

The Mutant BD9

analog 909-inspired bassdrum synthesis with sub-oscillator

Thank you for your interest in/purchase of the Mutant BD9 eurorack module. We would like to thank you for considering a place for the BD9 in your modular synthesizer! We hope you find it has a unique character that lends itself to much use in your musical endeavours. The Mutant BD9 is a eurorack modular format product, available as a built module and later as a DIY project that electronic enthusiasts can assemble themselves.

WE'RE OBSESSED WITH KICKS

Like the other percussion modules in the Mutant Drum family, the BD9 was born from the desire to evolve away from classic drum synthesis techniques and offer something with a unique character of its own. The kick drum is arguably an integral part of electronic music, so we wanted to make sure that the BD9 offered a supremely flexible and versatile feature-set useful for creating music with. We're so crazy about bassdrums that the Mutant Drum series has two different kick drum offerings: the Mutant Bassdrum and the Mutant BD9. The Bassdrum offers deep, sub-bass drum sounds and now we have the BD9 which is a thumping, heavy kick suitable for all sorts of different styles of electronic music. Don't be confused by the names – they are two creatures each with a different character!

The BD9 features a fully analog core inspired by vintage drum machines. The Mutant BD9 uses a triangle core VCO with a novel sine waveshaper and other support circuitry to form a kick drum tone, rather than the twin-t oscillator which is used in the Mutant Bassdrum. The flexibility gained by using a VCO core means that we have been able to add a lot of control over the various parameters that shape the sound of the kick drum! Signal levels throughout the BD9 are optimised for modular usage, rather than the line level signals of drum machines.

There are a number of envelopes and VCAs within the BD9 which are responsible for shaping the character of the sound. In addition, a "click" generator allows you to add an attack punch made up of white noise and a short pulse. This attack click is responsible for the pounding character of some infamous classic drum machines and helps the bassdrum to poke through even the heaviest of mixes.

In addition to multiple CV inputs and controls not found on classic machines, we added a sub-oscillator to the BD9 for maximal depth. At the end of the signal chain is the DRIVE circuit, which is capable of completely overdriving the BD9's signal before it reaches your mix, as well as providing classic sounds at its lower ranges.

The Mutant Philosophy

There are already some pretty awesome clones of vintage gear out there in the modular world. The Mutant Drums were not made to try and fill that role. Although each Mutant began as a favourable classic drum topology, we wanted to create something modern and different, while still maintaining an analog nature. Features like CV inputs and signal routing not found on classic analog drum machines were incorporated to make these circuits powerful creative tools in your modular synthesizer.

FEATURES

Parametric bassdrum synthesis offers creative control of the core sound

- The primary analog VCO offers classic 909-esque sinusoidal bassdrums, but can also be switched to generate a square wave bassdrum.
- The PITCH of the VCO spans several octaves, from about 30Hz to 240Hz, and can be modulated with voltage control
- A novel PITCH DECAY circuit allows you to adjust the duration and AMOUNT of the pitch-modulation envelope applied to the bassdrum, from short blips to exaggerated tom-like sweeps.
- The AMPLITUDE DECAY allows adjustment of the length of the bassdrum, from short punchy kicks to massive booms. This parameter is voltage-controlled with a snappy CV response time, allowing you to modulate the duration of your kicks per step.
- The CLICK generator is responsible for the attack intensity of the BD9. A fair amount of circuitry goes into creating this subtle punch at the beginning of the kick. The level of this effect is adjustable up to a fairly dramatic extremity.
- The overall timbre of the BD9 varies with the DRIVE control from warm, analog bassdrums at low settings to speaker-shattering overdriven sounds at high settings. Output levels are modular-level signals, unlike many classic line-level percussive devices.

Still not heavy enough? Try the sub-oscillator.

- A square wave sub-oscillator derived from the primary oscillator's pitch can be mixed in (manually and with voltage control) to the BD9. The effect can be subtle deepness or extreme timbre changes.
- A jumper on the back of the module allows you to select between the sub-osc being a raw square wave or having some of the high frequency components removed with a lowpass filter.
- At high OUTPUT DRIVE and SUB LVL combinations, the sub-oscillator can be modulated with CV to saturate the BD9 output in evolving ways.
- The SUB OCT can be set to 0, -1 or -2 octaves down from the primary oscillator. A drop of 0 means that you can mix an equal-pitch square wave with a sinusoidal primary wave.

