MS20 Mini Drums

Synthesis Guide

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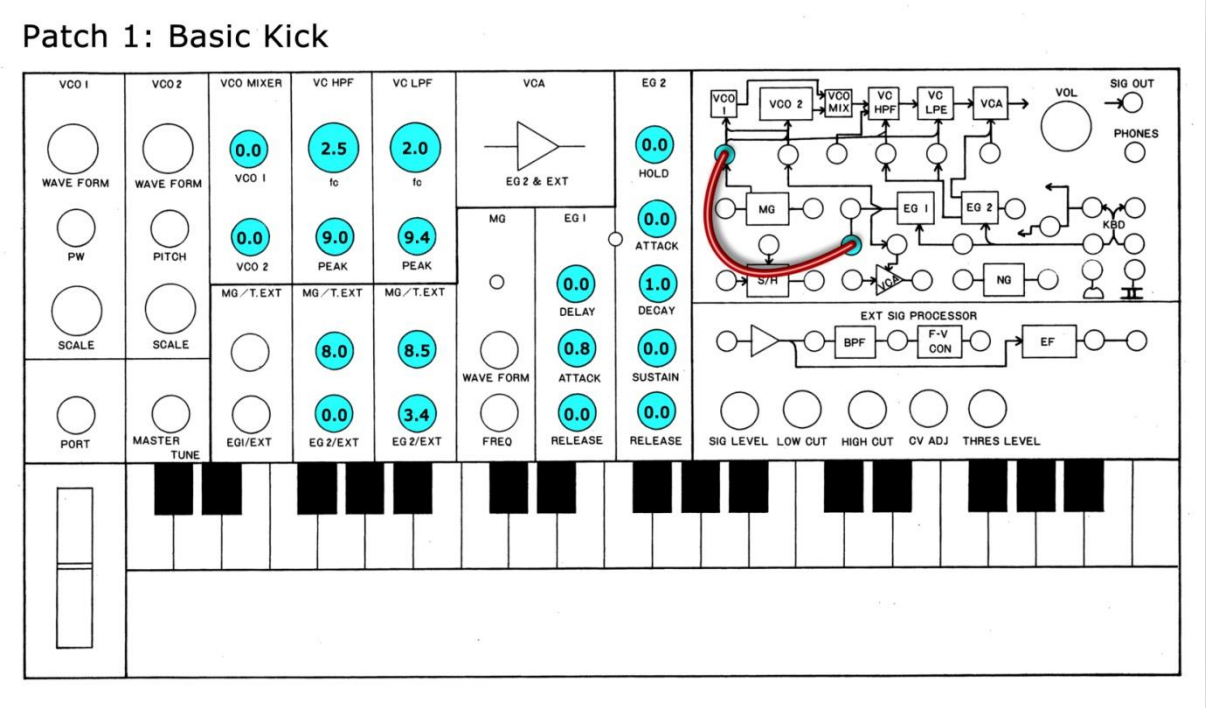
MS20 mini Drum Synthesis Guide

This guide provides drum and percussion patches and includes notes on how best to adjust them.

The patch diagrams only include relevant information, patch points and knobs that can change the sound are highlighted in blue. Controls and patch points left blank have no effect on the sound and so can be left in any position, with the exception of **PORTAMENTO** which should be set to zero.
All reference to knobs and patch-points in the notes are written in bold.

Contents

Section 1: Kick Drum



Refer to the audio example file *wams20_example_basic-kick_u .wav*

NOTES on Basic Kick

The patch shown above is slightly different to the video in that we now have **REV OUT** patched into **TOTAL**, which allows both filters to be modulated by the inverted output of ENVELOPE GENERATOR 1 (EG1).

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**

About REV OUT

As with most patches in this guide that use the **REV OUT** EG1 patch point, when you hit a key to trigger the sound you should hold down that key until the EG2 amp envelope has fully decayed. Otherwise the drum sound will end abruptly. You may also hear the undesirable effect of the EG1 suddenly increasing voltage as it enters the release phase of its envelope – which is also the reason why the patches using **REV OUT** like this have zero release on both EG1 and EG2.

Adjustments

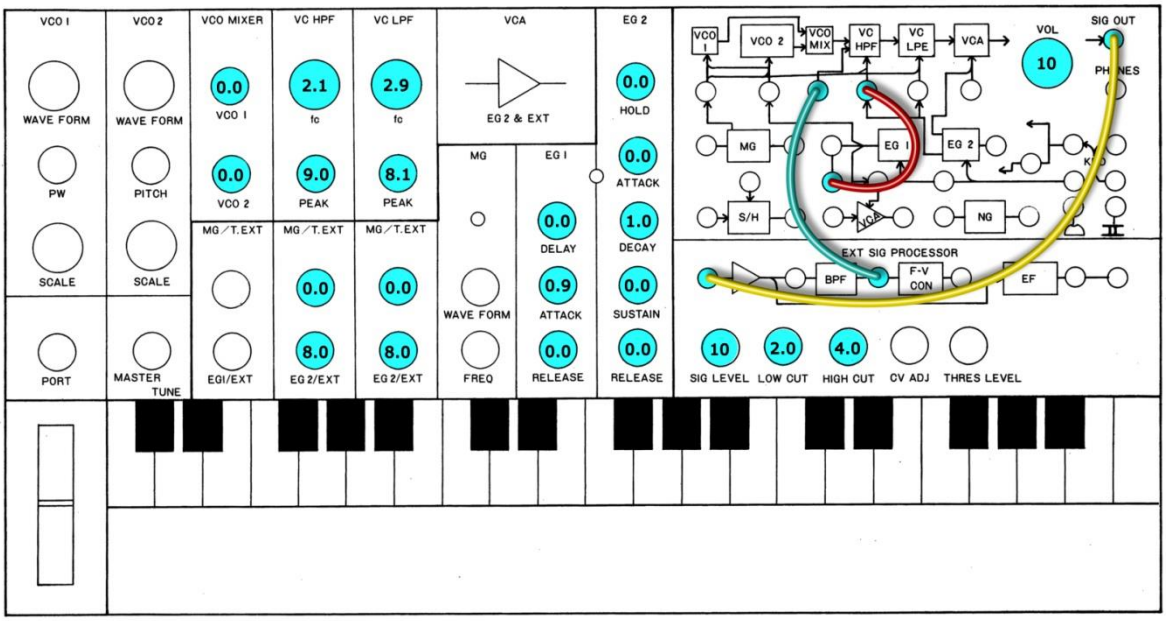
To increase *punch* from the initial transient, increase the EG1 **ATTACK TIME** slightly (turn it clockwise). Note that the higher this value gets the higher the pitch at the start of the transient becomes and the more elongated the initial *snap* gets, until it reads as a pitch change rather than a *snap*. The **DECAY TIME** of EG2 controls the VOLTAGE CONTROLLED AMPLIFIER (VCA) so if you want to change the length of the kick, this is the knob to adjust.

Adjust both the VOLTAGE CONTROLLED HIGHPASS FILTER (HPF) and VOLTAGE CONTROLLED LOWPASS FILTER (LPF) **CUTOFF FREQUENCY** to make your kick higher or deeper in pitch. You'll find that if you match the positions of the **CUTOFF**s and the CUTOFF FREQUENCY MODULATION

MG/T.EXT settings you'll get a more 'in tune' and ringing kick with more of a discernible pitch. This is because the filters are acting like oscillators and by matching these settings you're putting them in tune with each other. Also experiment with detuned sounding or inharmonious filter setups. You can also dial back the **PEAK**s a little more than the amounts shown above, which will open up the frequency range of the kick a little, but if you turn them down too much the filters will stop self-oscillating and go silent. Increasing the **PEAK** amount will give you a *harder* sound and a narrower band of frequency content.

Increasing or decreasing the CUTOFF FREQUENCY MODULATION **MG/T.EXT** settings will affect the perceived transient of the sound, increasing these values will increase the 'snappiness' and also the pitch. So it's usually best to avoid maximum values when generating kicks. Turning just one of the **MG/T.EXT**'s down (for example the one modulating the LPF) will result in a flatter tone/steady pitch – you may need to also increase the filter **PEAK** amount to achieve this affect.

Patch 2: Feedback Kick



Refer to the audio example file *wams20_example _feedback-kick_u.wav*

NOTES on Feedback Kick

The added feedback component in this sound gives wider frequency content and a distortion effect. Feedback is set up using the **SIGNAL OUT** socket. This means that you must use the **PHONES** output to record this drum sound.

Control of this patch is much like the basic kick patch with the slight difference that the **REV OUT** EG1 is not patched to **TOTAL** so it will only affect the HPF. This is to leave the **TOTAL** input free for other modulation sources, for example white noise. Try patching white noise to **TOTAL** and then dialling up the **MG/T.EXT** control (the one below the HIGHPASS). This will give a heavy *knock* to the kick. Alternately you can alter this patch by connecting **REV OUT** EG1 to **TOTAL** just like in the Basic Kick patch to control both filters with EG1.

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT** →VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**
2) **SIGNAL OUT** → EXTERNAL SIGNAL PROCESSOR (ESP) **SIGNAL IN**
3) BAND PASS FILTER **OUT** → **EXT SIGNAL IN**

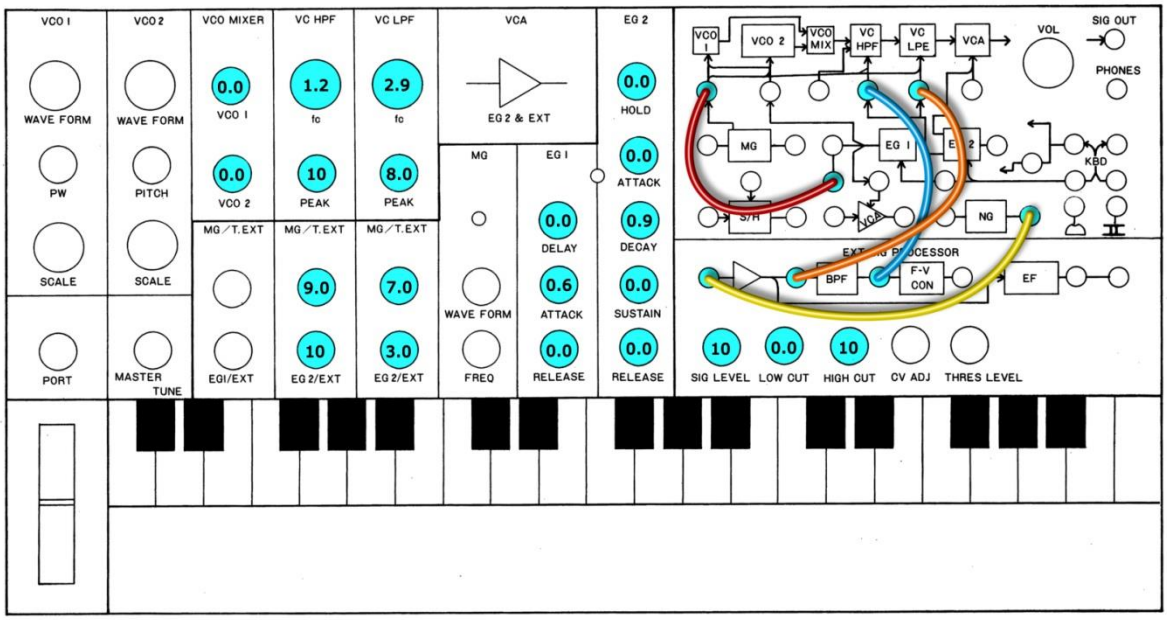
Feedback

The **VOLUME** control in this patch is very important, as the less you have, the less feedback you have. The easiest way to use this is to leave it at maximum and use the **SIGNAL LEVEL** in the EXTERNAL SIGNAL PROCESSOR (ESP) section to control the amount of feedback.

ESP LOW CUT and HIGH CUT

Because this patch takes the audio signal from after the BANDPASS FILTER in the ESP we have additional tonal control of the feedback element using the **LOW CUT FREQ** and **HIGH CUT FREQ** controls. Restricting this frequency range as shown in the patch above places emphasis on the mids, giving a more *hollow* or *knocking* feel to the kick. Letting through more highs will give you more of a *blip* on your kick and the lows will increase the *rough* distortion effect.

Patch 3: Noise Kick



Refer to the audio example file *wams20_example _noise-kick_u.wav*

Notes on Noise Kick

This is a variant to the Snare Patch (page 7) and gives a 'puff' kick type sound.

You can think of this as the same as the Basic Kick patch (page 2) with added noise content.

