Tiptop Audio | HATS808

User Manual

Introduction.

The HATS808 is Roland's TR-808 Hi-Hats sound generator adapted for modular synthesizer use. The front panel contains all of the controls found on the original TR-808 drum machine, allowing you control over the hi-hat decay time, volume levels to mix with other drums, and accent levels. In addition to the original circuit, a voltage-controlled Resonance (Q) was added allowing additional timbre changes. The module itself is very simple and straightforward to operate; however, we highly encourage you to read this manual as it contains useful information that will help you get much more out of the HATS808. These electronic drums are the heart and soul of our electronic music generation and learning how to use them correctly will open up a world of organic analog beats and sounds for you to utilize in your own music.

About the Making of the HATS808.

The HATS808 is a one-to-one clone of the original circuit found in Roland's TR-808 drum machine. The noise source in the HATS808 is made of a mix of six analog square wave oscillators set at specific frequencies. During the design we measured the frequency of those oscillators in several original machines and found large differences; that wasn't much of a surprise as these oscillators are made using very primitive methods with no scaling or temperature compensation. As with all the other modules in this series, our guide has been the original schematic.

For more in-depth information about the challenges that were facing us at making this series of modules please look at the BD808 User Guide.
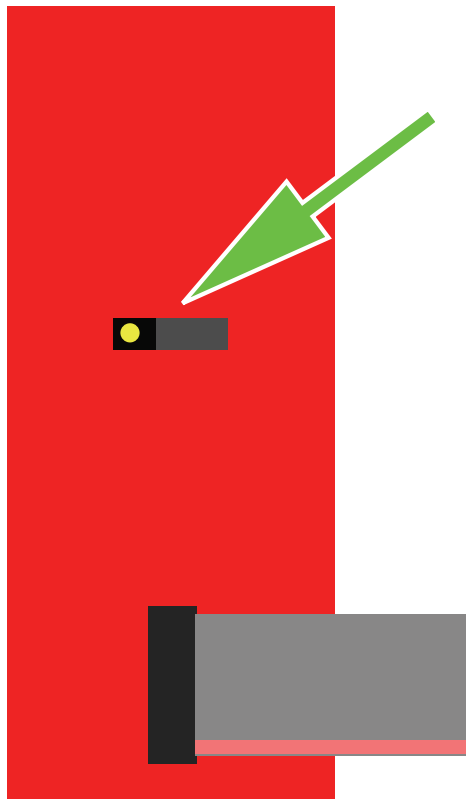
Understanding the 'choke' function:

The 'choke' function is a clever interaction between the two hats that adds a feel of dynamics and movement to your groove. It is an original part of the TR-808 circuit and is fully implemented in the HATS808. The idea is simple: if both sounds (CH and OH) are triggered at the same time, the short envelope of the CH will be forced on the internal VCA of the OH. So in that scenario what you will be hearing is a short CH from both outputs.

The nice thing about the choke is when a CH will be trigger after a long decayed OH, the CH envelope will 'choke' the long decay of the OH and will give this great effect of interaction between the two hats.

Using the choke function with accents can produce great rhythms.

If however you would like to disable to choke function, all you have to do is move the header located on the center of the module pcb to the other side. In that setting, the choke will be disabled and the OH will have long decays regardless of the CH triggering.

Let's get started.

Now that we understand the choke function, we can get started.

To start using the HATS808, just plug a gate signal into the OH GATE IN and plug the OH OUT to your sound system and set the LEVEL half way. You will hear the Open Hat.

Now plug a gate signal into the CH GATE IN and plug the CH OUT to your sound system and set the LEVEL half way. You will hear the Closed Hat.

Dynamics and Gain.

Level Explained:

The HATS808 offers two enhanced output gain stages over the original 808 design. This addition allows the output signals to get very hot so that anything flowing from the module will be overdriven, generating additional harmonics and tight attacks through distortion and clipping of the sound. This capability is one of the most useful ways to further harmonize the sound or for using those sound as a modulation source. Obviously we didn't invent the idea, it had been done for years by stringing 808's through multiple gain stages and tubes to overdrive the levels and create distortion. However, this idea has never been implemented as part of the sound generator itself and in a modular format to provide hot gain levels right from the source. This effect is easily noticeable by sending the audio output into line level instruments such as computer audio interfaces, outboard multi-effects, mixers, and even low level devices like guitar pedals, mic preamps etc. This enhanced gain stage will also make any synthesizer module operate at peak levels while adding interesting harmonics or digital artifacts in the case of digital processing modules.

To get the HATS808 to its hottest levels, set the LEVEL to max, set ACCENT to max.

On the other hand, if all you want is a nice, soft 808 sound, setting the range of the LEVEL knob somewhere between 0 to 50% will cover that.

Dynamics and Gain.

Dynamic Accent and Level control of any drum sound in the mix is a big part of making a beat sound right and are extremely useful with the CH sound. Dynamic Accent provides emphasis on a particular note through loudness. In analog circuits like the HATS808, the accent pulse physically "hits" the VCA circuit harder producing not only a louder sound but also more attack (much like if you were to hit a real cymbal harder or softer with a drum stick.)

