Tiptop™ Audio | BD808



User Manual

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Introduction.

The BD808 is Roland's TR-808 bass drum 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 full control over the bass drum timbres, volume levels to mix with other drums, and accent levels. 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 BD808. 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 BD808.

The BD808 is a one-to-one clone of the original circuit found in Roland's TR-808 drum machine. During the design phase, we created additional features only when implementation would not compromise the original signature sound, add excessive costs, or sacrifice panel space. Cloning a circuit that was designed and produced in the early 80's was not an easy task. A variety of obstacles including availability of the original parts, the modern SMT manufacturing process, the differences in +/-12V Eurorack power versus the +/-15V of the original 808, and far many more were addressed in the creation of this module. The BD808 has gone through several design revisions and was tested and built with components from many different suppliers and various design techniques until the sound came out just right.

One of the main problems we faced while creating this module was that each of the original 808's we were using for testing and comparing sounded different from each other...so which one sounded right? The 808 machines were built from 1980 to 1984, making the parts in them 30+ years old and the aging of each machine makes them sound different now than when they were first made. Additionally, the fact that the original machines were using 5% resistors and other parts with wide tolerances made each 808 sound different from one another, even when they were new. The answer lied in the schematics and the math representing these circuits. These defined a precisely tuned circuit aimed at producing a very specific sound in mind. With the BD808, we followed this design and created an 808 bass drum generator which, to the best of our knowledge, sounded like the ones that were rolling out of the assembly lines in the 80's.

Let's get started.

To start using the BD808, just plug a gate signal into the GATE IN and plug the BD OUT to your sound system and set the LEVEL half way.

Dynamics and Gain.

Level Explained:

The BD808 offers an enhanced output gain stage 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 through distortion and clipping of the sound. In fact, the BD808 can go even hotter than standard levels of modular VCO's. This capability is one of the most useful ways to get beefier and grittier sounds out of this circuit. 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 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 BD808 to its hottest levels, set the LEVEL to max, set ACCENT to max, and set DECAY to mid-way. At these settings, the BD808 can output a signal up to 20Vp.p (Most professional computer interfaces usually start clipping at 10Vp.p!!) Now you have an additional 10 volts to get varying sounds from sharp attacks at the start of the clipping to crushed tones at the end.

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

Dynamics and Gain.

Accent and Levels:

Dynamic Accent and Level control of any drum sound in the mix is a big part of making a beat sound right. Dynamic Accent provides emphasis on a particular note through loudness. In analog circuits like the BD808, the accent pulse physically "hits" the resonating circuit harder and provides not only a louder sound but also slightly more attack (much like if you were to hit a real drum harder or softer with a drum stick.)

While the original 808 has one global accent knob affecting all of its sounds simultaneously, the BD808 (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 input is 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.

One of the signature parameter of the 808 is its decay and in the BD808, we extended the decay time to the maximum amount possible by this circuit, right before self-oscillating occurs. If you hear your BD808 producing a low tone even without having been triggered then the DECAY knob is set to the maximum and the BD808 is oscillating. Turning the knob slightly back will eliminate the oscillation. Please note: Not all BD808's will self-oscillate, this is a matter of the tolerance in its circuit.

Inconsistent sound:

When the resonating circuit of the BD808 gets hit by a gate signal, it starts resonating, generating a low-frequency sine wave with a natural decay slope. An interesting phenomenon results from the nature of these resonating circuit in that if the decay time is longer than the time between drum hits, then an inconsistent sound is generated. If you are experiencing that, then be aware that this is not a defect, this is just how the circuit works. The designers of the 808 machine had used a negative feedback loop technique to allow variable decay times, which is controlled by the DECAY knob. Lowering the decay time to meet the drum hit's time interval will bring the circuit back to stability.

Tone explained.

The TONE knob controls the cutoff frequency of a low-pass filter that the drum sound goes through. The higher the knob setting, the more high-frequency harmonics are passed, resulting in the classic 808 Techno "basketball" sound with a tight, strong attack. The lower the knob is set, less high-pitched harmonics are passed through, resulting in a softer attack and a darker, smoother sound: a classic Marvin Gaye 'Sexual Healing' type of sound.

Creative Gate Sequencing with the Z8000:

By nature, it might look like the Z8000 is only a CV sequencer, but the Z8000 is actually both a gate and CV sequencer and gates can be generated in a very simple way, allowing for use with the drum module's (or any other module for that matter) gate inputs. In fact, the Z8000's unique matrix of shared knobs can create interesting drum patterns that can become very complex by utilizing all of the independent sequencers in the Z8000 and their control inputs.

So here is how it goes:

Set all the knobs on your Z8000 to their minimum settings.

Plug a clock signal into the 16-step sequencer (vertical or horizontal)

Plug the CV Out from whichever 16-step sequencer you chose to the GATE IN on the drum module.

On the Z8000, turn one knob up to 50%; as soon as the Z8000 steps through this knob, a gate signal (a pulse) will be generated and the drum module will sound.

Now if you turn on the next knob in the sequence, you will notice that you are still only getting one drum hit. That is because the Z8000 now generates one long gate signal. Turn this knob to min and turn the next knob in sequence up. You should now hear 2 drum hits.

Now connect the other sequencers in the Z8000 to other drum modules, it can get very interesting very fast. If you want to go even wilder, stack the CV output from the Z8000 and not only send it to the drum modules but also to control the pitch of your VCOs, filters, etc. Tired of the loop? Just turn all the knobs off and start turning new knobs on, or just switch the patch cables from the CV outs so they go to other drum modules. Did we mention using divided clock signals, direction inputs, or reset inputs as well??

Tips & Tricks:.

Step Sequencing the traditional way:

There are a variety of gate/trigger step sequencers available in Eurorack format. While most of them will do a great job in triggering sounds in a modular synth, some will fail at producing a good, tight percussive groove. Keep in mind that the tightness and groove of your beats are as good as the gate sequencer you use! We recommend using the drum module with sequencers or any other pulse generators such as clock dividers that have variation in timing of no more than 1 millisecond between any two consecutive steps (even that is a LOT). For example, the Z8000 16-step sequencer has less than 100 nanoseconds between steps while the 4-step sequencers have less than 50 microseconds! So just keep in mind that there are "good" sequencers and there are well... not so good sequencers out there. It wouldn't be a bad idea to ask the manufacturer for these figures to make sure you have a good enough sequencer to drive your drum modules -- it will make a big difference especially with Techno beats and like.

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 a T-Network sine generators, noise sources, VCAs, envelopes, and filters circuits aimed at creating percussive sounds. 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 Dragonfly delay, turning constantly on the beat the WET/DRY knob.

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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