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) NOISE GENERATOR **WHITE** → ESP **SIGNAL IN**
3) AMP **OUT** → VOLTAGE CONTROLLED LP FILTER **CUTOFF FREQ**
4) BAND PASS FILTER **OUT** → VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**

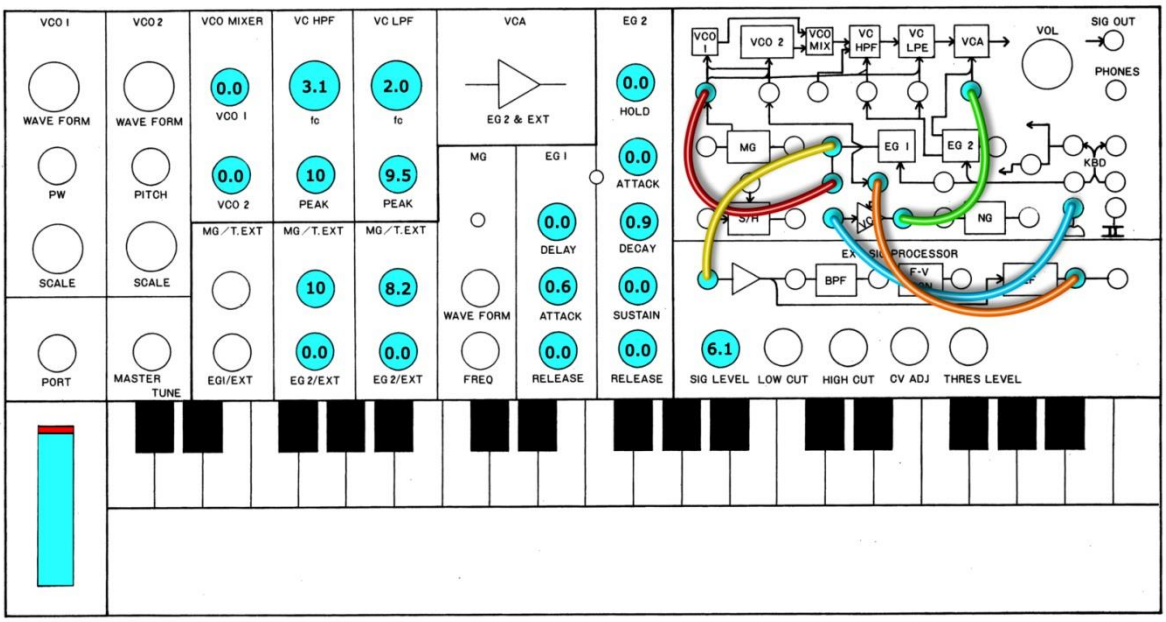
Filer position and Noise Modulation

Because the filters on the MS20 are in series, with the HPF audio going in to the LPF, the setting of the LPF is critical in letting the noise content of the HPF through. The patch above shows the HPF being modulated to the maximum by noise, however this effect is barely noticeable because the LPF is set low, in effect blocking most of that noise content. Therefore to hear more of the effect of the noise on the HPF you also have to increase the LPF **CUTOFF FREQUENCY**.
Also note that the noise is only modulating the LPF a little in the above patch (set to 3.0 on **EG2/EXT**) increasing this amount will start to turn the kick more into a snare sound.

ESP section settings

Turning down the **SIGNAL LEVEL** will result in a deeper kick, with obviously less noise content. The BANDPASS controls here will only affect the HPF noise content. If you want it to affect the LPF instead, switch the output leads over (shown as orange and blue).

Patch 4: VCA Kick



Refer to audio example *wams20_example _vca-kick_u.wav*

Notes on VCA Kick

This patch increases the signal level right at the beginning of the kick. The patch is a variant of the VCA Tom patch (Page 15) and is explained more fully there. The principals are demonstrated in the Toms video.

Think of this patch as the same as the Basic Kick patch (page 2) but with an added *thump* at the start of the sound.

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) ENVELOPE GENERATOR 1 **OUT** → ESP **SIGNAL IN**
3) ENVELOPE FOLLOWER **ENV OUT** → VCA **CONTROL INPUT**
4) **MODWHEEL** ∩ → VCA **IN**
5) VCA **OUT** → VOLTAGE CONTROLLED AMPLIFIER **INITIAL GAIN**

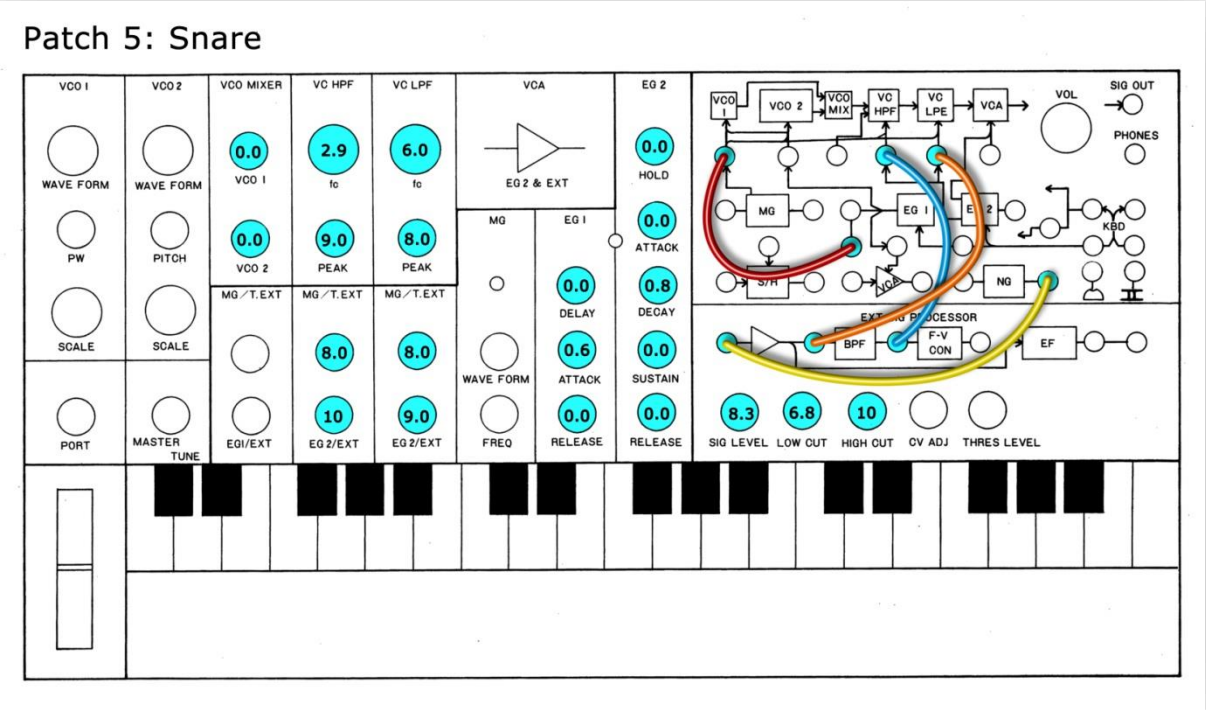
ESP **SIGNAL LEVEL**

You just need to put this at a medium level so that the peak light activates when you press a key, this is a good level for the ENVELOPE FOLLOWER to work well. If you set it too high you will hear a nasty feedback tone – and the TRIG OUT light will also be constantly on. Too low and you won't trigger the ENVELOPE FOLLOWER at all.

Controlling the 'VCA thump'

This is limited as you have no control over the length of that 'VCA thump', which is automatically determined by the ENVELOPE FOLLOWER. The only thing you can control is the amount of extra gain added, controlled by the MODWHEEL and shown in the above example at maximum.

Section 2: Snare Drum



Refer to audio example *wams20_example_snare_u.wav*

Notes on Snare Drum

The basic idea of this patch is that you use white noise as a Frequency Modulation source (FM). This makes it a much more versatile patch than one that simply uses noise as an audio component.

Patch points

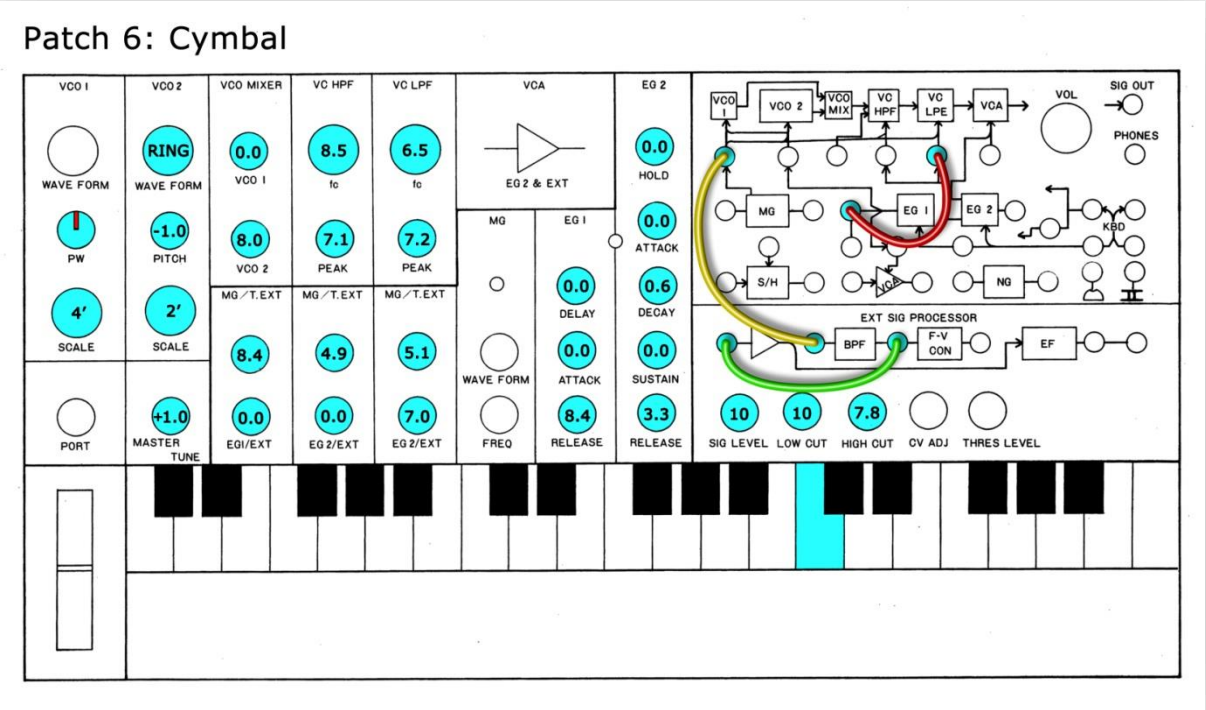
1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) NOISE GENERATOR **WHITE** → ESP **SIGNAL IN**
3) AMP **OUT** → VOLTAGE CONTROLLED LP FILTER **CUTOFF FREQ**
4) BAND PASS FILTER **OUT** → VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**

Adjustments

Use the HPF and LPF **CUTOFF FREQUENCY** to change the pitch and timbre of the snare. In this patch, the HPF frequency determines the position of the main low frequency component, basically like an oscillator, so turn that up a little for more mids, and down for more bass in your snare. The LPF frequency acts more like a conventional filter here, shutting down the high frequencies at lower settings and letting them through at higher.

The two **EG2/EXT** knobs control how much the noise will modulate the filters. Turning them up will result in a *grainy, broken-up* and *harder* sound. The ESP **SIGNAL LEVEL** also has the effect of making it *harder* sounding when dialled up, unlike the **EG2/EXT** controls which simply attenuate the FM, the **SIGNAL LEVEL** will change the tone as it increases due to saturation effects. **LOW CUT FREQ** and **HIGH CUT FREQ** in the ESP have a subtle effect on the sound and the **HIGH CUT** is a useful way of stopping your snare becoming too *broken-up* when pushing the **EG2/EXT** level of the HPF.

Section 3: Cymbals (and Hi-Hats)



Refer to the audio example file *wams20_example_cymbal_u.wav*

Notes on Cymbals

The MS20 mini can make literally hundreds of cymbal sounds by adjusting this complex patch. With so many variables that can alter the sound drastically with only tiny changes in control position, don't expect to hear the same cymbal as the example sound when you copy this patch on your machine. However, you should hear a sound that reads like a cymbal and if you don't, try hitting another key.

Patch points

1) BAND PASS FILTER **OUT** → ESP **SIGNAL IN**
2) ESP AMP **OUT** → **TOTAL**
3) ENVELOPE GENERATOR 1 **OUT** → VOLTAGE CONTROLLED LP FILTER **CUTOFF FREQ**

Rides, hats and crashes

Holding down the key will get you a nice Hi-Hat sound. Hitting and releasing it quickly produces a ride sound and turning the EG2 **RELEASE** down to around 1.5 will give you an open hat. It's actually quite effective to sequence an open and closed hat line like this over midi because the closed hat will choke the open. Crashes can be made by selecting NOISE with the VOLTAGE CONTROLLED OSCILLATOR 1 **WAVEFORM** control and turning up **VCO 1 LEVEL** in the VCO MIXER and then also patching from **WHITE** noise (NOISE GENERATOR) to **EXT. SIGNAL IN** to maximise the noise content.