Tip: One of the famous sounds of the 808 CH is made by sending repetitive triggers to the CH gate input (all steps ON) and a repetitive one-step-on one-step-off to the CH Accent input. This will create this great dynamic variation that is a sound signature of both the 808 and 909 CH in techno music and other styles of dance music.

While the original 808 has one global accent knob affecting all of its sounds simultaneously, the HATS808 (and all other drum modules in this series) offers an independent accent level control. This feature adds far more dynamics than what was possible with the original machine.

Accent Explained:

The accent inputs are a gate/trigger signal.

While the accent input is not in use, the incoming gate input is routed (normalized) to both the accent input and the gate input. This serves for two purposes:

1. To allow you to reach the hottest drum sound possible even when there is no accent input signal connected.

2. It makes the ACCENT knob act as a fine control of the output gain level. This is very useful in situations where the LEVEL knob range is too coarse for setting precise levels in a mix with other drum sounds.

Connecting a gate signal into the accent input will break the internal routing mentioned above and will allow for independent control over accent regardless of the incoming gate signal. In this case as long as there is no accent signal present, the drum sound will be set to the minimum accent level set internally, and once the accent input gets hit by a gate signal, the drum sound will get louder in proportion to the accent level set by the accent knob. In short: the higher the knob setting, the larger the difference will be in gain levels between the accented notes and the un-accented notes.

Decay explained.

The Open Hi-Hat on the HATS808 has a decay knob for controlling the length of the envelope. Keep in mind that this setting will be overridden with the choke function enabled and a simultaneous drum hit of both the OH and CH. For more information, please see the "Understanding the 'choke' function" section of this manual.

Q and VC-Q explained.

The HATS808 includes a voltage-controlled Resonance circuit on the main internal band-pass filter. This is an addition not originally found on the 808 machines. When the Q knob is set to its minimum position, it points to a little dot marked "808", this is the position of the original sound with out any effect caused by this additional circuit. When turning the Q knob away from this position, the sound of both hats gets more and more metallic and set to a different tune. This goes up to a point where the filter get saturated and the crushing sound kicks in, very similar in effect to a digital bit crusher, but here its done using analog circuitry. In its maximum setting, the filter becomes an oscillator and generates a constant tone. Due to tolerances in the circuit, some HATS808 will have a slightly wider oscillating range than others.

The VC-Q is a 0-5V CV input and the Q knob will offset the applied VC. This input works well with positive signals such as envelope generators and sequencers. It can also be modulated into the audio range using oscillators or any other sound source.

Band-Pass OUT explained:

As mention earlier in this manual, the HATS808 sound source is made of a mix of six analog square wave oscillators with their frequencies spaced apart. The mix of those is then fed into the main Band-Pass filter to extract the necessary harmonics needed to create the basic tone for the hats. The Q knob and VC-Q are the voltage control resonance of that filter and will alter the sound on the Band-Pass OUT. The sound coming out of the Band-Pass OUT can be useful in many ways, one of them is to use it as raw material for creating your own Hats sounds by running the sound through additional Band-Pass filters and VCA's in your modular.

Tips & Tricks:.

Creative Gate Sequencing with the Z8000:
Please see BD808 User manual for in depth information.

Step Sequencing the traditional way:
Please see BD808 User manual for in depth information.

808/909 Drums in the modular synth environment:

The analog drum modules in this series are made from a very well-tuned patch consisting of T-Network sine generators, noise sources, VCAs, envelopes, and filters circuits aimed at creating percussive sounds (see original patch from the 808 drum machine manual). Each drum module contains several of those "modules" patched together to create that specific sound. These internal "modules" are made from discrete parts in the most minimal way, a clever analog design. Now comes your turn to add to that patch; your modular synth is full of modules waiting to interact with the sounds coming from the drum modules. By passing these drums through your own modules, you add additional analog processing on top of the raw drum sounds, extending the patch. Here are some simple ideas:

Run two different drum sounds into a ring modulator or a VCA for some amplitude modulation effect. For example, use the BD808 and the open hi-hats from the HATS808 module for that.

Run a drum sound through a resonating filter, then run another drum sound to the CV input of that filter, modulating its cutoff, resonance, amplitude, or all of the above simultaneously! Sequence them in unison or vice versa.

Run the drums at full level through wave folders, 8-bit crushers, Z-DSP effects, band pass filters, or just about anywhere you might find to be creative. You can even send the audio out into CV inputs of just about any module.

Here at Tiptop Audio, we have a favorite patch running mixed or independent drum sounds through the Z-DSP's Bat Filter while modulating the Z3000 clock source to the Z-DSP on the beat.

Note: Keep in mind that with these drum modules, your modular system has now become a self-contained electronic music machine where a complete multitimbral piece of music can be set to play. The integration of the drum modules can create results as simple as having them play a groove alongside bass lines and other melodies or as complex as switching trigger signals on the fly while having the drum sounds go through additional sound processors and having these processors further modulated for some unpredictable and intricate percussive beats. The question you need to ask yourself is, "what will happen if I patch this drum sound into this input and how will that sound?" And that input can be just about anything: any CV inputs, audio input, waveshaper inputs, sync inputs, FM inputs, the list is as long as you can imagine. Sometimes it's very hard to predict the result, sometimes it's nothing interesting at all, and sometimes it can get downright insane! But isn't that what makes modular synthesizers so fascinating in the first place?

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