Designed for the contemporary modular synthesizer

- Plenty of eurorack-compatible control voltage inputs with bipolar attenuverters facilitate synthesis of dynamic percussion.
- A practical analog trigger circuit allows activation of the BD9 from many signal sources (anything with a positive-going edge lasting 2ms or longer). Most electronic drum pads can also directly trigger the Mutant BD9.
- An accent input accepts analog voltage control (0 to 5V will fully modulate the volume from low to high).

TECHNICAL SPECIFICATIONS

Width: 13HP | **Depth:** 30mm
Current draw: +50mA, -50mA @ 12V

INTERFACE

The BD9 Core

PITCH

The fundamental pitch of the BD9's VCO core can be adjusted between 30Hz and 240Hz. Voltage control applied at the PITCH jack and adjusted by the attenuverter at the PITCH CV control can modulate the pitch of the BD9.

PITCH DECAY + AMOUNT

The PITCH DECAY is a percussive envelope separate from the volume envelope of the BD9, which can be applied to the PITCH of the kick drum with the AMOUNT control. A classic setting is to dial in a relatively brief (about 1/3rd of the way up) PITCH DECAY with a fairly extreme AMOUNT setting. This will generate a punchy kick drum. Adjust the PITCH to taste.

AMP DECAY

The overall duration of the BD9 is adjusted using this control. At its lowest setting, you will get short, punchy tones. At its most extreme setting, the kick will decay over a long period of time (over 20 seconds). This parameter can be modulated with CV at the AMP DEC jack, and its CV can be attenuverted with the AMP DECAY CV control. Try applying an LFO or CV sequence to modulate this parameter over time!

WAVE

Select the core VCO waveform of the kick drum with this switch. Classic percussion synthesis usually calls for a sinusoidal waveform, as this is the oscillation that naturally occurs in acoustic drums when struck with a mallet. The BD9 also offers a harmonic-rich squarewave.

TRIG

This input jack is used to trigger the BD9. This analog circuit is specifically designed for modular use and will trigger from virtually any positive-going signal source that lasts 2ms or longer, reaches a peak voltage of about 1V, and falls back down to 0 (or below 0) before occurring again. Many piezoelectric drum trigger pads from electronic drum kits should also be capable of triggering the BD9.

ACC

The ACCent input jack allows you to modulate the intensity and volume of the BD9 with CV input. The jumper on the back of the module allows you to select whether the default state (with no CV plugged in) is pulled UP (highest) or DOWN (lowest) to lowest accent level. 5V of CV will fully modulate the BD9 to full accent level. **Try using accent CV in conjunction with the OUTPUT DRIVE control to dial in a setting which lets you overdrive the BD9 with high accent CV present, but sound more mellow and toned down when the accent CV is low. In this way, the ACC input can function like a voltage controlled overdrive for the kick drum!**

OUTPUT DRIVE + OUT jack

This control also acts as a volume control for the BD9. For clean drum tones, keep the DRIVE at lower settings. At high OUTPUT DRIVE settings, the BD9 will be completely overdriven and create intense, distorted kicks. The purple LED above the OUT jack acts as a clipping indicator. The OUTput jack is capable of putting out full modular level signals, up to 20 volts peak to peak.



The Click Generator

The click generator in the BD9 provides a burst of white noise and a short pulse at the beginning of the kick drum. This percussion synthesis technique adds a lot of attack character to the sound of the bassdrum.

CLICK LVL

This control simply controls the volume of the click at the beginning of the drum sound. It is worthwhile to note that the accent level (described on the previous page) affects the duration of the click generator. This means that at higher accent levels, the click is more prominent in the kick's mix.

The Sub Oscillator

Perhaps the most unique feature of the BD9, this Mutant Drum features a square wave sub oscillator, much the same way that some hardware synthesizers offer a sub oscillator on their control panels for making bass patches with. This sub oscillator can be used to further bring out sub frequencies in the kick drum, or mix in some harmonic qualities to a sine wave bassdrum by mixing an equal frequency sub wave in with the fundamental sine wave of the VCO. Its effect is especially apparent when using higher fundamental PITCH settings on the BD9 and having the sub oscillator tuned an octave or two below.

There is a jumper on the back of the module which allows you to select whether the raw square wave of the sub oscillator is lowpass filtered or not. A raw square wave has quite a bit of harmonic content and thus may not be desirable to have for sub frequencies. You may turn this LPF off by setting the jumper to the 'OFF' position. The factory default is 'ON'.

