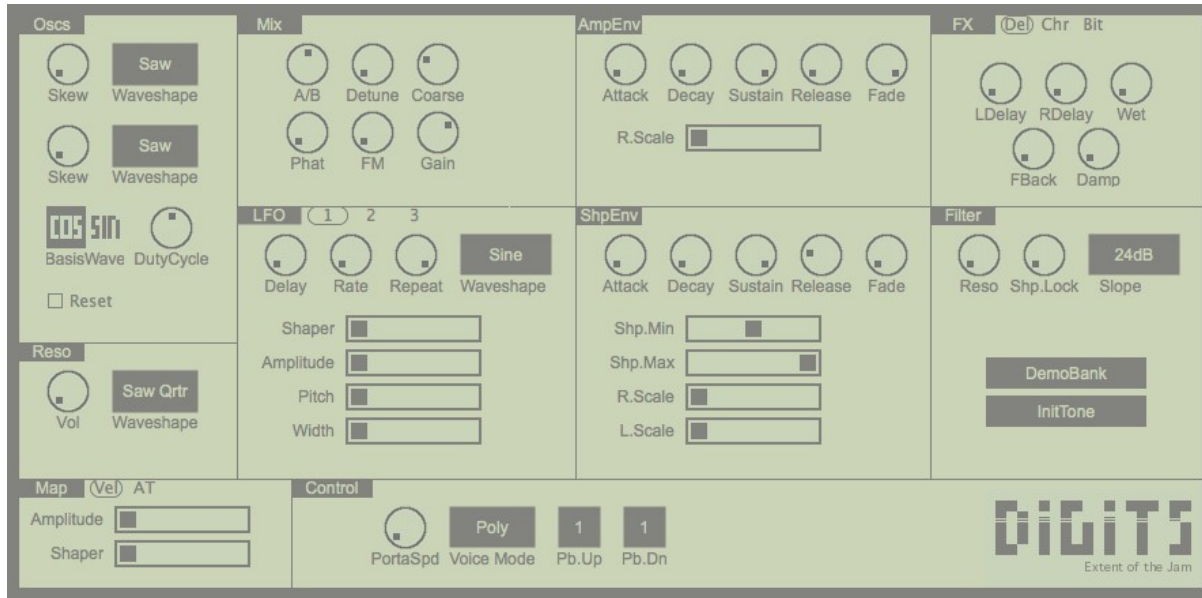


## *Digits 2*

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Digits is offered as closed source free software. By using it, you accept the following conditions:

- The author is not responsible for any data loss, broken hardware, or ruined gigs that might occur as a result of the use or misuse of this software. Although this software has been tested and no serious problems have been found, this is always a risk with any complex computer program.
- Although Digits is free, it may **not** be freely redistributed and the binary of the program may not be altered. Please link to the installer found at <http://www.extentofthejam.com>
- If you have any questions, please feel free to drop me an e-mail!

The author may be contacted at [louis.gorenfeld@gmail.com](mailto:louis.gorenfeld@gmail.com).

### Summary

Digits is a Phase Distortion synthesizer. This form of waveshaping synthesis has its roots in Casio's brilliant CZ line of digital synthesizers from the 80s. It is designed to have the warmth of a subtractive (analog) synthesizer, yet be capable of the squelchy tones and sharp attacks of an FM synth. Digits in particular can create warm pads, glitchy sounds, dirty basses, filthy sweeps, screaming leads, and anything in-between.

For those familiar with Moog-like subtractive synthesis, think of the “shaper” as being synonymous with “brightness” or “filter cutoff”.

## Setting up Digits

### **Mac OS X:**

- ̱ Run the setup package. This will install the VST into the default path (/Library/Audio/Plug-Ins/VST)
- ̱ The presets and manual can be found in /Applications/Digits
- ̱ You may have to enable VST support in your VST host. For instructions on how to do this, please consult your host's manual.

### **Windows:**

- ̱ Run the setup program. By default, this will install the manual and presets into Program Files\Extent of the Jam\Digits. If on a 64-bit system, look under “Program Files (x86)”.
- ̱ The setup program will attempt to detect your VST directory. If it can't find it, it will by default install the VST DLL next to the manual and presets.
- ̱ You may have to enable VST support in your VST host. For instructions on how to do this, please consult your host's manual. Be sure to point it to the correct directory if needed.

