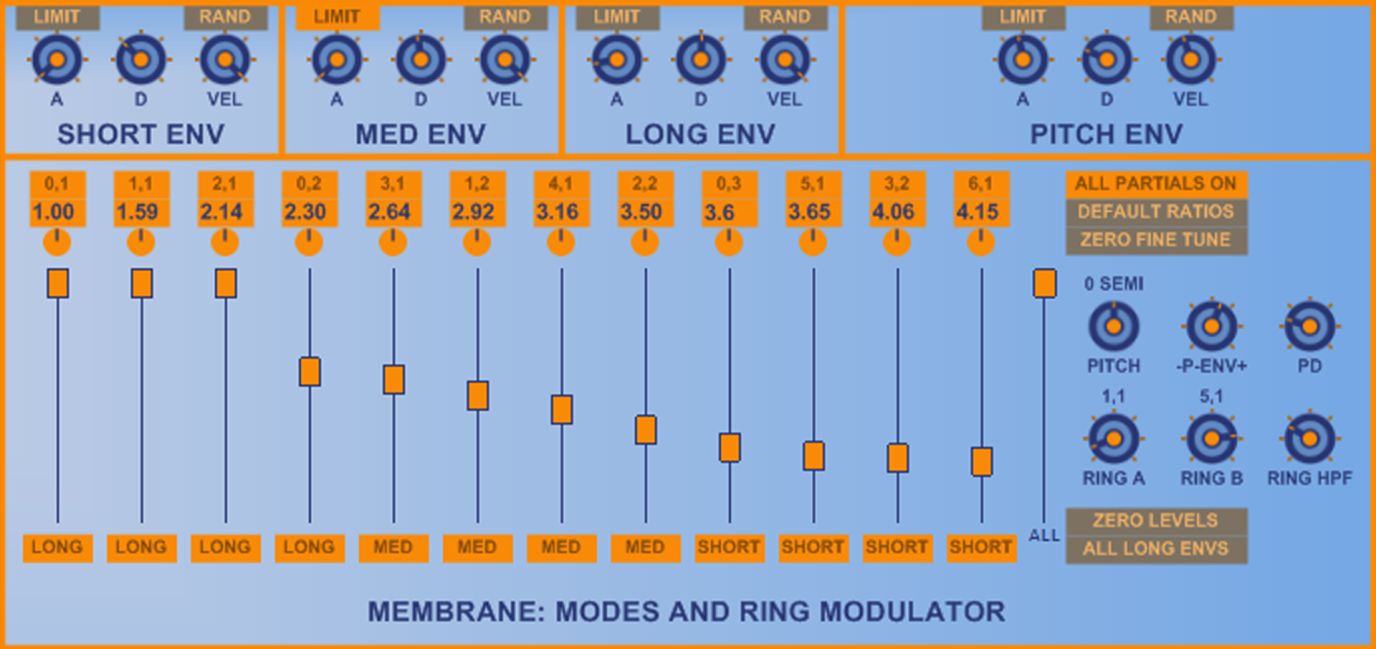
The STRIKE contains a sinewave oscillator. You can choose to track the incoming MIDI pitch with the TRACK button, offset or set the base pitch with the PITCH knob, modulate the pitch with the envelope above, using the P-ENV knob, and set the amount of NOISE FM.

Tip: Typically the STRIKE sound will be very short compared to the decaying overall tone of the drum sound.

Tip: You could also set a very short sound to use instead of the SPIKE generator, which would give you much more control over that click sound.

Tip: If you just want noise from this panel, turn the PITCH knob high, so it’s beyond normal hearing range, and increase the NOISE FM level. Set FIXED tracking as shown in the picture above. The noise produced will have a quality that differs somewhat to plain white noise.

Tip: The STIRKE generator can produce a range of “analogue” percussion sounds on its own.



The MEMBRANE panel is where the main body of the sound is created.