Note: Noise crashes and hats can be generated from the Snare Patch (page 7) and also shakers by slowing the EG2 attack a little once you have a Hi-Hat sound – there's a few noise hats made in this way in the MS20 mini Library, but no examples of crashes or shakers.

Adjustments

FM is finely balanced in this patch, to start your adjustments, change the VOLTAGE CONTROLLED OSCILLATOR 2 **PITCH** control slightly and then adjust the first **MG/T.EXT** knob in the FREQUENCY MODULATION section (the one below the VCO MIXER) while hitting different keys. Usually the keys around the highest octave of the keyboard work best. What you're aiming for is a clash of frequencies within the sound. It's a very hit-and-miss technique but will generate many unique cymbal sounds.

In the ESP section, movement of **SIGNAL LEVEL**, **LOW CUT FREQ** and **HIGH CUT FREQ** all have dramatic effect on the sound and will quickly turn your cymbal into various buzzing tones (and other cymbals). Leaving the ESP **SIGNAL LEVEL** at 10 and experimenting with the placement of the ESP **LOW CUT FREQ** and ESP **HIGH CUT FREQ** controls will help keep your sound more in 'cymbal' territory. For example some nice chunky open hats can be found by allowing more low frequencies in here by decreasing the ESP **LOW CUT FREQ** number.

Another good way to alter the sound is by changing the **VCO2 LEVEL** in the VCO MIXER section and also the **PEAK** of both filters. When adjusting these, think of the **PEAK** as a mixer level for the filter. Find a nice balance between these 3 elements.

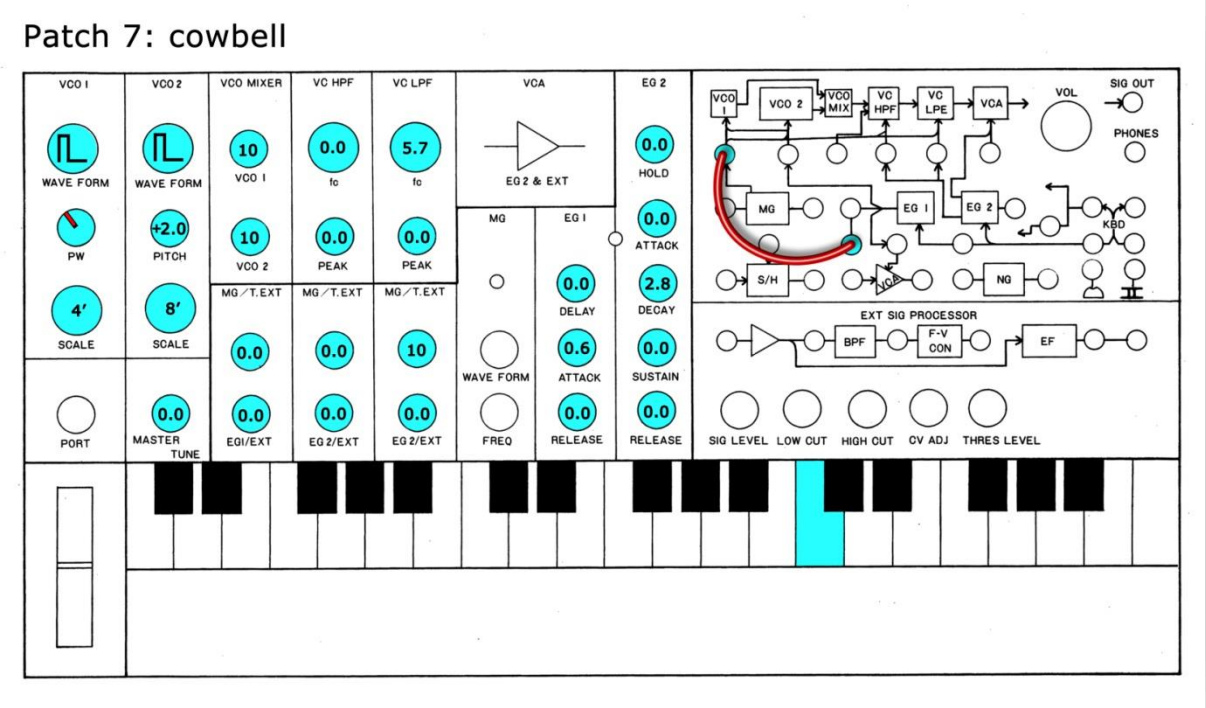
ENVELOPE GENERATOR 1

Not mentioned in the video, this part of the patch is simply there to move the LPF at a nice slow rate making the cymbal sound change slightly over time. You can get a similar effect without this patched in by using EG2 to move the filter instead – which will move the filter at the same speed that the amp fades out.

Adding more complexity

As mentioned in the video, patching the **MODWHEEL** ∩ to **VCO2 CV IN** is a great way to introduce yet more variation to the cymbal sound. The **RING** setting on VCO2 is ordinarily locked in relative pitch to VCO1. When you patch the **MODWHEEL** ∩ into **VCO2 CV IN** what you're doing is unlocking this relative pitch by disengaging the keyboard control of VCO 2. So the keyboard controls the pitch of VCO 1 and the MODWHEEL controls the pitch of VCO 2. Only positive values will affect the pitch, so the MODWHEEL only affects the sound from its centre position and up.

Section 4: Percussion



Refer to the audio example file *wams20_example_cowbell_u.wav*

Notes on Cowbell

This is a very simple patch that generates a sound similar to the 808 cowbell.

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**

Adjustments

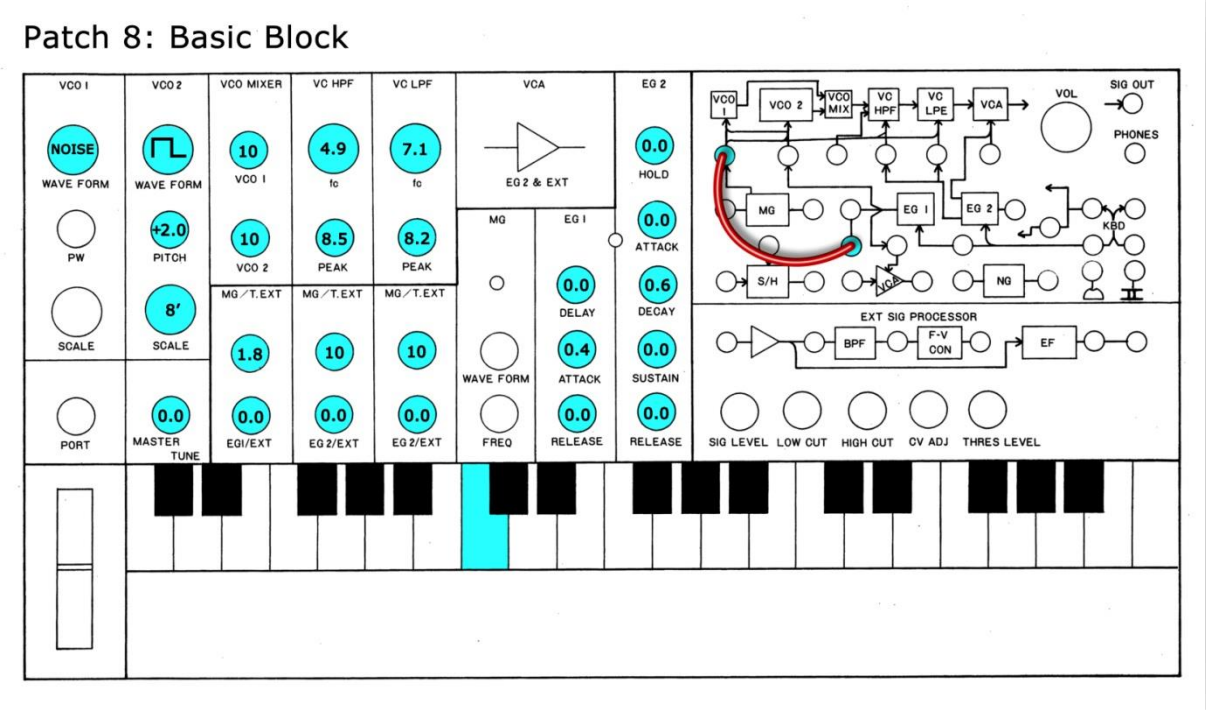
You can bring out different frequency content of this sound by filter and **PEAK** adjustment much like using EQ. You can also add in HPF movement with **MG/T.EXT.**

If your cowbell is now becoming too *zappy* decrease the EG1 **ATTACK** amount or turn down the **MG/T.EXT** controls somewhat.

Metallic cowbell sounds are possible by adjusting the Cymbal patch (page 8):

- change OSC2 wave form to square
- change the **SCALE** to 4'
- decreasing the HPF **CUTOFF FREQUENCY** to around 5
- shorten the EG2 envelope.

Note: because the scope of the Cymbal patch is so large, a huge number of percussive sounds can be generated from this point on. These haven't been included in this guide or the drum library, but are well worth exploring.



Refer to the audio example file *wams20_example_basic-block_u.wav*

Notes on Basic Block

This is a very simple patch that generates an electronic block sound. You can also make a simple 'noise hi-hat' with this patch by removing VCO2 from the mix.

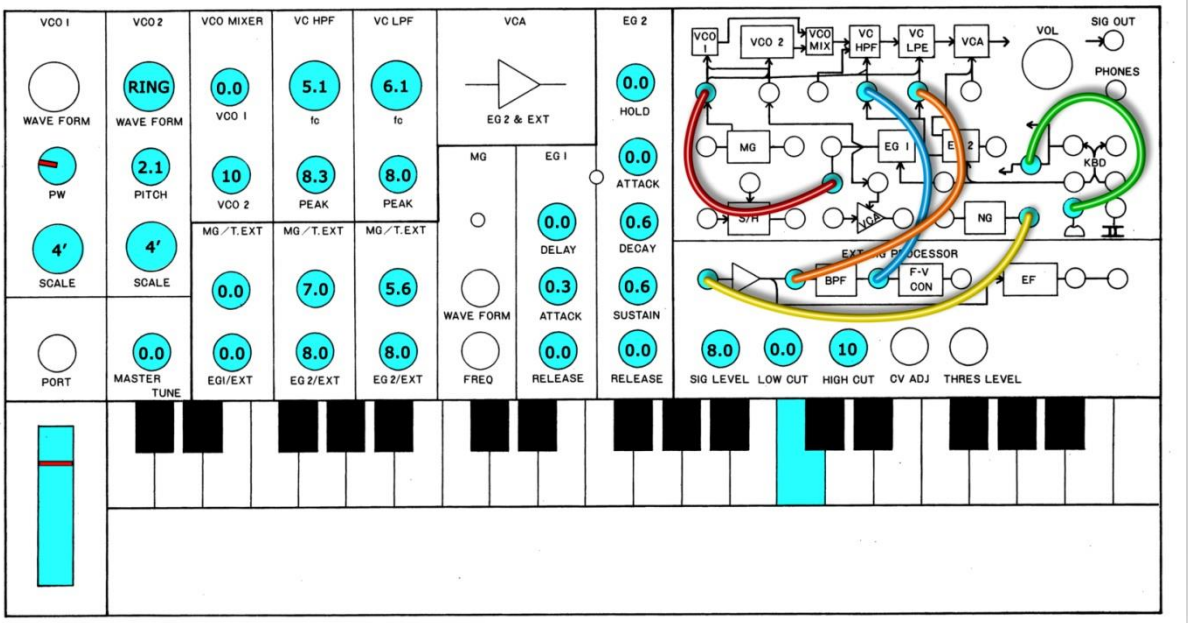
Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**

Adjustments

The transient is very important to this sound so adjustment of EG1 **ATTACK** is critical. Tiny changes will make a big difference to the character of this sound, turning it clockwise by a couple of millimetres will make it sound *zappy*, then as you turn it anticlockwise the sound will turn more into a *snap*. In between zero and *snap* is where you want to set this **ATTACK** point. You may also prefer this sound with slightly less noise in the mix so adjust **VCO 1 LEVEL** to get this balance right.

Patch 9: Complex Block



Refer to the audio example file *wams20_example_complex-block_u.wav*

Notes on Complex Block

This is a variant on the snare patch (page 7) and is epically good for generating mid to low frequency percussion.

It's hard to get this patch to sound exactly like the example because the MODWHEEL position is critical and extremely sensitive to small changes.

