Shinsa BEAT

Music Analyzer and Beat Extractor

- Technical Description and Operational Guide
- Eurorack module

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Description

- Shinsa BEAT is a single 16HP Eurorack module that analyzes music and extracts beat cadence information in realtime
- The module outputs three Control Voltage (CV) trigger signals to feed into other modules or equipment
- Front adjustments allow for selecting the part of the music spectrum to analyze for beat extraction
- Front controls are also available for selecting the beat cadence to synchronize the trigger output
- Auto input level control let's the module work with a wide range of sound output connections, from low-level line to high-level headphone outputs
- Two separate analyzer channels per module; low frequency for bass and drums and mid frequency for percussions and cymbals
- Compatible with Eurorack systems

Front Panel Controls

Trigger Outputs - CV output triggers for channels A and B. Also, one trigger output for A or B.

Holdoff Control - Sets the beat cadence to match the incoming musical rhythm, in BPM (Beats Per Minute)

Level Control - Adjusts the audio level for the internal detector and analyzer. LED lights when level is at proper level.

Frequency Control - Sets what frequency area to analyze of the audio input signal.
Low channel 20Hz-800Hz; Mid channel 400Hz to 8KHz

Setup Switches - These are gain input options for the module. See the Gain Switch page for these functions.

Analog Input - Music audio input, mono (L-channel). The signal range for this input is -5v to +5v.

Auto Level Indicator - Lights when there is sufficient audio input to run the module. Auto adjusts to proper level internally.

Connecting up the module

Here is a typical connection setup for the Shinsa BEAT module. The pictured module below is installed in a small Eurorack case and is connected up to the Funiki SPLASH module.

Trigger outputs A and B connected to other modules

LEDs indicate when triggering is occurring

Levels adjusted until LEDs light

Auto Level LED is lit to indicate input audio is at proper level

Setup and Use

Audio Input

Shinsa BEAT needs an analog music input over a 3.5mm plug. Only one channel of audio is analyzed, therefore a mono 3.5mm cable will work fine. Ring is audio ground and Tip is the signal. If you use a stereo 3.5mm cable, only the left channel is used by the module.

The audio input has an automatic level control, therefore it accepts a wide variety of signal levels, up to a maximum of +/- 5 volts. Line level audio works best, but headphone levels also work fine. Some low signal microphone levels work, but it is best to use a mic preamp before the Shinsa BEAT module. When the module recognizes a proper signal level, the Auto Level LED will glow.

There are two dip switch options (Gain) to allow for a wider range of input levels. Normal operation is both switches OFF (sliding left).
-Turning ON switch 1 (sliding right) adds a lot more gain to the input signal for dealing with very low signal levels.
-Turning ON switch 2 (sliding right) decreases the input level to better deal with high level signals.

Remember there is auto gain on the input, therefore please wait at least 15 seconds for the input level to settle before deciding to use the Gain switches.

Setup and Use (cont.)

User Adjustments

It is best to start with all the knob settings at their mid-point setting. Input an analog music signal and wait for the auto level to settle with the Auto Level LED lighting up.

Frequency adjustment

This knob tells the module to look at a specific frequency for beat information. There are two separate analyzer channels, one for low frequencies and one for mid frequencies. The Low channel is adjustable from 20Hz to 800Hz. The Mid channel is adjustable from 400Hz to 8KHz.

The musical beat is usually contained in percussive instruments so you should set the Frequency to look at these specific areas:

Kick drum - 80Hz to 150Hz

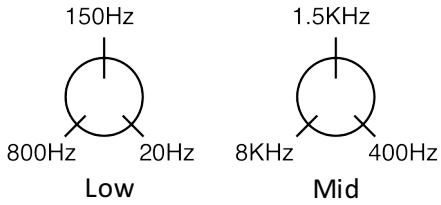
Floor tom - 60Hz to 120Hz

Reg tom - 200Hz to 1KHz

Snare - 120Hz to 250Hz

Cymbal - 400Hz to 8KHz

Hand clap - 100Hz to 300Hz



With electronic music, the actual beat frequencies can be anything, therefore it's best to just listen and adjust in real-time to a proper setting.

Setup and Use (cont.)

Level adjustment

This adjusts the audio level through the separate analyzer channels, in case there is too much, or too little, signal in the specific frequency to analyze. Adjust this until the Level LEDs light up.

Holdoff adjustment

Once a beat has been recognized, the internal trigger needs to be synchronized to it. This is accomplished by setting the Holdoff setting to closely match the beats per minute (BPM) of the incoming music. This allows Shinsa BEAT to ignore any other beat signals except those that are in cadence with the music. You can set this to the exact BPM to catch every beat, or to a 1:2 cadence to catch every other beat. You should adjust the Holdoff to a little under the musical BPM setting. Watch the output LEDs to see how the Holdoff setting affects the trigger outputs.

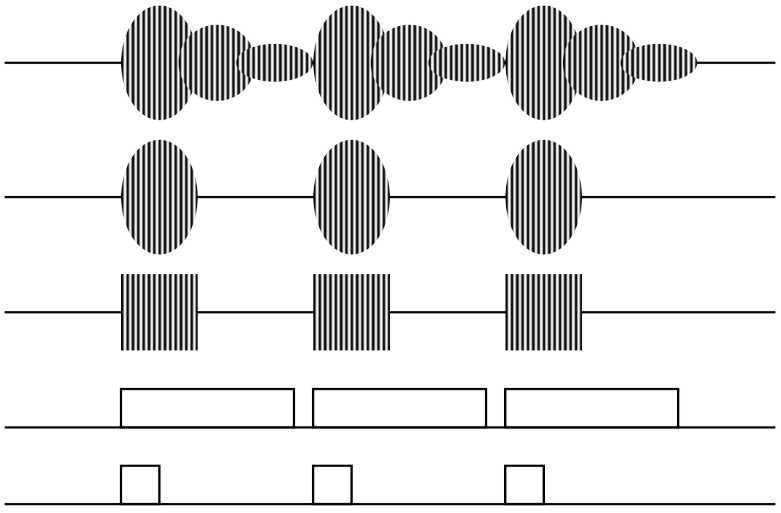
Trigger Outputs

Shinsa BEAT has 0-5 volt trigger outputs for both channels (Low and Mid), plus an output that is the logical OR of both the A and B outputs. These outputs can drive other Eurorack modules or external devices.

How it works

Shinsa BEAT is a unique music analyzer that incorporates several stages of analysis to extract a proper beat cadence. It is not a color-organ, which has been around for over 50 years. Shinsa BEAT is much more complicated and embeds a lot of unique circuitry to take analog music and output a digital trigger signal for external control.

Shinsa BEAT looks at the make up of the music in the frequency domain, then takes that data and converts it into the time domain to find a proper rhythm match. It then synchronizes to a internal beat-per-minute (BPM) signal to output a 5 volt, synchronized, beat-matched trigger signal.



Getting Help

Shinsa BEAT is a very complex Eurorack module, but it should be easy to configure and use. Trying out various types of music and settings is the best method for getting used to how to setup the module.

If you are still having difficulty, please reach out to our tech support department, and they'll be glad to help you out.

Unagi Tech Support: techinfo@unagi.net