Custom Creating Your

If you have ever dreamed of designing your own drum sounds, you must be living right. You are lucky to be alive at a time when custom sound designing has been made available to the average person with an average paycheck. Up until a short time ago, what I am going to talk about was only available on systems costing hundreds of thousands of dollars. Today, for less than the price of the least expensive car on the market, you can make your aural dreams come true.

I am talking about *visual editors* for samplers. These editors have been the biggest thing for sampling keyboards since their introduction into the consumer market just a few years ago. First, let me give you a couple of quick definitions.

A sampling keyboard is an instrument that "records" a given sound by turning that sound into numerical data. Once the sound is stored in number form, the computer (either inside the keyboard or a separate outboard unit) can manipulate that data in a large variety of ways.

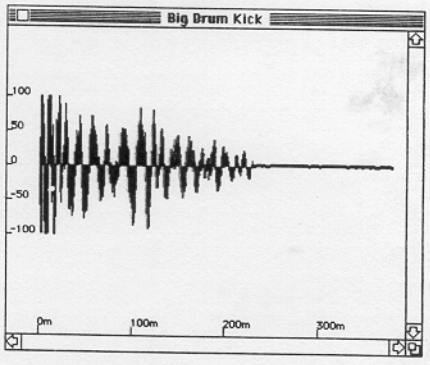
A visual editor allows the computer operator to see the sampled shape of the sound's waveform on the computer screen, and to make any desired adjustments by using his or her ears *and* eyes. This is a very important feature, as sound waves vary from 20 waves per second to greater than 20,000 waves per second. Being able to see a picture of the wave simply makes editing much faster, easier, and more precise.

The system that I am using consists of the *E-Max* sampling keyboard made by E-mu Systems, Apple's *Macintosh* computer, and the visual editor for the *E-Max* by Digidesign called *Sound Designer*. There are other visual editors on the market for many different sampling machines. Besides the *E-Max*, *Sound Designer* is made for the *Emulator II*, *Prophet 2000/2002*, Korg *DSS-1*, Akai *S900*, and the Ensoniq *Mirage*. Another visual editor of samplers is the *Soundfiler ST* from Drumware, which works on the Akai line of samplers (*S-612*, *X7000*, and *S900*) in conjunction with the Atari ST computer. The company that makes the *Macintosh* editor for the E-mu Systems *SP-12* drum machine, Blank Software, also makes an excellent editor for the *Mirage* called *Sound Lab*. The Casio *FZ-1* sampler even has a small LCD screen built right into the top of the synthesizer with the visual editing software "in the box." In other words, this synth allows you to perform visual editing without the external computer that the other instruments require. There are visual editors for other computer and sampler combinations, and more are being made all the time.

Perhaps the best way to describe how I use these tools to create new percussion sounds is to show how a sound is created from beginning to end. Let's build a bass drum sound.

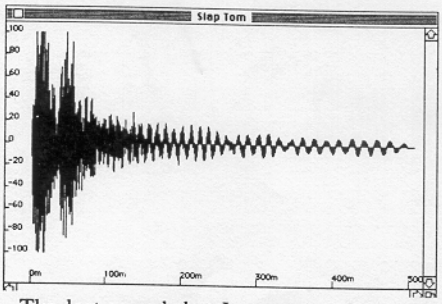
I have always loved the bass drum sound that was included in the *E-Max* factory disk called "rock kit." The first step in creating my new bass drum sound involved getting that sound from the *E-Max* over to the *Macintosh*. For those of you with access to an *E-Max*, this sound can be found in Preset 99 (Big Drums), Primary Voice 12—"NW]6." The *E-Max* and the *Macintosh* communicate with each other through an RS-232 cable, at about ten times the speed of MIDI.

After loading the sound into the computer, it is possible to look at the shape of the sound wave. Example 1 shows the overall wave shape of this sound, which I simply called "Big Drum Kick." (The numbers running across the bottom of this example represent milliseconds. The numbers along the side represent a percent of full amplitude [volume].)