### **Linux:**

- ̱ Extract the tarball
- ̱ Navigate to where the contents are and run install-digits.sh. This will put the manual into /usr/share/doc/digits, the presets into /usr/share/digits/presets, and the VST .so file into the place specified by \$VST\_PATH. If \$VST\_PATH is not set, it will put the .so file into /usr/share/digits

## What's New?

### **...In Version 2:**

- ADSR envelopes (they used to be trapezoidal)
- True lowpass filter with resonance (1, 2, 3 or 4 poles!)
- Toggleable oscillator reset
- Assignable aftertouch and mod wheel support
- 3 LFOs instead of 1
- Both monophonic and polyphonic glide modes
- Key-Rate and level scaling for envelopes
- Changeable pitch bend up and down
- New analog chorus emulation
- Harmonic bitcrush effect

### **...In Version 1.3:**

- Full editor GUI!
- Much lower CPU usage
- New global gain setting
- **Gain defaults to -3db if not set**  
(e.g., all old patches/projects default to -3db, so you may need to adjust gain on old projects)
- Better bank/patch support
- New patch directory layout

### **...in Version 1.2:**

- Fixed memory leak on instantiation

- Better FruityLoops support
- Added "fade" option to sustain stage of envelopes
- More and better presets
- LFO->pitch modulation with noise is improved

#### **...in Version 1.1:**

- First Windows and Linux releases!
- Smoothed zipper noise for FM amount automation
- Delayed LFOs are smoother when they kick in
- Fixed dropped notes with extremely low latencies
- Fixed slow instantiation bug
- Improved MIDI handling

### **User Interface and Patch Saving**

While the user interface is described in detail below, you should first know a few things about patch saving. Digits uses standard FXP files to save its patches so that they can be easily shared between programs. However, if you want these to be accessible from within the Digits GUI, these files **must** be placed into **/Applications/Digits/Presets/<BANK\_NAME>/** on Mac (where <BANK\_NAME> is the name of your bank). When you use the save dialog from within Digits, it will default to the **User** bank. You may freely create any number of additional banks off of the **Presets** directory (adjacent to the existing banks).

The bank/patch controls are located in the center bottom of the GUI. The top row is the bank while the second row is the currently selected patch. Click either to pull down a menu of banks or patches. To **save** a patch, click the item labeled "<save patch>" in the patch menu (it's always the last item).

For instructions on what each parameter does and tips on how to use them, read on!

## Parameters



### **Skew/Waveshape (ShpMod)**

Instead of a waveform selector for each oscillator, the oscillators have these two parameters. The shaper mod determines how many times the waveshaper runs per cycle. The lowest setting is square (twice per cycle), then saw, and then FM-like tones.

The skew slider can make subtle variations in the tone. At 0% or 100% are its cleanest sounds. In-between settings can either add a little bit of hair (overtones) to the sound or morph between the tones, depending on the mod setting.

Here are some common waveshapes and their settings to get you started:

**Saw:** Skew=0, Mod=Saw

**Sine-Pulse:** Skew=100%, Mod=Saw (thin, highpass-like sound as shaper increases)

**Square Approximation:** Skew=0, Mod=Square

**Clean Square:** Skew=100%, Mod=Square

And here is an example of the funkier, more FM-like waveshapes you can make:

**Sine with Dip:** Skew=0, Mod=Angrier

**Sine: 1 cycle fast followed by 1 cycle slow:** Skew=0, Mod=Angrier

### **ResoWave**

Style of the resonance generator:

**Saw Quarter:** Saw-like resonance, little high end, buzzy, squelchy

**Saw Half:** Saw-like resonance with strong fundamental boost, smooth. Good for adding punch to basses.

**Square Quarter:** Square-like resonance, little high end, buzzy, squelchy

**Saw Half:** Square-like resonance with strong fundamental boost, smooth. Good for basses and strange, dreamy, bell-like pad sounds

### **ResetOsc**

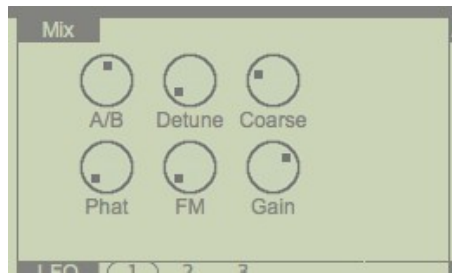
Set to true to reset the oscillator on each note onset. If off, the oscillator resumes from where it left off

### **ResoVol**

The volume of the resonance generator.

### **BasisWav**

The phase of the waveform used in shaping. The default, Cosine, gives the most predictable results. Sine is good for tones with a high-pass characteristic.



### **A/B**

This is the balance between oscillators 1 and 2.

