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Assignment 2

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[ASSIGNMENT 2: PART 1 2 & 3]

SynthMaker Plugin

Figure 1 - 6-Pack Cut-Up

It's called 6-Pack Cut-Up; for a lack of a better name. It is a VST instrument (VSTi) that has two parts to it; a sound synthesizer, and 6 cutters each with an effect/filter to alter the sound.

The sound synthesizer is a dual oscillator that lets the user create two different oscillating waves each with its own volume control. It is the stock synthesizer that comes with the download of the SynthMaker program; however it has been modified to suit the specific need of this VSTi. It comes with several preset options so the user doesn't even need to know what an oscillator and a band reject filter is.

The synthesizer takes a MIDI control and passes each frequency into the two different deturners, then oscillators, then each though an amp to control each frequency individually. Both frequencies are passed into a state variable filter where the user can choose the filter it can pass through as well as an ASDR. The combined output of the state variable filter is then passed through an additional ASDR envelope prior to passing though the final amp.
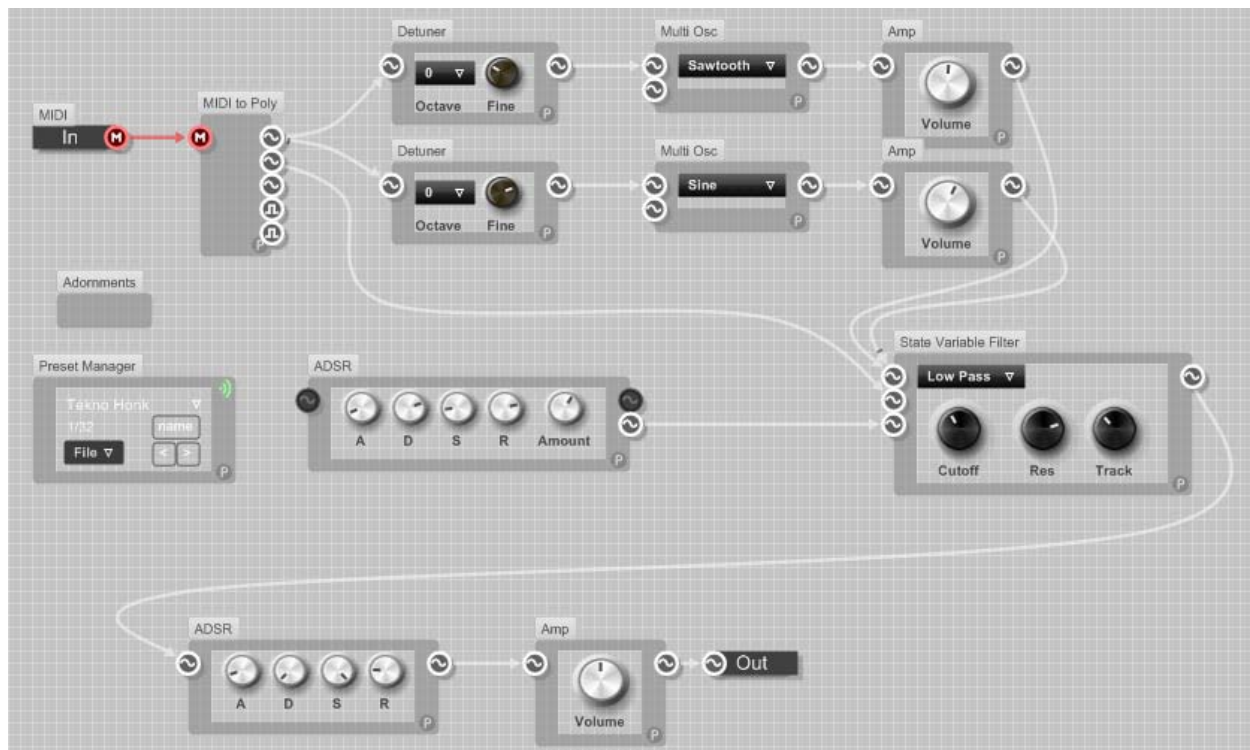

Figure 2 - Dual Oscillator

Once the desired dual wave oscillator is achieved, the wave is feed into the 6 different cutters. This begs the question of what exactly is a cutter. A cutter is defined by two things: how often the sound is to be cut (in Hz), and the length of the cut (in percent). For example, one cutter can be set to cut the audio every half a second and have the length of the cut be 50% of that time; this would mute the audio for 25ms at every 50ms interval. The cutter function is shown below; it accepts the cutting interval, the length percentage, as well as the input wave. As output, it sends out the wave as a poly as well as the

wave as a mono; this allows for many different filters to use the audio. As an additional output, it sends

a 1 if this channel is being used and 0 if it is off. This allows for accurate mixed of signals when all the

channels are combined together.