Patch points

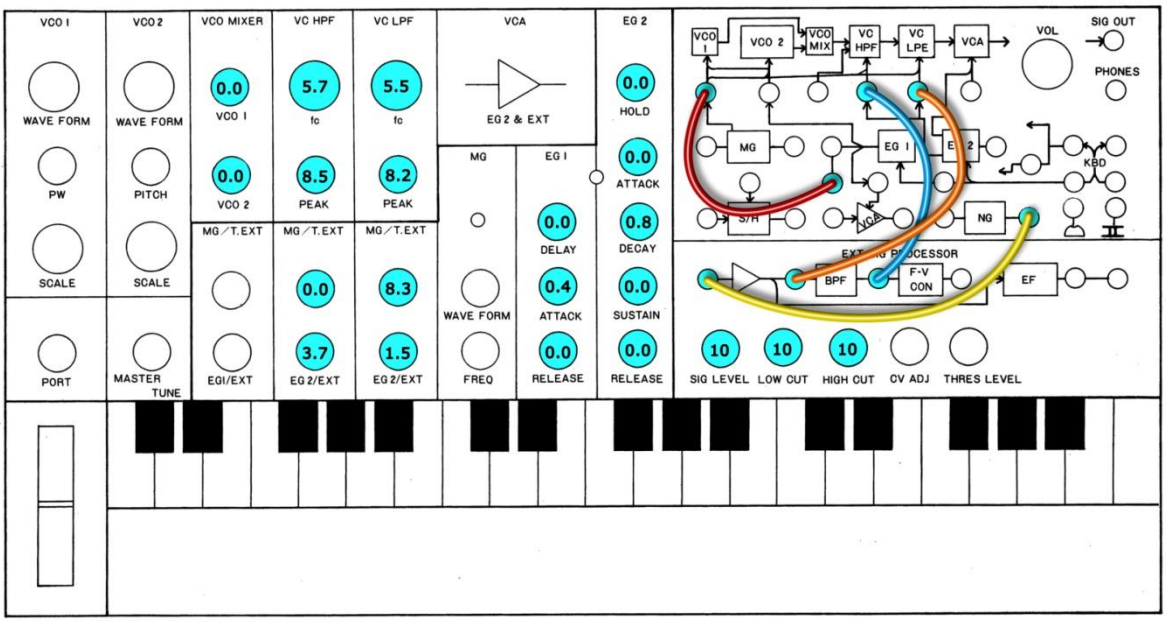
1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) NOISE GENERATOR **WHITE** → ESP **SIGNAL IN**
3) AMP **OUT** → VOLTAGE CONTROLLED LP FILTER **CUTOFF FREQ**
4) BAND PASS FILTER **OUT** → VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**

Adjustments

A Good place to start is the noise level. To get the noise balance how you want, leave the **EG2/EXT** knobs as they are and instead adjust the ESP **SIGNAL LEVEL**, think of this as a mix amount control, it's best not to lose the noise completely as it adds to the percussive feel of the sound. Higher values here will also add an extra distortion to the noise and will mask the VCO signal.

Lowering the HPF **CUTOFF FREQUENCY** will allow more of the lower frequencies through from the VCO. Raising it will have the opposite effect, 'thinning' the sound. If you want a more *woody* or *hollow* tone, start by lowering the HPF a little, say to around 3.5, then experiment with the MODULATION WHEEL placement, with an aim to generate a strong lower frequency component. Then adjust the PULSE WIDTH **PW** of VCO1 to make it more *woody* or *hollow*. It's also useful to experiment with different **SCALE** settings of VCO2, though VCO1 is usually best left at 4'.

Patch 10: Clave



Refer to the audio example file *wams20_example_clave_u.wav*

Notes on Clave

This is a variant on the snare patch (page 7) and generates a high pitch percussive *strike* or *blip.*
Note that the **LOW CUT FREQ** in the ESP is set to maximum, which has a subtle but very important effect on the sound.

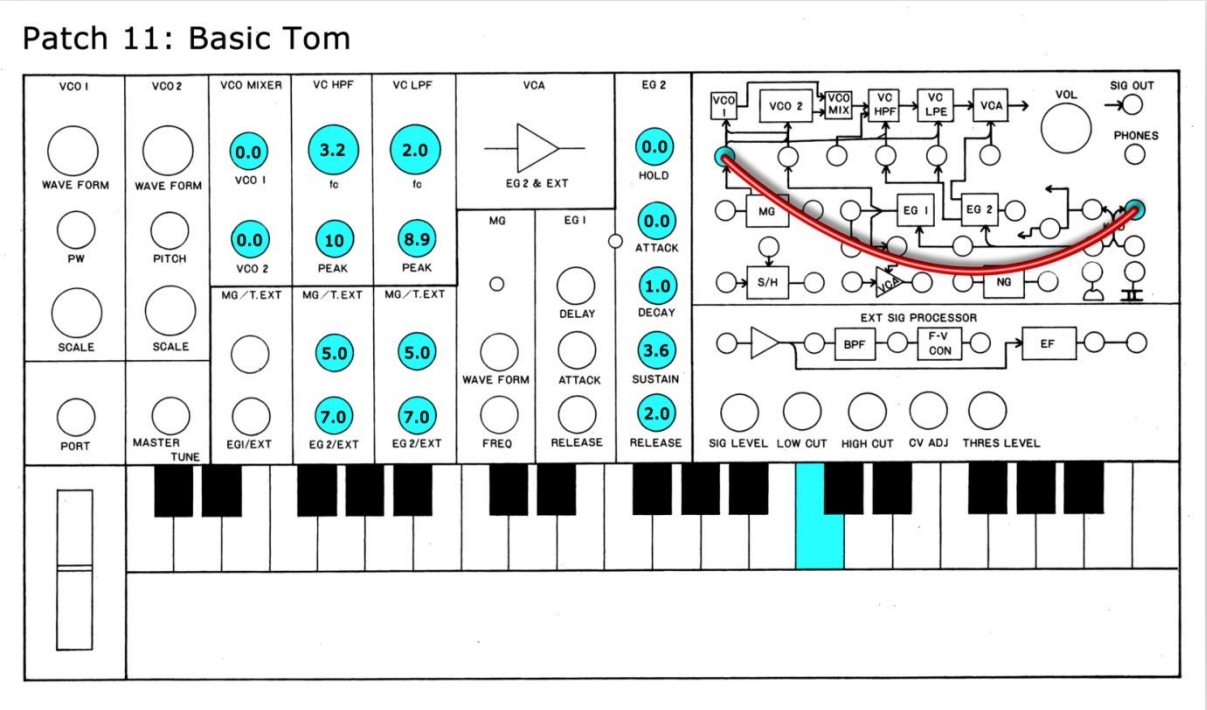
Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) NOISE GENERATOR **WHITE** → ESP **SIGNAL IN**
3) AMP **OUT** → VOLTAGE CONTROLLED LP FILTER **CUTOFF FREQ**
4) BAND PASS FILTER **OUT** → VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**

Adjustments

EG1 **ATTACK** is critical to this sound as a tiny amount too much will turn this *strike* sound into a *squip*. In between zero and *snap* is where you want to set this **ATTACK** point.
Moving the filters up here will produce higher pitched *strikes*, the actual note of it is governed by the HPF **CUTOFF FREQUENCY** position, but the LPF **CUTOFF FREQUENCY** should be moved with it to allow the high frequencies through. Turning up the LPF **PEAK** a little will create stronger self oscillation that will interact with the HPF tone creating new harmonic content.

Section 5: Toms



Refer to the audio example file *wams20_example _basic-tom_u.wav*

Notes on Basic Tom

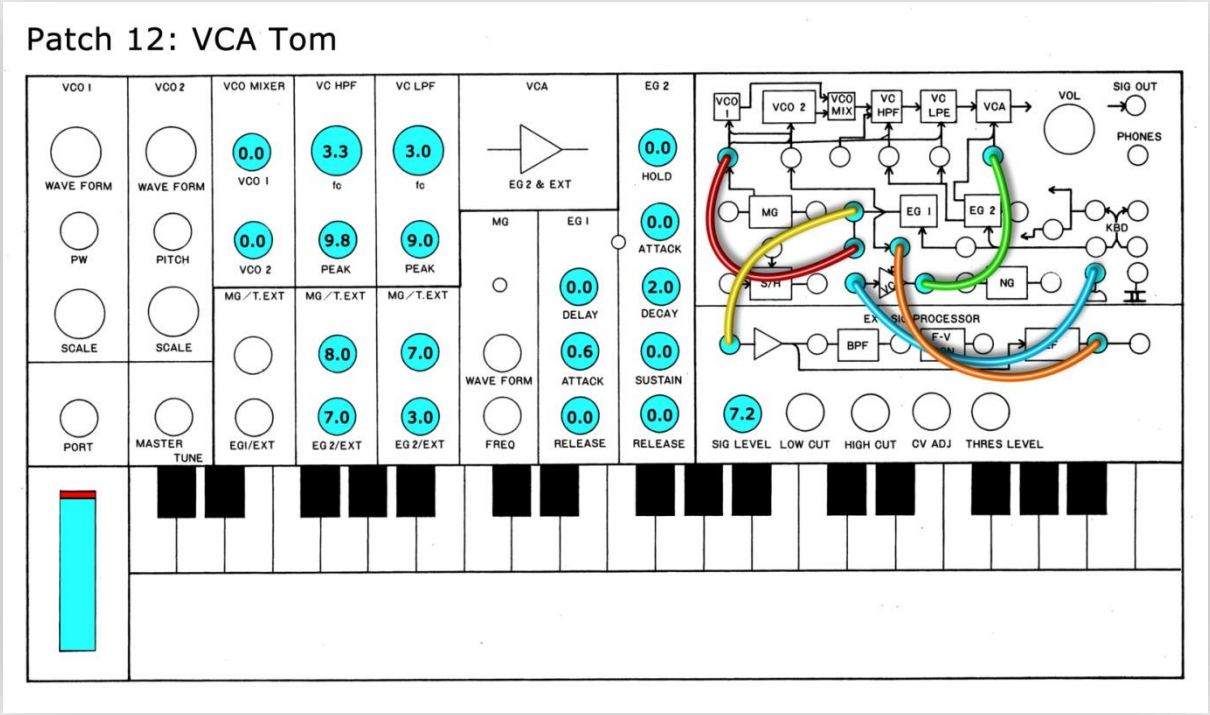
This generates a *fat* sounding bass tom that you can play up and down the keyboard.
When playing, release the key quickly for a subtle double transient effect.

Patch points

1) **KBD CV OUT →TOTAL**

Adjustments

Change the envelope EG2 to give you shorter or longer tom sounds.
The main component to this patch that gives the Tom its pleasing tone is the relationship of the filters, which are acting like two oscillators. So changing one relative to the other will give all sorts of detuned and harmonic effects, for example raising the LPF **CUTOFF FREQUENCY** to 2.7 will give a nice detuned effect.
Because it has basic key-tracking this filter frequency ratio will be preserved when playing different keys, making it easier to find the pitches you want to record. Note that you won't get this key-follow using midi.



Refer to the audio example file *wams20_example _vca-tom_u.wav*

Notes on VCA Tom

This tom sound has much more emphasis on the transient, making it hit harder. Lack of key-tracking makes it more difficult to adjust pitch.

Patch points

1) ENVELOPE GENERATOR 1 **REV OUT →TOTAL**
2) ENVELOPE GENERATOR 1 **OUT** → ESP **SIGNAL IN**
3) ENVELOPE FOLLOWER **ENV OUT** → VCA **CONTROL INPUT**
4) **MODWHEEL** ∩ → VCA **IN**
5) VCA **OUT** → VOLTAGE CONTROLLED AMPLIFIER **INITIAL GAIN**

Using EG1 **REV OUT** and the standard EG1 **OUT** at the same time, both creating instant attack

This is quite a difficult concept: what's happening in this patch is that we have our EG1 set to have a slower than instant attack (0.6 on the patch sheet) taking '0.6' amount of time to go from zero to maximum output. But because we're using the **REV OUT** output it starts off instantly at maximum and takes '0.6' amount of time reach zero. ie: the envelope is inverted.

We are also using the ENVELOPE FOLLOWER, which together with the VCA patch points and the MODWHEEL, creates a 'GAIN jump' at the begging of the sound.

We trigger the ENVELOPE FOLLOWER with the standard non-inverted EG1 **OUT**. But in this case it doesn't matter that EG1 takes '0.6' to get from zero to maximum output because the ENVELOPE FOLLOWER is triggered much before that maximum value – in effect instantly. This is how we can use the 2 outputs of EG1 to do the same thing: both making instant attacks, even though from one of the outputs the attack is less than instant.