Rigidly supported circular membranes create a range of partials with non-harmonic (enharmonic) relative frequency ratios. This is explained in detail in the papers and links supplied in the download, so I won’t attempt to myself.

Since this is an additive synth you can enter whatever ratios you want to experiment with, and make fine tuning to each one. If you want to start again, using the theoretically ideal ratios, click the DEFAUL RATIOS and/or ZERO FINE TUNE buttons. The labels at the top of each slider give the *mode number* for an ideal membrane, and are just for reference.

Each of the 12 partials has a level slider to get the amplitude balance which sounds right. You can set them all to zero with the ZERO LEVELS button. Also you can adjust them all together with the ALL slider (this will override previous slider settings).

One of the issues with additive synthesis is that different partials need to decay at different rates. Typically (but not necessarily) the higher frequencies will decay faster. I found by experimentation that 3 envelopes will suffice, and 4 or more is overkill and eats up more CPU without audible benefit. I’ve named the 3 *amplitude* envelopes SHORT, MED and LONG even though they all have the same operating range. This is to help with identification when selecting which envelope to use for which partial (chosen at the bottom of each slider).

The PITCH ENV generates an envelope assigned only to pitch modulation. This means any pitch modulation can be set independently of the 3 amplitude envelopes.

Tip: I found it useful to start designing a sound with all partials set to the LONG ENV, then modifying as necessary. Just click the ALL LONG ENVS button to achieve this quickly.

The PITCH knob allows you to set a semitone offset to the keyboard pitch. This means you can map the sound anywhere onto the keyboard and not be confined by the note position when played.

-P-ENV+ allows you to set the amount of pitch sweep from the PITCH ENV. In the central default position (double-click) there will be no effect on the pitch, a negative setting will cause the pitch to drift UP to the note and a positive setting DOWN to the note.

Tip: Some drum synth techniques use a pitch envelope to simulate what you might hear from a real drum. Actual pitch shift on an acoustic drum is very short and of low variation, maybe a semitone or so, and is less with softer hits. On real drums you might hear what seems to be a pitch envelope, but it’s actually the effect of higher partials lasting longer. In this case it sounds a bit like an upwards pitch shift, but it’s an auditory illusion.

The PD knob is for setting the amount of Phase Distortion. It affects all partials equally and at the minimum setting the partials are pure sine waves. As you increase the PD setting more of the output signal of each partial affects in own phase modulation, thus producing a higher harmonic content at the start of the sound, fading as the decay progresses. This produces a broader spectrum of enharmonic partials when using the ring modulators and can add some extra “snap” to the sound.

The MEMBRANE section provides 3 outputs. One is of course the additive synth. There are 2 Ring Modulators available which are level-set on the MIXER (see later). RM ALL is a summation of successive pairs of partials being processed by 6 Ring modulators. The other is RM AxB and in this case you use the RING A and RING B knobs to select a pair of partials feeding a single separate Ring Modulator. This latter arrangement gives you full control of the Ring Modulator pair. Whereas the RM ALL is a more dense enharmonic sound, the RM AxB can be much better defined to maybe pick out a specific element for the sound.

The RING HPF knob controls the cutoff of a static high pass filter, and works on RM ALL *and* RM AxB equally. It’s useful because ring modulators produce sum and difference frequencies and the *difference* frequencies can sound too low in pitch.



The SNARE panel is for generating the high-pitched rattle of a snare system bearing on the resonant head underneath a drum. Essentially it’s a processed noise source.

You can choose between WHITE NOISE (as shown), FM noise (which has a different character), or both.

The chosen noise source is the fed though a static HPF (High Pass Filter), then a static LPF (Low Pass Filter). This allows you to set the tone of the snare sound over a wide range and bandwidth.