If the cutter interval knob is set to 0, all the incoming audio is muted; this is equivalent to turning off

this audio channel. If the cutting length knob is set to 0, the incoming audio is feed directly to the

output; except of course when the interval knob is 0.

The outgoing audio signal is multiplied by either a 1 or 0 determined by the respectful knobs and

corresponding timers. However, the values are ran through a de-zipper of 10ms prior to flipping to
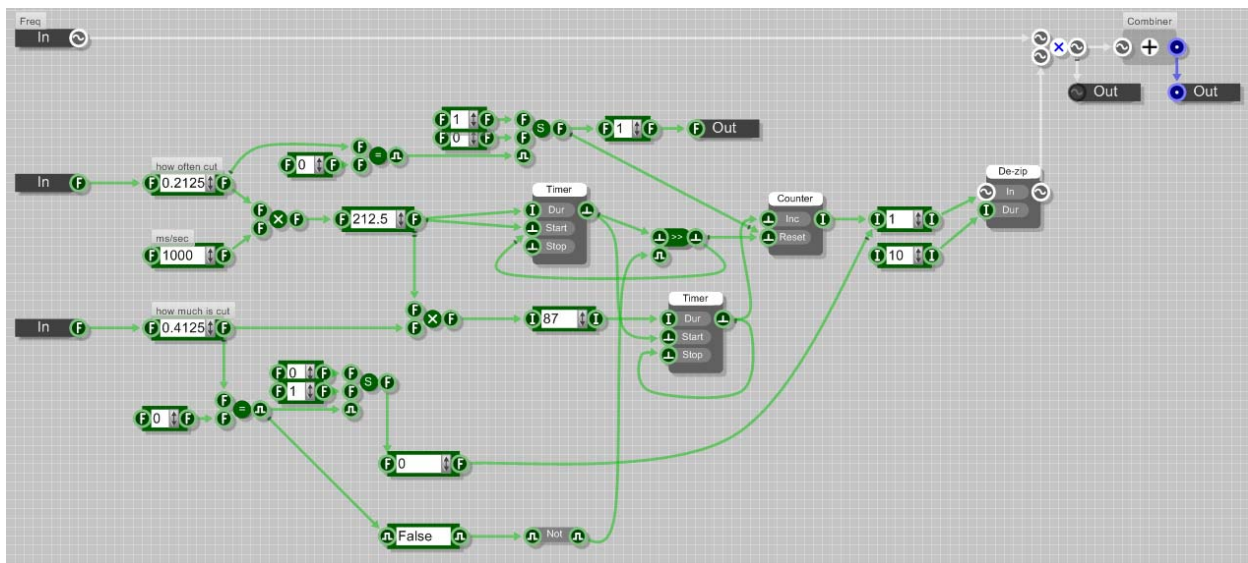
prevent a harsh click of audio.

Figure 3 - Cutter Function

Once the allowed audio has left the cutting block it is fed through a user-controlled filter/effect.

Once the audio stream has been altered, it is scaled down by 1/n, where n is the amount of active

channels, and added to the rest of the output streams. Each stream is scaled down to prevent overflow

and clipping.

The scaling function accepts the 1s or 0s from each of the 6 cutting channel, as well as a 1 or 0 stating if the wet/dry mix is on. The function adds all the input together and divides by 1/n. However, because it is possible that there can be 0 channels active, a slight work-around has be devised that avoids a 1/0 calculation: this is shown below.
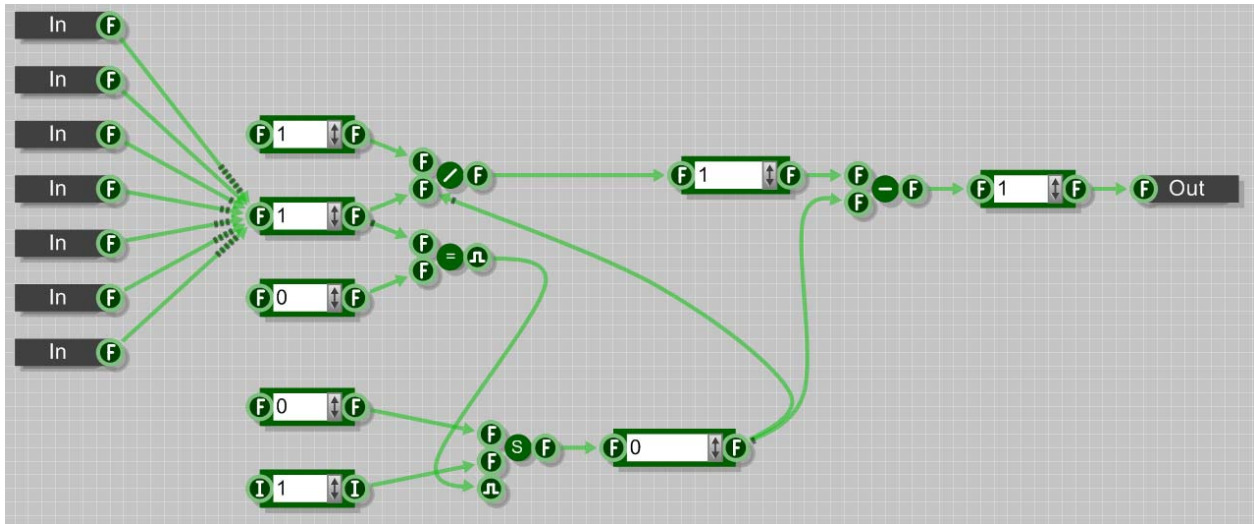