Adjustments

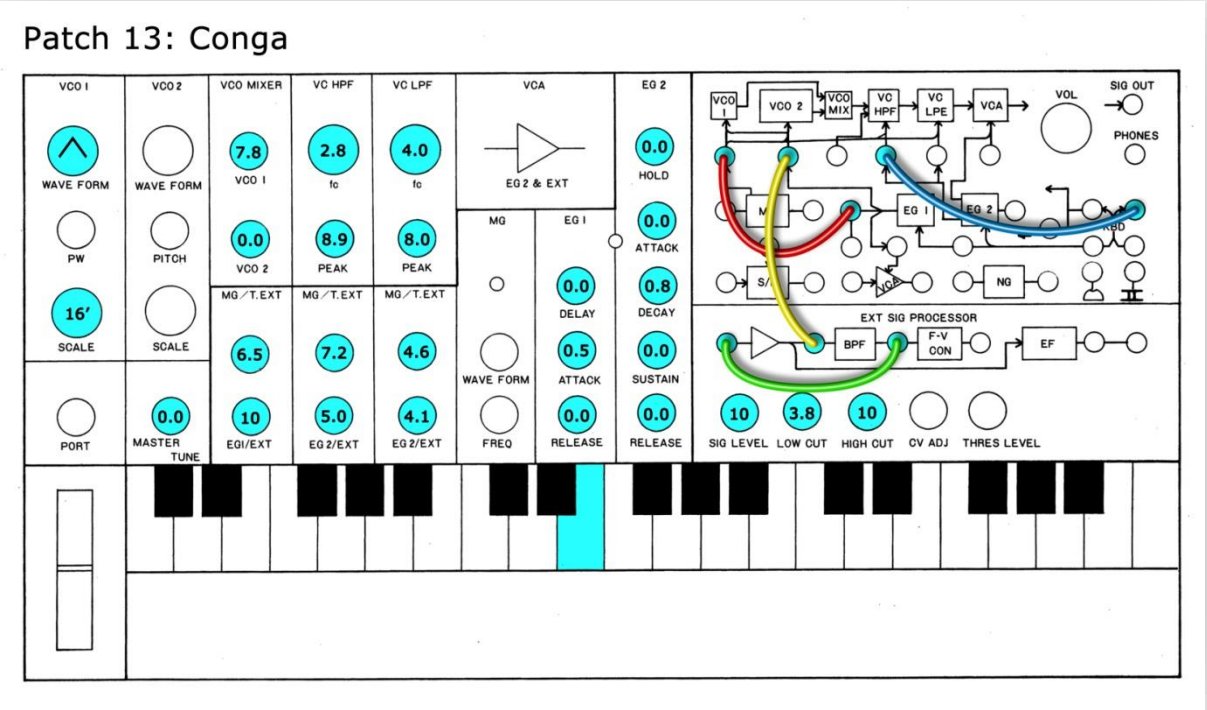
The first thing to adjust on this patch is to lower the **EG2/EXT** knobs to around 2.0. This makes the EG2 bend both filters by the same amount, keeping the filter's relative pitch at the same ratio – making it easier to experiment with the harmonic relationship of the filters.

After this you can experiment with the filters **CUTOFF FREQUENCY** placements. As with the Basic Tom patch, a major part of this sound is the harmonic content generated by both filters. Again think of them as oscillators and the CUTOFFs as pitch controls, find some nice harmonics by adjusting these. It's usually best to have the HPF set at a slightly higher point than the LPF, which will generate nice detuned sounding toms.

Unfortunately this patch does not have key tracking, so to have the same tom sound but at a different pitch you have to move both **CUTOFF FREQUENCY** controls at the same time by hand, keeping their relative difference the same as you turn.

As with other patches, adjust the transient with the EG1 **ATTACK TIME** combined with the **MG/T.EXT** controls. The length of the tom is changed with EG2 **DECAY TIME** which will also affect the falling pitch change of the tom along with **EG2/EXT**. As with the VCA Kick patch (page 6) you can control the amount of 'VCA thump' with the MODWHEEL.

Section 6: Conga



Refer to the audio example file *wams20_example_conga_u.wav*

Notes on Conga

This is a complex patch used for generating conga/bongo or other hand-drum type sounds.
When recreating this patch it's easy to miss that we're using the normal EG1 **OUT,** not the **REV OUT**.

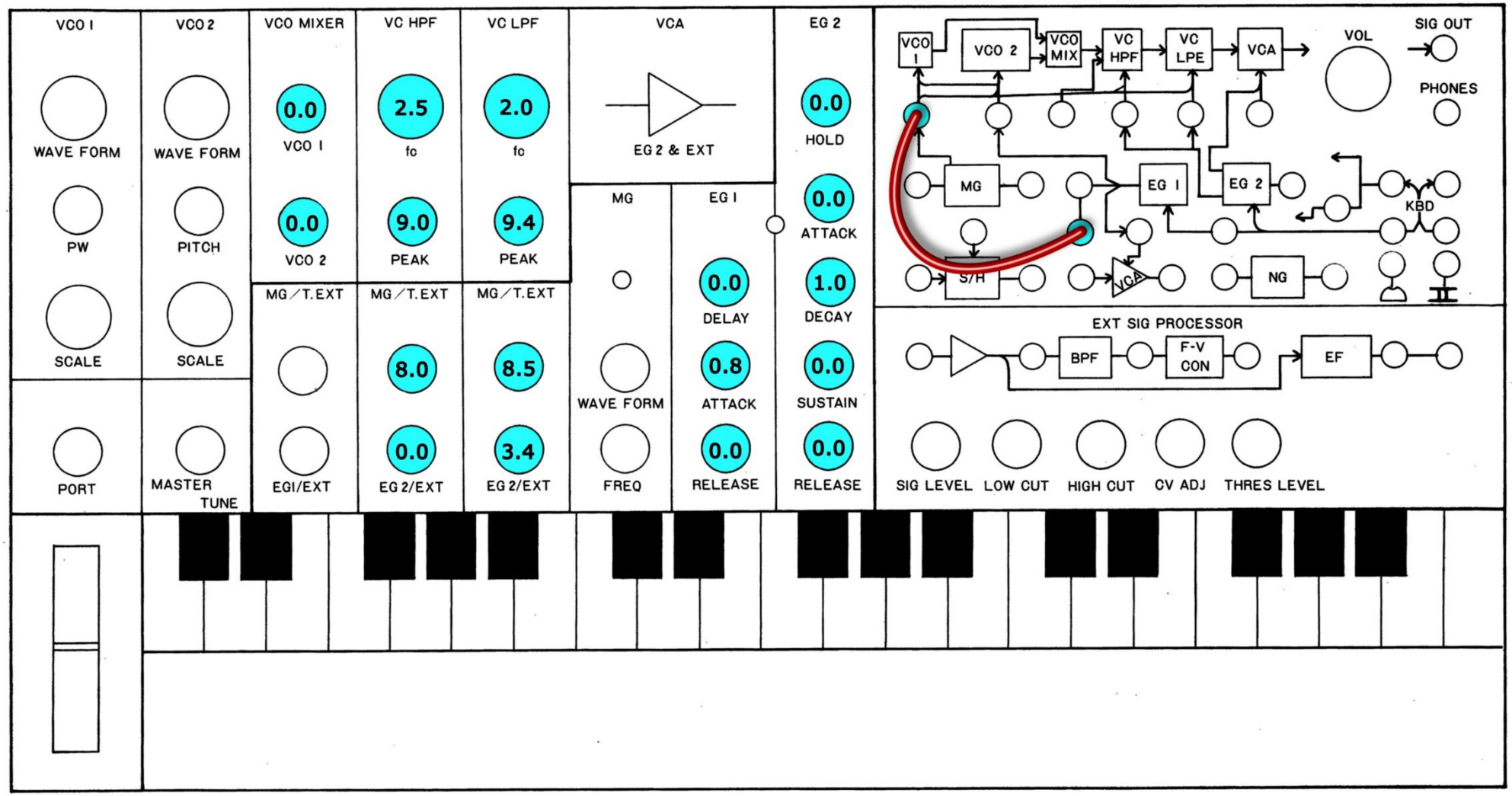
Patch points

1) BAND PASS FILTER **OUT** → ESP **SIGNAL IN**
2) ESP AMP **OUT** → VOLTAGE CONTROLLED OSCILLATOR **FREQ**
3) ENVELOPE GENERATOR 1 **OUT** → **TOTAL**
4) **KBD CV OUT** → VOLTAGE CONTROLLED HP FILTER **CUTOFF FREQ**

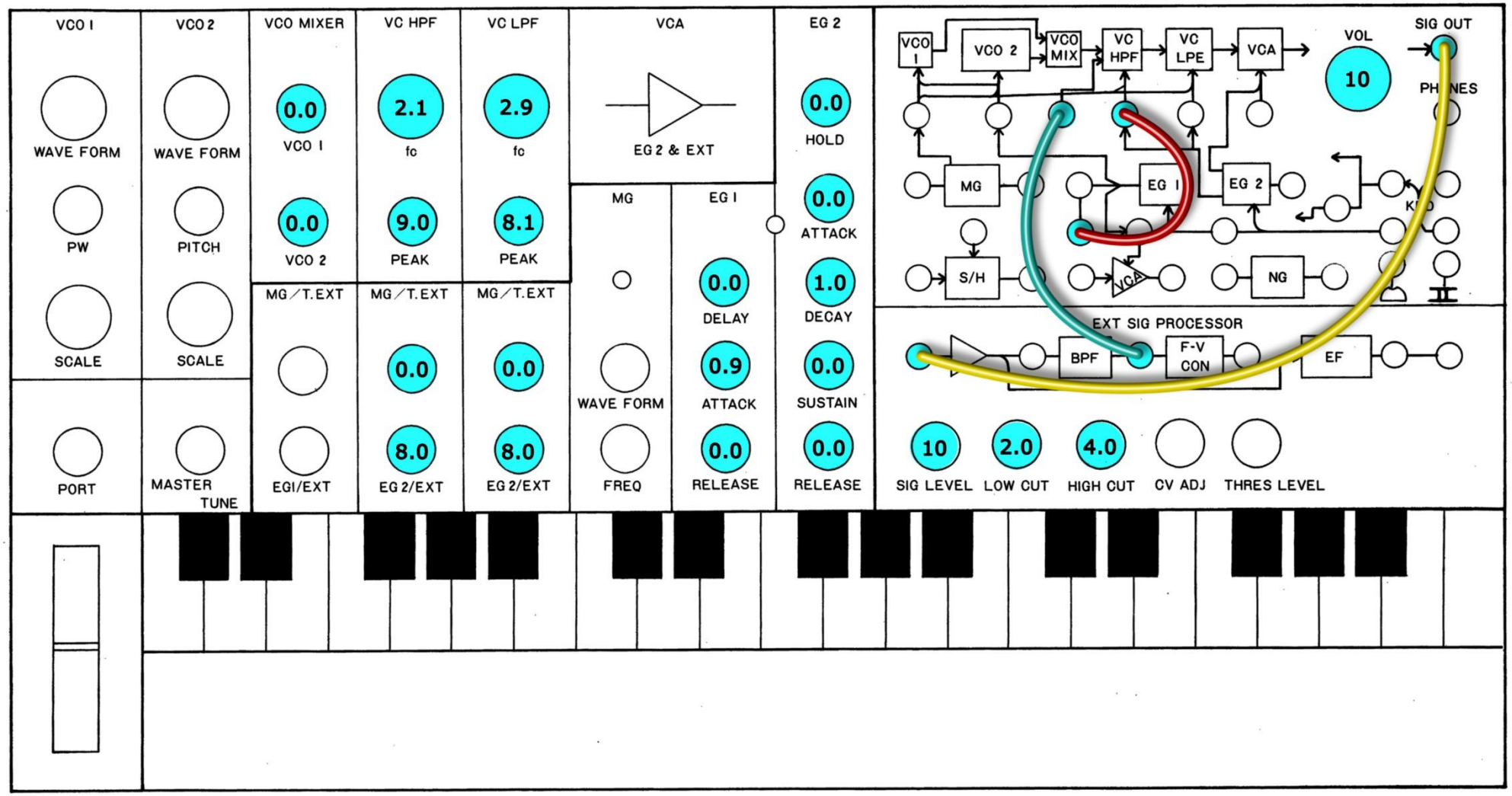
Adjustments

Start by changing the **LOW CUT FREQ** and the **HIGH CUT FREQ** controls found in the ESP. Then adjust the HPF **CUTOFF FREQUENCY** to generate the low frequency content and then move the LPF **CUTOFF FREQUENCY** to remove any unwanted high frequencies. Go back and forth from these sets of controls until you have generated a good drum sound.
Fine adjustments of the EG1 **ATTACK** and EG2 **DECAY** shape the transient and length of the sound. Further transient shaping can be made with all 3 **MG/T.EXT** controls. Next try different keys, and also different **SCALE** settings (on VCO1). Finally adjust the VCO MIXER **VCO1 LEVEL** and filter **PEAK** amounts to get a nice balance of sounds, when adjusting these think of the **PEAK** as a mixer level for the filters.