### **Detune**

The amount that oscillator 1 and 2 are detuned from each other

### **Coarse**

Coarse detune (octave) for oscillator 1

### **Phat (Unison)**

When phat is enabled, several copies of the tone are generated when a key is pressed. These are all detuned from each other. This is good when you need a fat sound.

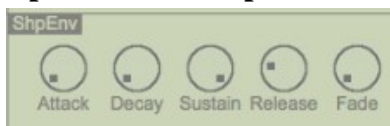
### **FM**

If FM is on, oscillator 1 is the modulator which feeds into oscillator 2's carrier signal. This slider controls the amount.

### **Gain**

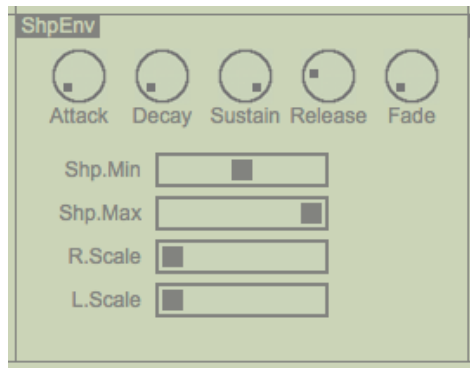
The loudness of the sound. The default is -3db, but the control ranges from 0db (maximum loudness) all the way down to -infinity!

## **Amplitude and Shaper Envelopes**



The envelopes in Digits are ADSR envelopes. In an effort to fit the most flexibility into the least amount of space, they are modeled after trapezoidal envelope generators:

1. When a key is hit, the envelope rises from zero to its maximum at the rate specified by the **Attack**. This is the attack phase.
2. Once the envelope hits the maximum, it decays to the sustain level set by **Sustain** at the rate specified by **Decay**.
3. Once the envelope hits its maximum, it goes into the sustain/fade phase if **Fade** is on. If fade is on all the way, the amplitude stays at the sustain level as long as the note is held. If fade is between 0 and 1, the amplitude will slowly fade at the rate specified. Lastly, if fade is 0, this phase is skipped entirely and it transitions immediately into the decay phase.
4. When a key is released, the release phase is triggered. During this phase, the envelope decays back to zero at the rate specified by **Release**. If sustain is on, this happens when the key is released. If sustain is off, this happens either when the key is released or immediately after the decay phase.



### **Shp.Min and Shp.Max**

Shaper Minimum. These are the two endpoints of the shaper envelope: attack starts at whatever Shp.Min is set to and increases until it hits Shp.Max. Generally, minimum is higher than maximum. However, the envelope can be inverted if you set Shp.Max lower than Shp.Min.

### **R.Scale**

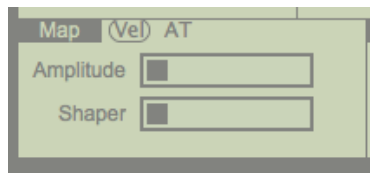
Rate Scaling. This determines the amount that the envelope is scaled as higher notes are played. Think of an acoustic string instrument where higher notes decay more quickly than lower notes. This is centered around middle A.

### **L.Scale**

Level Scaling. This determines how much duller higher notes sound than lower notes. With this up all the way, lower notes are much brighter than higher notes. With it at its minimum, higher notes are only slightly brighter. This is centered around middle A.

### **PulseWidth**

The initial pulse-width of the tone.

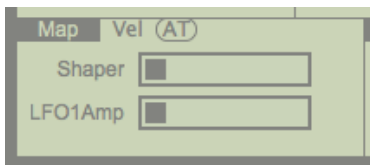


### **Velocity      Shaper (Vel tab)**

The amount that velocity affects the brightness of the tone (the shaper amount).

### **Velocity      Amplitude (Vel tab)**

The amount that velocity affects the volume of the tone



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The amount that velocity affects the brightness of the tone (the shaper amount).

### **Velocity      Amplitude (Vel tab)**

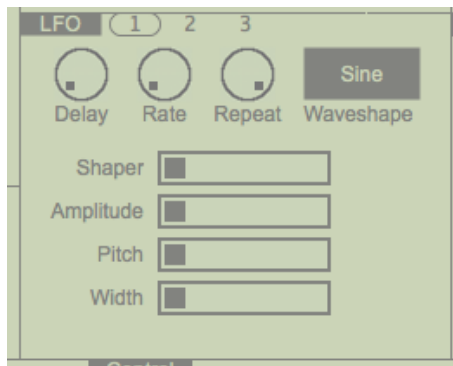
**The amount that velocity affects the volume of the tone**

### **Aftertouch or Mod      Shaper (AT and Mod tabs)**

The amount that the aftertouch or mod wheel affects the brightness of the tone (the shaper amount).