Figure 4 - 1/n Scaling

After the audio channels has been scaled and added together, they are combined into a mono track and sent out as complete.

To use this crafty VSTi plugin, all the user needs to do is set the oscillators to their desired settings, then take free range of each of the 6 cutters: adjusting the frequency of cuts, then the length of the cut, then finally how the filter/effect alters the sound.

The six cutters come equipped with, and are displayed in the following order:

1. Echo

2. Echo (a secondary echo because two different echo effects can sound really awesome)
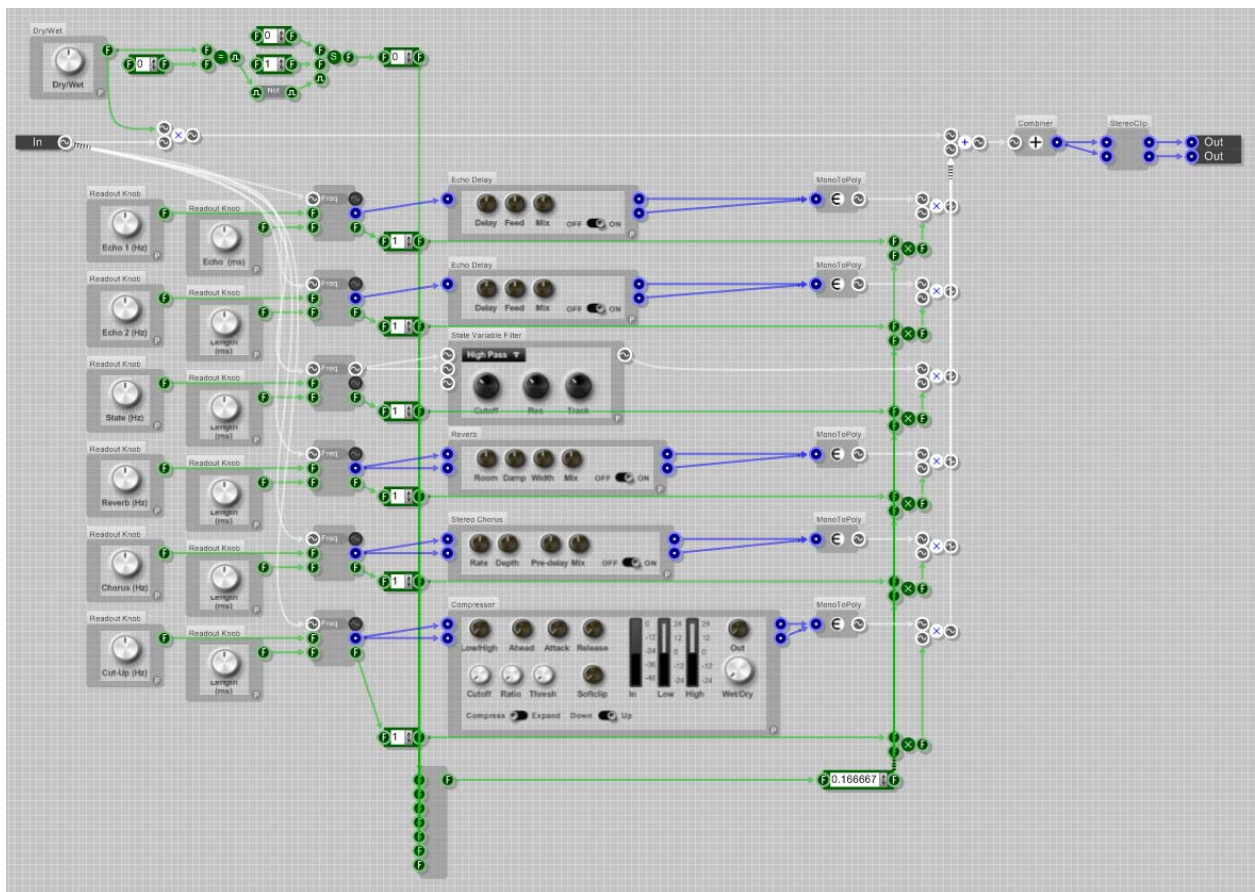
3. State Variable Filter

4. Reverb

5. Stereo Chorus

6. Compressor

Figure 5 - Cut-Up Breakdown