Bit Designer

Version 1.0

User Manual

Bit Designer is an advanced digital distortion effect that, at its core, gives you control over the raw bits of the digital audio stream. This manual will give you an understanding of how the bit designer works, so that you may take full advantage of it.

1. The Effect Section (Fuck Yeah!)

At the top of the 'Fuck Yeah!' section is a **randomizer** button. It randomizes all controls in the ensemble except the Threshold Distortion, the Pre and Post Filters and the Dry/Wet mix - this is to minimise the probability of having an inaudible setting generated.

1.1. The Tuned Buffer

The tuned buffer is the first step in the effect signal chain. When activated with the **!** button, it holds and repeats the audio at a rate specified by the **Size** knob. The repeat rate is tuned to an equally tempered chromatic scale (the standard western keyboard) and is playable via MIDI. MIDI note on and off messages activate and deactivate the buffer repeat and MIDI note values specify the size of the buffer. The **Speed** knob controls the rate of playback, with negative values reversing the buffer playback.

1.2. Pre Filter

Before any of the distortion effects comes a pre filter. It is a fairly basic virtual analogue design, with one **resonance** control and two cutoff controls for the **highpass** and **lowpass** filters. The filter has been finely tuned and will saturate at high resonance values.

1.3. Sample Rate (SR)

The first level of digital distortion is the sample rate reduction. This section has one **Reduction** control that reacts to your system sample rate. It reduces the sample frequency in the pitch domain, so a setting of 12 corresponds to a reduction of one octave, and thus a halving of the sample rate.

1.4. Bit Control

This is the heart of the **Bit Designer** effect, and the section that does the most damage. The whole section is at an 8-bit resolution. All controls in this section interact, so it is rare to press a button and have nothing happen. It has 5 main control areas:

i. **Bit Activate**
   Here you have a series of 8 buttons that can activate or deactivate the corresponding bit of the audio stream.
ii. **Bit Invert**
   These 8 buttons allow you to invert the state of the bit, so a value of 1 becomes a value of 0 and vice versa.
iii. **Bit Sample Offset**
   This series of 8 knobs allows you to apply a delay to the corresponding bit. The delay time is set in samples and is therefore linked to your sample rate.
iv. **Error and Swap**
   The **Error** button sets the output of the **Bit Control** to be the difference between the input and the effected signal. This means that it outputs only the digital quantization error. It makes the most difference when the other settings of the effect are subtle.

The **Swap** button, when active, swaps the two nibbles of the audio byte. This means that the fist set of 4 bits in the 8-bit word is swapped with the second set.

v. **Bit-shift**
This control offsets the 8-bit word to the left (if negative) or right (if positive) with a wrap-around. So, if we think of the 8-bit word like this: 01234567; at a value of 1, the word becomes 70123456, at a value of -2 it becomes 23456701 and so on. This is the most extreme of the controls in this section.

1.5. Threshold Distortion (Thres Dist)

In this section you can control a hard clipping distortion. The **Threshold** knob allows you to set the clipping level of the distortion. The unique feature of this distortion is that you are given control of the volume of the clipped signal **(Clipped)** and the volume of the signal that is traditionally removed **(++)**.You can also invert the phase of either signal by setting the levels to a negative value. In effect, this distortion can also be used as a very basic waveshaper.

1.6. Post Filter

Identical to the **Pre Filter** in every way except its position in the signal chain. A useful feature to smooth out the harsh digital effects of this ensemble.

1.7. Out

A typical **dry/wet** crossfader is provided at the end of the signal chain. Please note: the 'dry' signal is taken post-buffer.

2. Modulation Section

A tempo synch'ed LFO and an Envelope Follow are provided as modulated sources. Both sources can have two **destinations**, with bi-polar control over the **amount** for each.

2.1. Input Envelope Follower (Env Follower)

The Envelope Follower follows the amplitude of the input signal before it reaches any of the effects. Apart from the standard **destination** and **amount**, there are two controls for **Attack** and **Decay** time, as well as a meter for displaying the value of the follower.

2.2. LFO

The LFO provided is the same as any standard LFO. It is synchronised to the host tempo and you control the **Rate** by specifying the number of cycles per beat. The **Phase** control sets the offset in relation to the host clock song position.
With the **Wave** control you can morph between 3 different waveforms (0 = Triangle, 1 = Sine and 3 = square) and with the **Sym** knob you can set the symmetry of the waveform.

- Thanks for checking out Bit Designer. I hope you enjoy destroying your audio.

\\Special thanks to OTO machines and Doepfer for the initial inspiration and to Matt for explaining the usefulness of Core.
\\Knob Skins were taken from the Ez-FFT modules.