The TENSION knob is there to simulate the degree of rebound of the snare wires, coils or beads against the resonant head. This rebound is at zero with the TENSION set to maximum and, as you reduce the TENSION, the snare starts to sound looser, with more of a vibrating rattle. The source of this rebound can be set to SYNTH (as shown), SAMPLE or both. This means you could add the sound of the snare to any chosen *sample*.

For the snare’s envelope you can choose between the 3 amplitude envelopes on the MEMBRANE panel, probably the LONG one, but that depends on what sounds best for you.

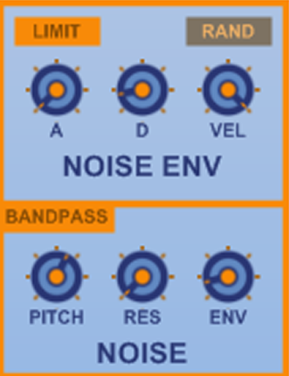
You can turn SNAP on or off. SNAP increases the exponentiality of the chosen envelope and, when turned on, the snare envelope is sharper and shorter. This give you more options; effectively 6 envelopes for the price of 3!

Tip: I found that LONG ENV with SNAP turned on to be a good starting point.

The shaped sound is then fed into a COMB filter, which adds to the metallic character of the snare sound. You can set the base frequency and resonance to give a wide range of snare types. Finally, the comb-filtered sound can be balanced with the unfiltered sound to give a suitable degree of mix for the COMB effect.

Tip: Due to the damping effect of the snare against the resonant (bottom or snare) head, the “Tom” part of the sound is typically shorter than a similar Tom with no snare engaged. Energy is taken away by the snare, so the overall envelope should be shorter, sometimes very short. If you want a short Tom “smack” with a more defined snare, you could reserve one of the 3 amplitude envelopes just for the snare itself.

Tip: You can use the SNARE generator for other types of noise source too.



The final section of The SYNTH is devoted to NOISE generation. The ENV at the top is dedicated to the NOISE volume contour but can also be used to control the pitch of the dedicated state-variable filter below.

The type of filter is chosen with the orange selector, here showing BANDPASS.

The PITCH sets the centre frequency of the filter and is *not* influenced by the incoming MIDI pitch.

The RES knob sets the filter’s Q or resonance.

The ENV knob adjusts the amount of influence of the NOISE ENV on the centre frequency.

Tip: Filtered noise is often used to simulate the many enharmonic frequencies present in a real drum, especially early on. It can also be used on its own to create the “thud” of a deeply pitched drum and for many sound effects too. For some sounds it could be all you’d need!



The option to layer any SAMPLE with the SYNTH brings endless possibilities to drum and other sounds. The panel, shown in the picture, deals with all the handling of the SAMPLE.

Click on the LOAD button to navigate to the folder containing your samples. Double click on any file to load it and then *all* the samples in that folder will become available in the browser. These can be paged through with the arrow buttons or selected by clicking on the sample name and choosing from a dropdown list.

The UNPITCHED switch allows you to also choose PITCHED. UNPITCHED means the sample only plays back at one pitch, ignoring the incoming MIDI pitch values. PITCHED means it will track the MIDI keyboard.

The TUNE knob provides for an adjustable semitone offset to the sample’s playing pitch, along with the FINE knob. When set to zero (double-click for default) the sample will play at its native recorded pitch. The system is set up internally to expect C1 (note 36) to sound the sample natively. Changing the TUNE value can be useful if you wish to use an alternative note for triggering, or to spread a sample sound over the keyboard with suitable pitch matching. Note that if you use a pitched *musical* sample recorded at say middle C, *it will play* ***correctly*** *at C1*. If you want to play it at middle C, as it was recorded, set -24 on the TUNE knob which tells the system that it was actually recorded 2 octaves higher.

You can set the region of the sample you wish to play. The START knob sets the point at which the sample will play from, when triggered. The LENGTH knob will set the point at which playing stops. The central orange bar shows the play region.

The VELOCITY knob simply sets the level according to MIDI velocity. At zero it’s always at maximum volume and, as you increase the value, softer-hit notes become quieter.