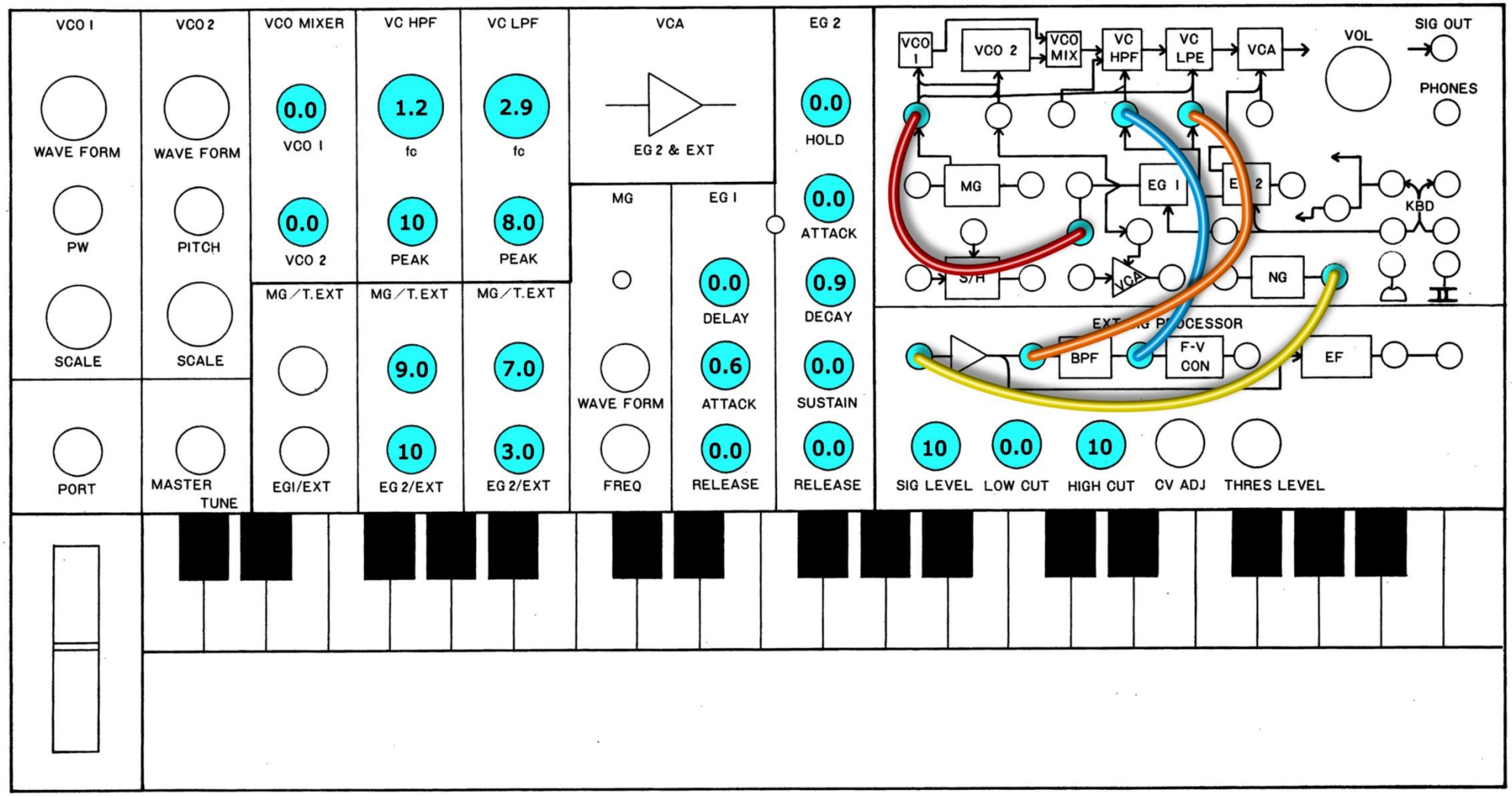
Patch 1: Basic Kick



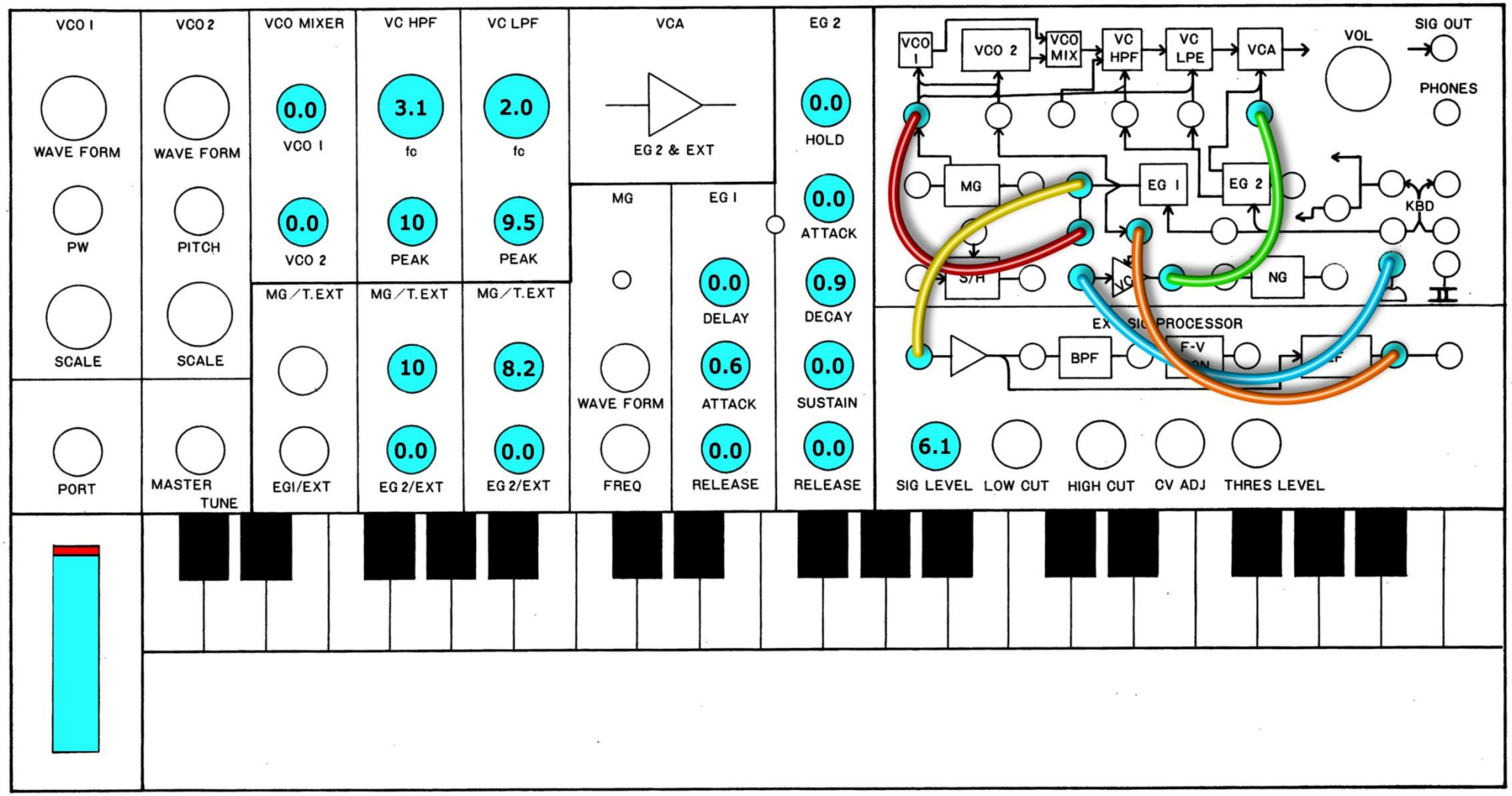
Patch 2: Feedback Kick



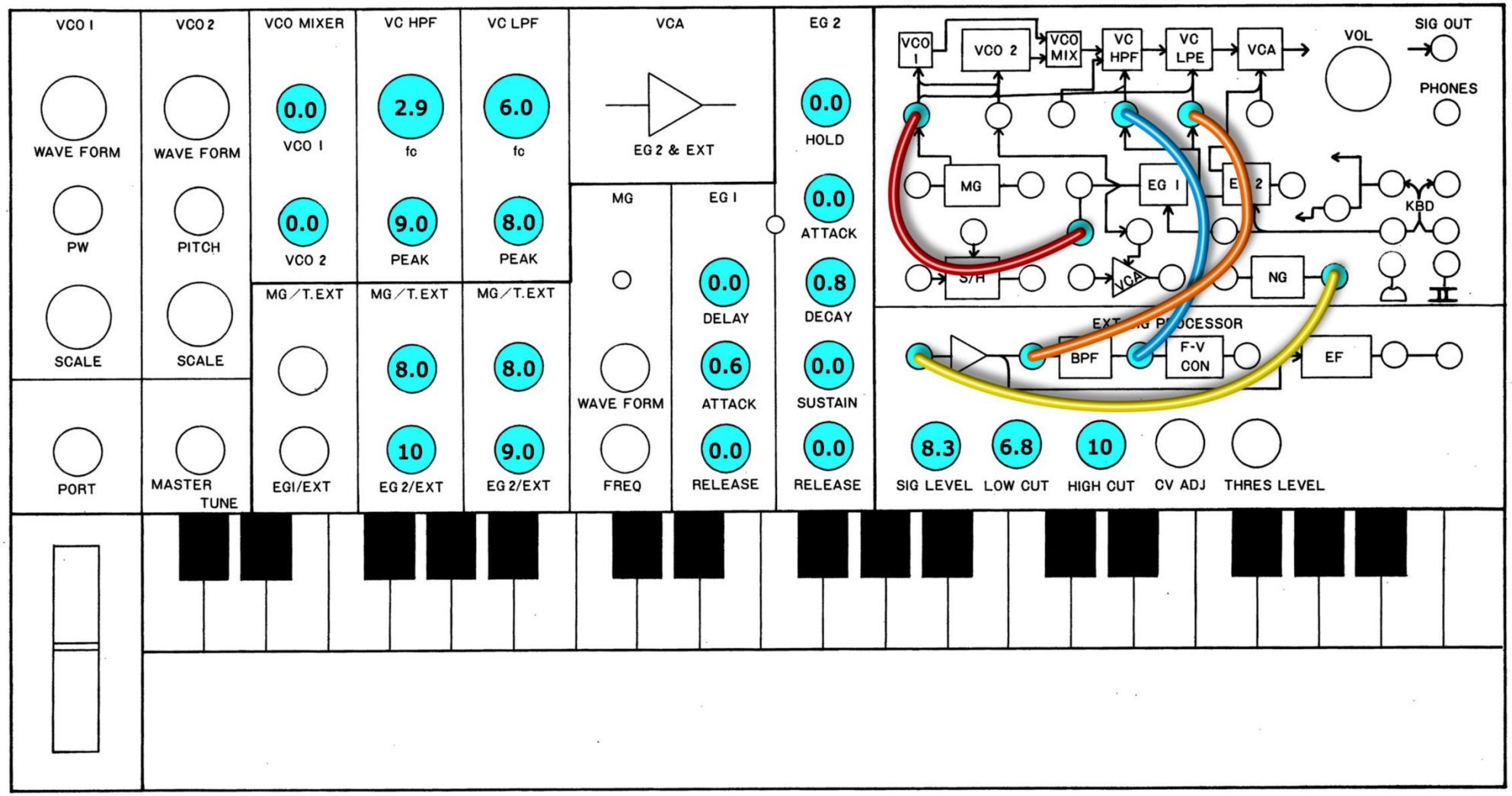
Patch 3: Noise Kick



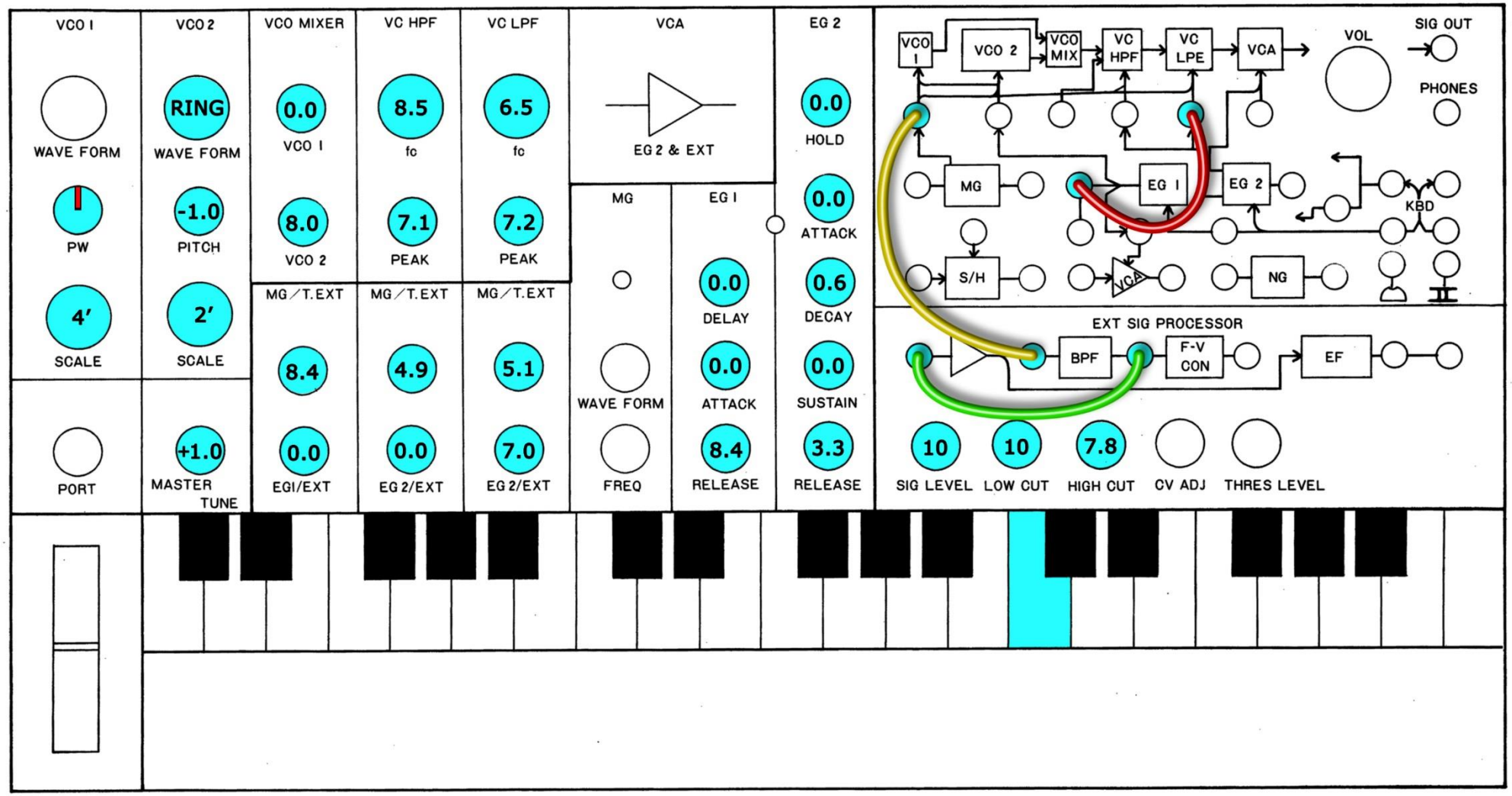