## **Aftertouch or Mod LFO1Amp (AT and Mod tabs)**

The amount that the aftertouch or mod wheel affects the amplitude of LFO1. This can be used to do vibrato.



### **LFO Delay**

Amount of time before the LFO kicks in. This is especially useful for vibrato.

### **LFO Rate**

How fast the LFO goes. The LFO will go from low settings (for tremolo/vibrato) all the way into the audible frequency range (for special effects, noise generation, atonal sounds). To generate noise, set the LFO to 'noise' type and modulate the frequency. All of the parameters except for pulse-width will happily go into the audible range.

### **LFO Repeat**

How many times the LFO repeats before it stops. Use this to add some roughness or extra impact to the start of notes, or to add a little note glide to the onset of each new note.

### **LFO Waveshape**

The shape of the LFO

### **LFO Shaper**

### **LFO Amplitude**

### **LFO Pitch**

### **LFO Width**

How much the LFO affects the shaper, amplitude, frequency, or pulse width



### **Ldelay/RDelay**

Digits has a pair of simple delay effects built-in, one for the left speaker and one for the right. These parameters control how long the delay is.

### **Del Wet**

This slider controls how much of the delayed signal is present. When it is set to zero, there is no delay effect on the sound.

### **Del FBack**

The delay feedback amount controls how much of the delayed signal is fed back into the delay lines.

## Del Damp

Digits' delay line also can model high frequency loss. This controls the rate at which high frequencies fall off as they're cycled back into the delay line.



## Chr Depth

## Chr Rate

Take the chorus from a gentle effect to a Leslie-like warble by increasing the depth and rate

## Chr Tone

With the tone knob low, the sound is darker. As it's increased, the sound is brightened.

## Chr Dirt

The amount of grain and noise coming off of the bucket brigade simulation. Go from a clean digital chorus sound to a dirty analog chorus by changing this knob.

## Chr Wet

The amount of the effect in the mix.

## Flanger

Check this box to switch into flanger mode.



## Divider

This is how much the harmonic bitcrush effect downsamples the signal.

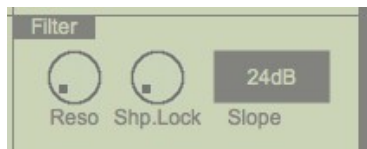
## Bits

The bittage of the bitcrush effect.

## Wet

By altering the wet/dry mix, you can add more or less of the bitcrushed signal into the original sound.





### Shp.Lock

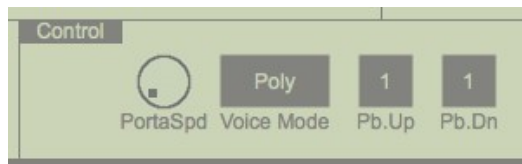
When this is on, the shaper amount is locked at what this is set to, and the filter is engaged. It's recommended that you adjust **ShpMin** and **ShpMax** to a different range when the filter is engaged.

### Reso

The filter's resonance level

### Slope

There are 4 filter modes: 4 pole (24 dB/oct), 3 pole (18 dB/oct), 2 pole (12 dB/oct), and 1 pole (6 dB/oct). 6-pole is good for effects and adding resonance to sound without attenuating the high frequencies too much.



### Voice Mode

There are 4 modes available:

*Poly*: This is the default. Multiple notes can be sounded and there is no automatic glide.

*PolyGlide*: For each note sounded, it glides to the next note at the speed specified by

#### **PortaSpd.**

*MonoHeld*: One note may be played at a time. If multiple notes are held, the note glides to the next at the speed specified by **PortaSpd**.

*MonoGlide*: One note may be played at a time, and the note always glides to the next at the speed specified by **PortaSpd**.

### PortaSpd

This is the speed that glides set with the **MonoMode** setting happen at (portamento).

### Pb.Up / Pb.Dn

This is the amount that the pitch wheel can affect the sound, in semitones.

### PbendUp/PBendDn

This is how many semitones the pitch bend wheel can affect the sound. It defaults to 2 semitones. I recommend using 2 up and 12 down-- then you can easily use the pitch wheel for vibrato and slides, and use sliding down for cool pitch effects!

### And Now...

Thanks for showing an interest in my software. I hope you enjoy using Digits as much as I enjoyed writing it!

--Louis Gorenfeld / Extent of the Jam