Tip: You may only need to play a reduced *section* of a sample, such as the strike or decay phase, to embellish the synthesised sound.

Tip: You may have a *loop* which contains a sound you like. In this case, load up the loop and create a region just for that sound. You don’t necessarily need to slice it in an editor first!

Tip: The *end* of the chosen region is set to fade out over 40mS to help avoid a click at the end. However, the start is *not* faded in. This allows you to make a click at the start of the sound. While *operating* the region knobs and playing, you will hear clicking due to randomly hitting peaks in the sample.

Tip: If you want to *avoid* a click at the start, maybe in a longer loop with many events, turn on the BEAT and hold down the ***shift key*** while you adjust the START knob. This give you a fine-adjust mode for the knob so you are more easily able to find the best start point while listening to the result. This is also useful for synchronising the drum sample with the synth so they start at the exact same time.

Tip: Some samples don’t start instantly or may have reverb tails. You can use the region controls to alter the START point, and LENGTH to cut out the tail.

Tip: The download includes a selection of drum samples of different types, so you can start to experiment straight away.



The MIXER is where you mix together the outputs from the SYNTH to create the SYNTH composite sound, and balance this with the SAMPLE sound.

You can route the SYNTH and SAMPLE signals each into the main filter or directly to the output, using the little switches under the SYNTH and SAMPLE level knobs. In this way you could use the main FILTER for either, both or neither sources.

For the SYNTH composite sound you have 7 level controls. The small orange lamps will be lit when a control is above zero, and indicates that the corresponding section will be using CPU.

I found it useful to be able to set all the SYNTH mixer knobs to zero, so the ZERO button will do just that. It’s useful if you want to start over again with the mixing!

The SYNTH and SAMPLE level knobs will only be seen when the SYNTH or SAMPLE switches on the front panel are lit and thus turned on and using CPU.



The main filter gets its input from the MIXER, based on the routing set on the MIXER. If SYNTH *and* SAMPLE are set to DIRECT, the filter panel controls disappear and are replaced by a notice saying the filter is not in use.

The FILTER FREQ ENV can influence the centre frequency according to the adjustment of the ENV knob.

The selector showing BANDPASS allows you to choose the filter type and the -12dB/OCT switches between that slope and -24dB/OCT.

The PITCH knob sets the centre frequency, and if the TRACK switch is lit, keyboard tracking is added to the PITCH knob’s value.

The RES knob sets the filter’s resonance. This is calibrated so that, when set to maximum, the filter can ring like the analogue equivalent.

The DRY-WET knob adjusts the balance between the incoming unfiltered sound and the filtered sound. When set to fully DRY, the little orange lamp dims and the FILTER is bypassed, and then it doesn’t use any CPU.



After some careful consideration I decided to include a reverb. The engine is the MVERB 7B created by Martin Vicanek and I think it has a great sound.

I expect that in a real situation you will want to use your favourite reverb(s) but I provided this at least for auditioning purposes. It can be bypassed by turning the DRY-WET knob to fully DRY and then it won’t use CPU.

PRE-DLY sets a pre-delay time before the reverb fills out.

TAIL is the duration of the reverb tail before it reaches -60dB (T60).

DAMP sets the damping effect of the higher frequency components in the reverb tail to simulate a softer space.

WIDTH sets the width of the stereo tail. If the SAMPLE is stereo it will be processed fully in stereo. The SYNTH section is mono (one channel) so the reverb can create a nice space for it.

DRY-WET sets the balance between the incoming sound and the reverberated sound. When turned to fully DRY the reverb is off and bypassed.

The selector showing NO GATE allows you to choose 2 different gated reverb times, so you can simulate Phil Collins!

Tip: You may want to turn off the reverb when exporting a sample. If you *do* want the reverb recorded, the T60 TAIL time will automatically be taken into account by the RECORDER for the recording timer.