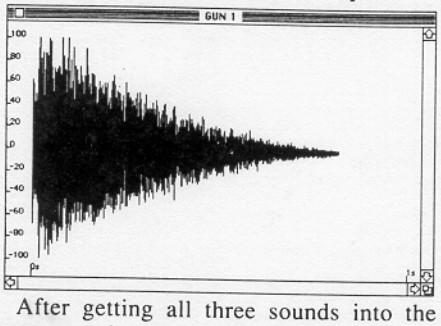


The original size of this sample was 10,500 samples in length. At a sample rate of 27,777 samples per second, it lasts about .378 seconds. One of the first things that you may notice about this sound is a tailing string (after about 225 msec) of what looks like low-level noise. As it turns out, it *is* noise, and the very first thing that I did to this sound was to cut out all of the samples after the last little peak. The resulting sound after the cut was 6316 samples (.227 seconds long). Cutting off the end of a sound ("truncating") isn't a difficult task without the visual editor, since it's fairly easy to hear where the sound stops and the noise begins. But it is much easier and faster *with* the visual editor, since you can *see* where the noise begins and just move right to that spot.

There are two other sounds that I wanted to use in order to create my new bass drum sound. One of these sounds was found on the sound disks that were included with Blank Software's *Drum File* program for the E-mu Systems *SP-12* drum machine. The particular sound I wanted was called "Slap Tom." One wonderful feature of this program is that computer sound-files created with *Drum File* can be read by either *Sound Lab* or *Sound Designer* and vice versa. This means that you can take a sound from the drum machine, use the visual editor, then send it back into the drum machine. In order to work with this sound, I simply asked the *Drum File* program to "export" Slap Tom in *Sound Designer* format. Then I quit the program and opened the sound-file in *Sound Designer*. Example 2 shows the overall view of the Slap Tom sound.



The last sound that I wanted to use came from another source. This sound is called "Gun 1," and is included with the *Ultimate Drum and Percussion Sample Library* by Studio Digital Samples. This library can be purchased in *Drum File* format on *Macintosh* computer disks, and therefore, the process of getting "Gun 1" into *Sound Designer* was the same. The overall wave of this sound can be seen in Example 3.



After getting all three sounds into the computer, it was time to start processing them in a number of ways.

My first idea was to combine the very punchy attack of Big Drum Kick (which was my favorite thing about this sound) with the decay of the Slap Tom. This function is called "Merge" in *Sound Designer*,

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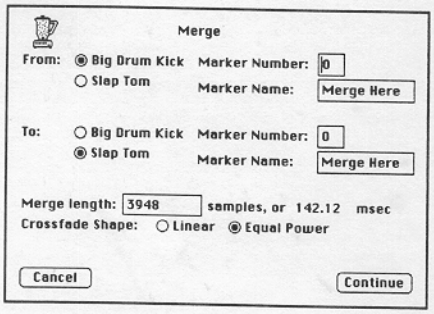
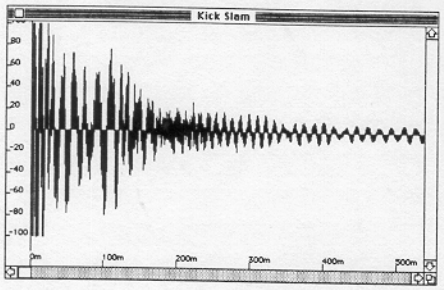
by Norman Weinberg

and allows the user to merge any two sounds together at any point in time. For this merge, I placed a marker (a specific location in the sound) at 85.24 msec after the start of the Big Drum Kick, and a marker at 177.40 msec into the sound of Slap Tom. During the merge, I selected these two markers for starting points of the merge. Example 4 is a picture of the merge function display screen. This merge (or "splice" in analog terms) is really a crossfade between the two markers in the two different sound files. The length of the crossfade is indicated by the box called "Merge length" and can be specified by the user.