Patch 4: VCA Kick



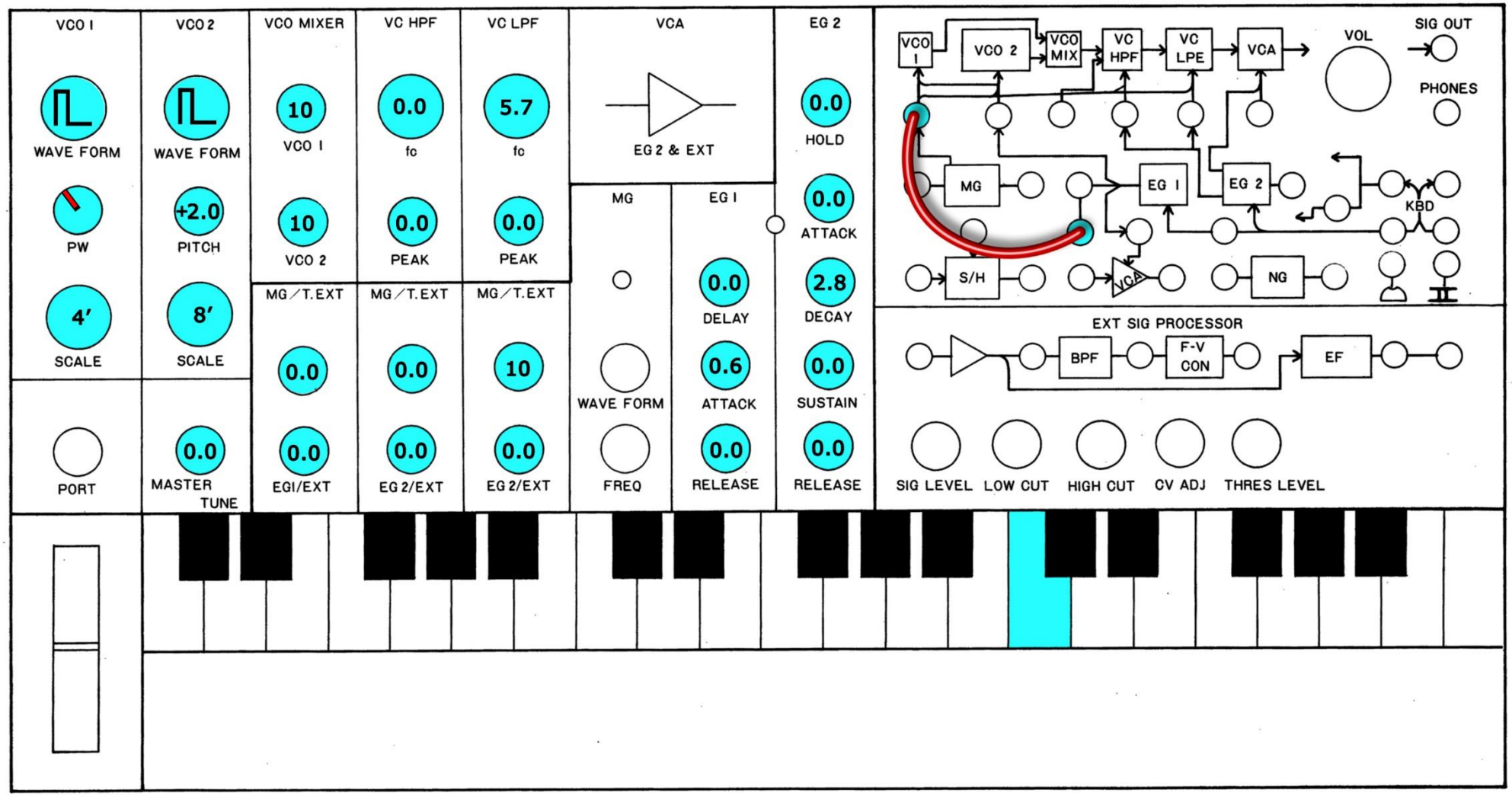
Patch 5: Snare



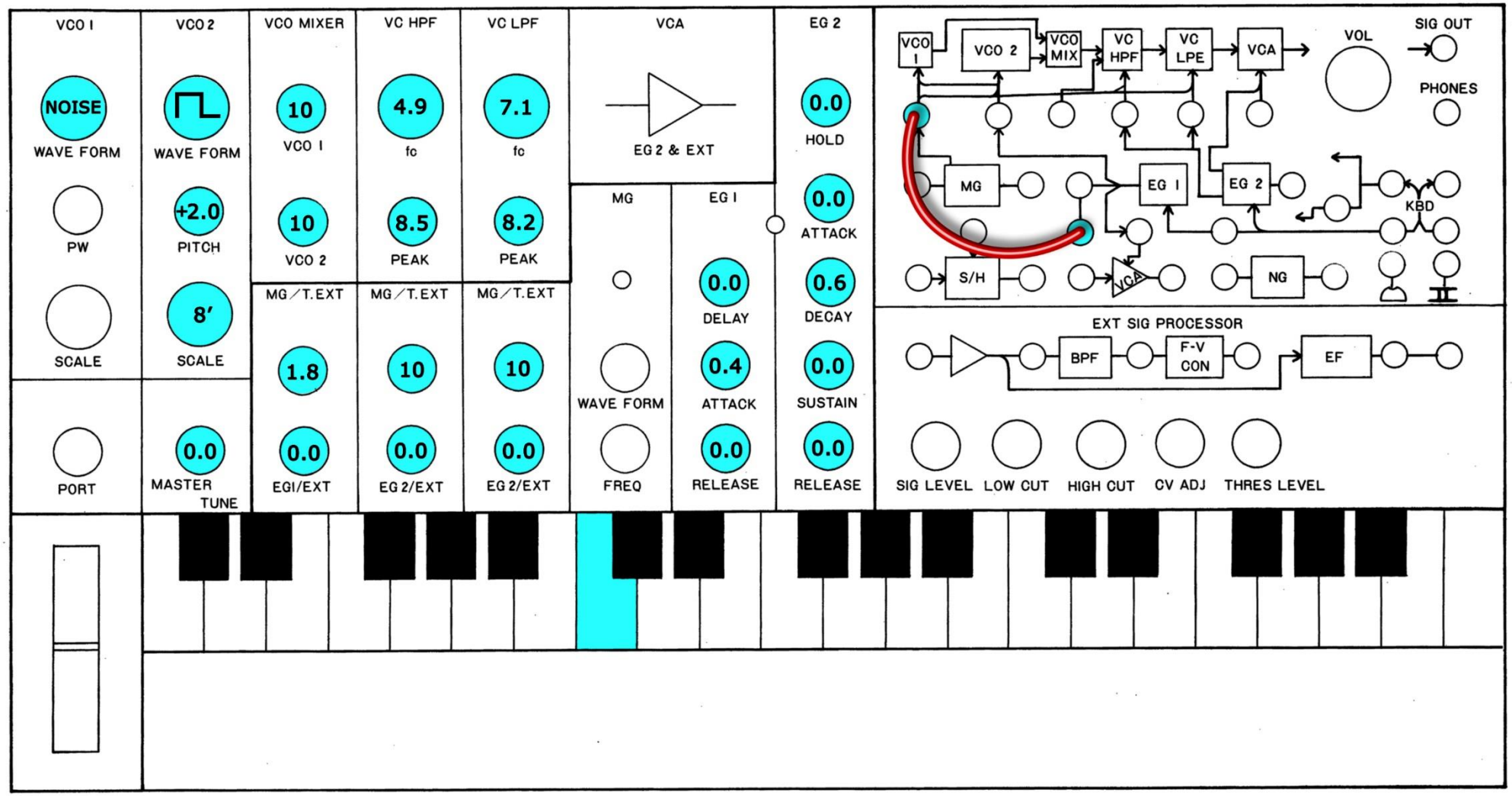
Patch 6: Cymbal



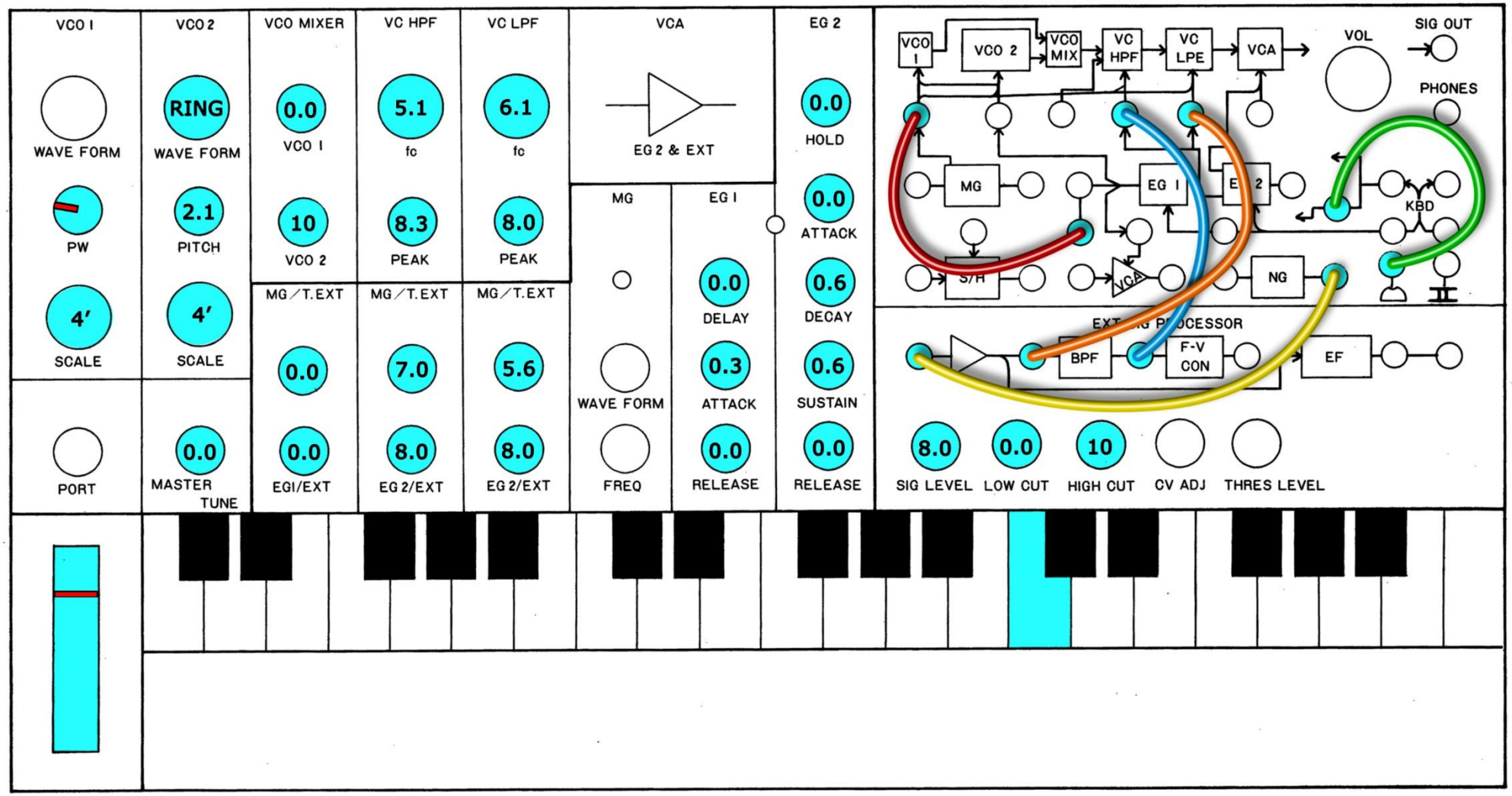
Patch 7: cowbell



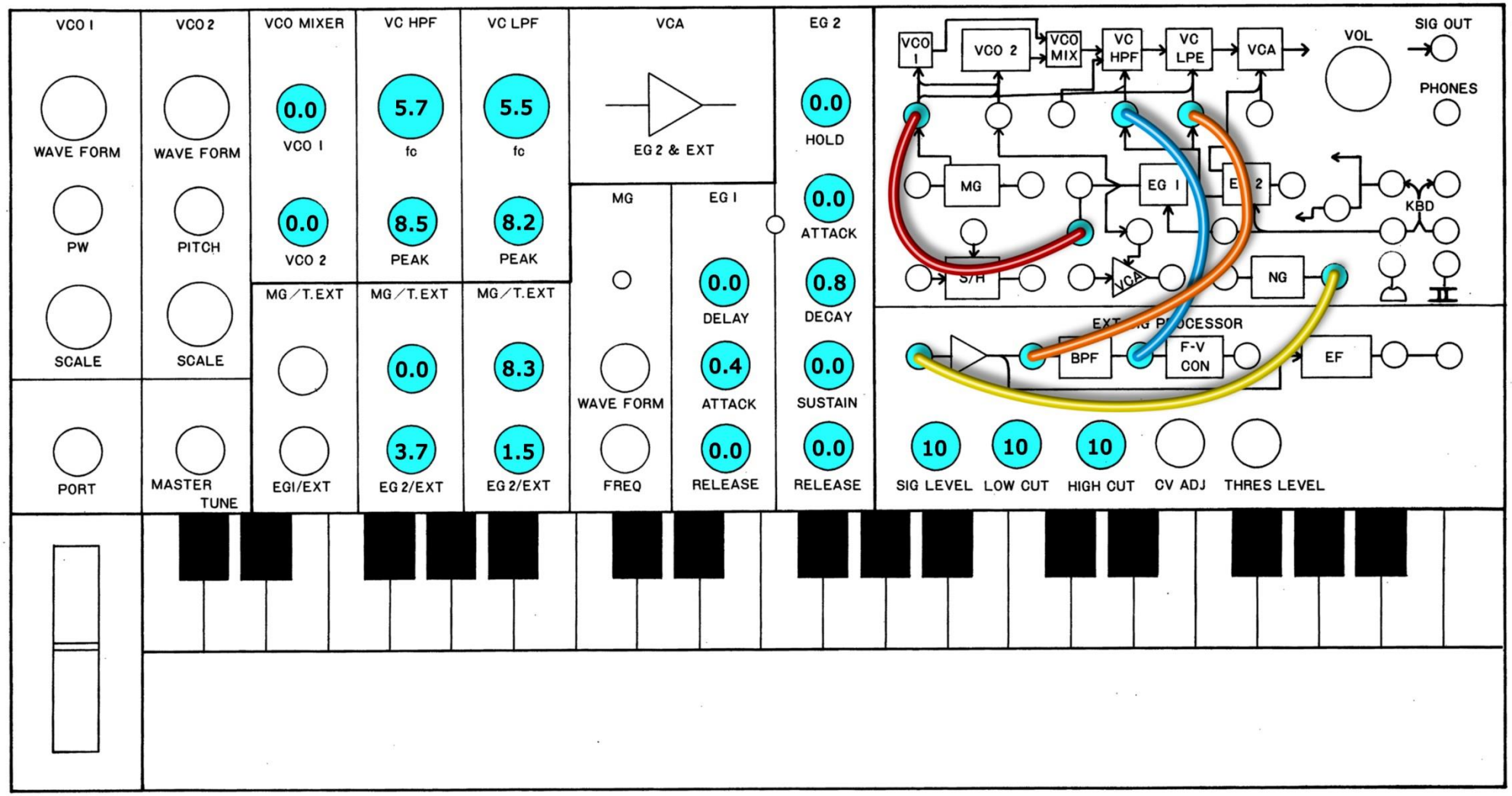