SUB LVL

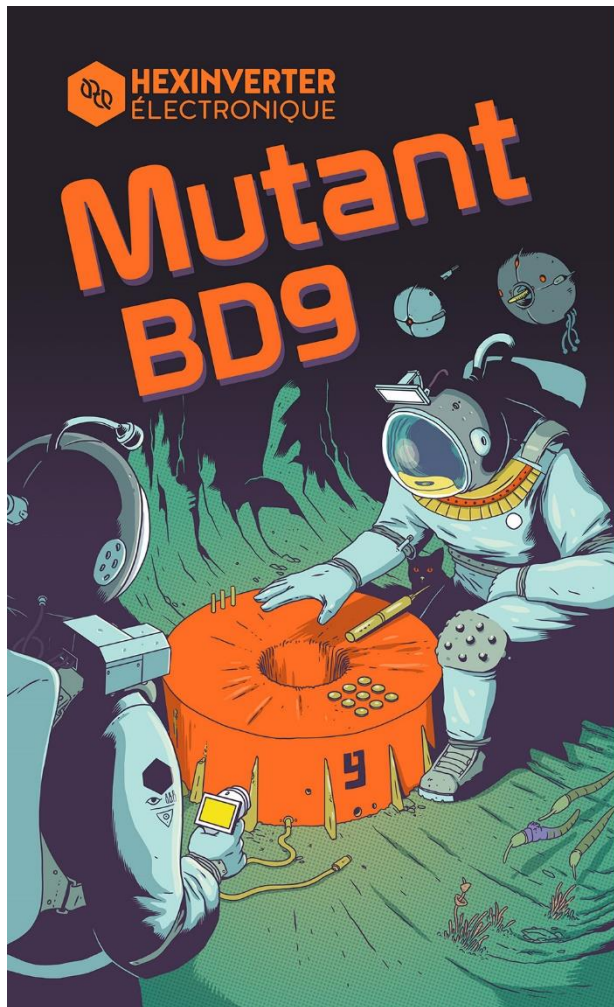
This knob controls the volume of the sub oscillator. Applying a control voltage at the SUB LVL input jack allows you to modulate the level of the sub oscillator. Try bringing the sub oscillator in and out of the mix with a CV sequence or other modulation source. **At high OUTPUT DRIVE levels, the sub oscillator and main BD9 VCO can sometimes take turns over-saturating the final drive stage, resulting in some interesting and somewhat evolving timbres!**

SUB OCT

This switch selects the octave of the sub oscillator frequency. The sub oscillator is **always derived from the main VCO's frequency**. Selecting a SUB OCT octave of "0" will give you an equal frequency square wave, while selecting "-1" or "-2" will drop the sub oscillator 1 or 2 octaves from the main VCO pitch, respectively. Try setting the main WAVE to a sinusoid and the SUB OCT to "0" to blend together a sine and square wave to make your kick drum with.

QUICK REFERENCE CARD

These are included packaged with every module, but if you lost yours, you might find it handy to print it out and have near your modular for reference.



Quick reference card



Adjust the fundamental **PITCH** of the bassdrum's oscillator. This parameter can be voltage controlled.

The **length** of **PITCH DECAY** can be adjusted, as well as the **AMOUNT** of influence it has on the bassdrum's VCO.

AMP DECAY controls the overall **duration** of the BD9. This parameter can be modulated with voltage control.

Modulate the **PITCH** and **AMP DECAY** with either positive or negative CV via the attenuverters.

The BD9 gets its intense attack punch from the **CLICK** generator. Adjust the level here.

The **WAVE** switch selects either a square or sine wave for the oscillator.

While it sounds deep on its own, adding a **sub-oscillator** with the **SUB LVL** control brings it to a whole new level!

Also acting as a volume control, low **OUTPUT DRIVE** will give you classic sounds. Turning up the gain will give you **intense, distorted bassdrums**.

The **SUB LVL** can be **modulated with CV** input! Try turning the sub-oscillator on at certain steps in your drum pattern.

Select the number of octaves the sub-oscillator drops with the **SUB OCT** switch.

Setting the **SUB OCT** to 0 will give you an equal-frequency square wave you can mix with a sine wave to create a **totally different bassdrum sound!**

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