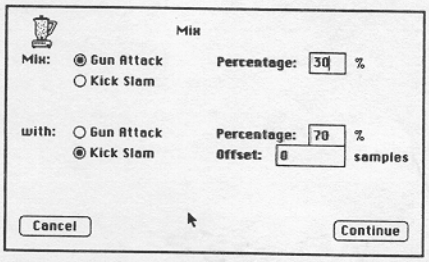


Example 5 shows the end result of the two merged sounds with the name "Kick Slam" (Slap Tom). I now had a bass drum sound with a very crisp attack and a nice long fade into the tom's decay. Trust me; even though you can't hear it in this article, it's a good sound.



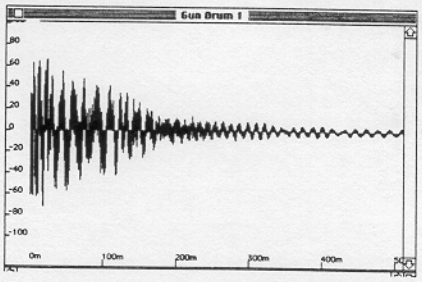
Once I got the basic sound of the new bass drum the way I wanted it, I decided to add just a little more punch to the attack. This is where the "Gun 1" came in. The first thing to do was slice off just the first 100 msec of the gun sound. I was looking more for the sound of the attack, and didn't want all of the gun's decay to be included in the sound. By cutting the attack off and saving this sound as a new file on the computer, I had really created a new sound. I called this new sound-file "Gun Attack."

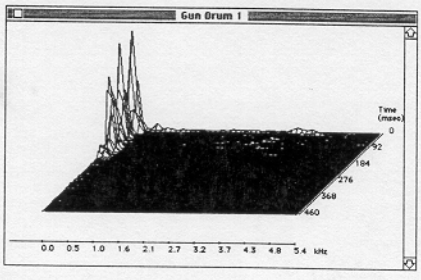
Another feature of the *Sound Designer* program is a command called "Mix." This does pretty much what you might expect; it mixes the two different sounds together and creates a single new sound. Example 6 shows the screen of the mix command window.



In this window, you can specify the relative percentages of each sound's volume. For my new bass drum, I used 70% Kick Slam and 30% Gun Attack. The offset option in the window can create phase shifting between the two different sounds when they are mixed. Because the gun sound is made up of a lot of "noise," I didn't worry about using this option.

When two sounds are mixed together, it creates an entirely new sound. For this reason, the final sound has to have another name that will distinguish it from all of the other sounds. The final product, which I called "Gun Drum 1," is a sound that has never before been heard. Examples 7 and 8 show two different views of the finished sound. Example 7 is the waveform view, and Example 8 is a Fast Fourier Transform (FFT) view. The FFT view shows the frequency analysis of the sound over a period of time (the first 400 msec). You can really see the additional gun sound at the beginning in the higher range of kHz.





This sound has been digitally created and mixed from other sounds, but retains its own fresh identity. Do I like it? Yes! Would you like it? I don't know. Is it useful? I think so.

After a sound has been created in this manner, more work can be performed that can alter its sound. The *Sound Designer* program includes a sophisticated set of digital filters that add different amounts of equalization to the sound. The sound can be looped to create an even longer decay, or even merged or mixed with more sounds. The end result can be shaped into whatever you want.

Of course, the most important question is, once my new sound has been completed, what can I do with it? One option is that the sound can be loaded back into the *E-Max* sampler and played from the keyboard. It can also be played from a sequencer, or triggered from a drum machine or an electronic drumset. Since the sound-files of *Sound Designer* and *Drum File* are compatible, I exported the Gun Drum 1 back into the *Drum File* program and loaded it into my *SP-12* drum machine. Now I'm going to program some beats into the drum machine using my new bass drum.