Patch 8: Basic Block



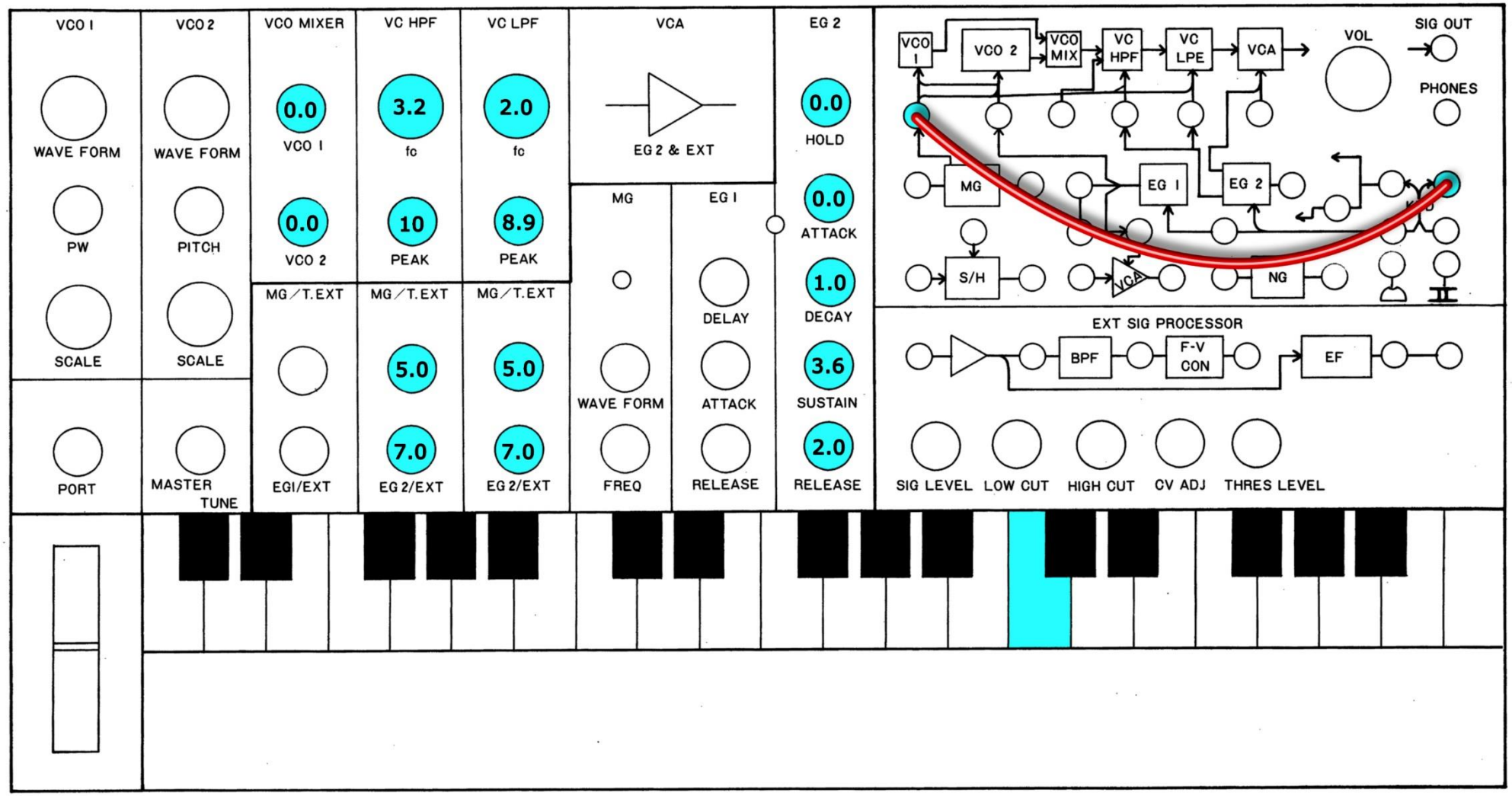
Patch 9: Complex Block



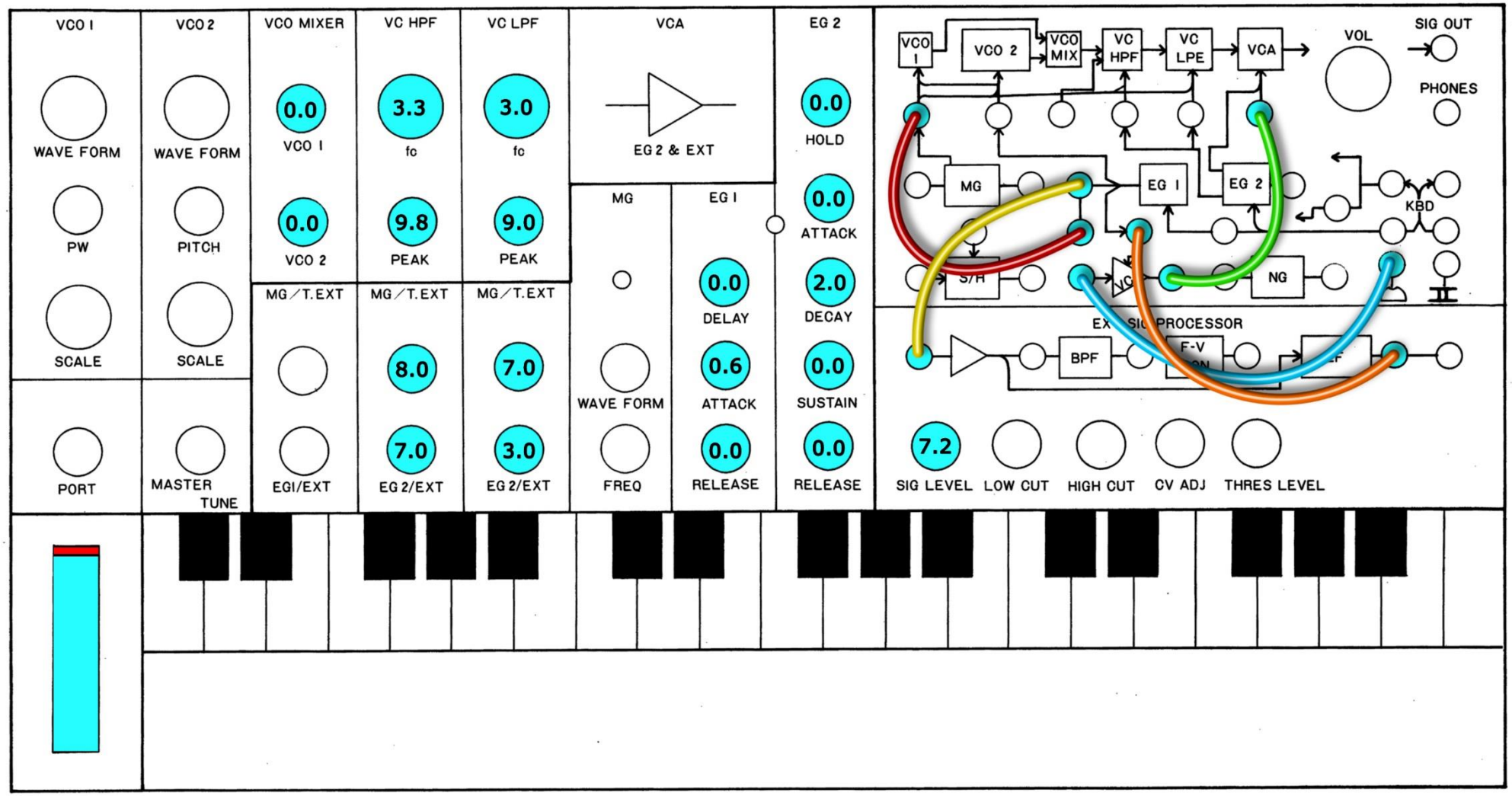
Patch 10: Clave



Patch 11: Basic Tom



Patch 12: VCA Tom



Patch 13: Conga