

## DIGIDESIGN SOUND DESIGNER FOR EMULATOR II REVIEW OCTOBER 1985

### Sound Designer

**Computer:** Apple Macintosh with 512k with two diskette drives.  
Internal 10Meg hard disk recommended but optional.

### Additional

**Hardware:** Emulator II with rev. 2.2 or later software equipped with RS422 interface.

**Interfacing:** Mac to EII via RS422.

**Features:** Allows extensive editing of sampled sounds, variable-magnification visual display of waveforms, Karplus-Strong synthesis algorithm, FFT frequency analysis of sound, remote control of EII parameters (VCF, VCA, envelopes, and so on).

**List Price:** \$995.00.

**Contact:** Digidesign, 920 Commercial, Palo Alto, CA 94303. (415) 494-8811

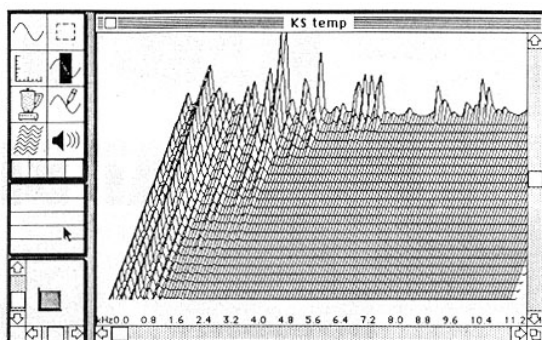
### DIGIDESIGN'S SOUND DESIGNER

software is to the Emulator II what voicing software is to the DX7 - and then some. Written by Evan Brooks, Sound Designer performs on a number of levels to enhance the Emulator II by greatly simplifying some of the more tedious aspects of sampling through visual waveform display, extensive waveform editing, digital mixing, and visual display of most of the EII's parameters. It's the kind of software that most manufacturers dream about developing for their products, and from our test drive of Sound Designer, EII owners have really lucked

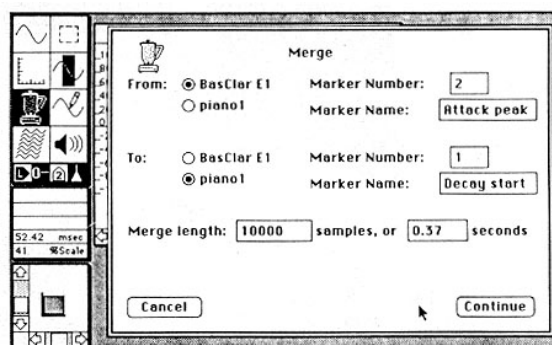
Sound Designer requires a 512k Macintosh with two disk drives to run on. However, Digidesign strongly recommends you use an internal hard disk (externals work, but aren't as fast) if you really intend to use the program in serious professional applications. We tested it out on both a 512k Mac and a Mac equipped with a HyperDrive (General Computer, 215 First St., Cambridge, MA 02142) internal 10 Meg hard disk (the equivalent memory of 25 floppies), and we agree with the recommendation. You'll find that one or two Emulator II voices (sound files, in Sound Designer terminology) can easily fill an entire 3½" micro floppy, and one 17-second sample won't even fit on a single-sided disk, due to the fact that samples are converted from 8-bit words (the way they're stored in the Emulator II) to 16-bit words when transferred to the Mac, so an 8-second sample takes up twice the

amount of disk space in the Mac that it would in the EII. This is important because when Sound Designer transfers a sound from the EII to the Mac, it writes that sound to disk. If you don't have enough room on your disk, you have to truncate the sound or you won't be able to work on the sample. In addition, using a 2-disk drive system takes up more time, because storing long samples to disk takes what seems like forever, although it might really only be 15 or 20 seconds. The internal hard disk is much quicker. Another alternative is to use a double-sided 800k disk drive such as is offered by Haba Systems (15154 Stagg St., Van Nuys, CA 91405).

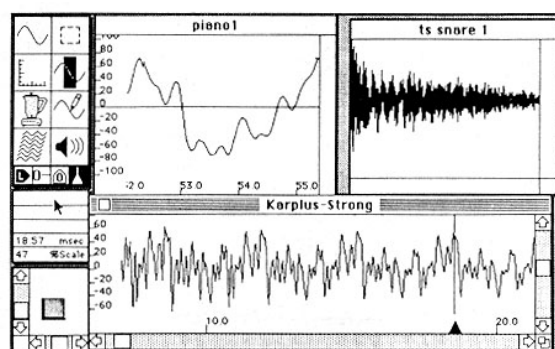
The program features a copy-protection scheme typical of most every Macintosh program - you can make backups with no problems, but in order to run the program, the master disk must be inserted into the drive just after the computer is powered up. After the computer reads whatever information it needs from the master, you can remove it and insert the working copy. You get two copies of the master disk when you buy the program. Additional copies are available at any time should you ever need them. Digidesign is working on a way to install the program in a hard disk so you don't have to use the master disk at all. Currently, however, you must boot the hard disk, and then insert the master in order to run the program.



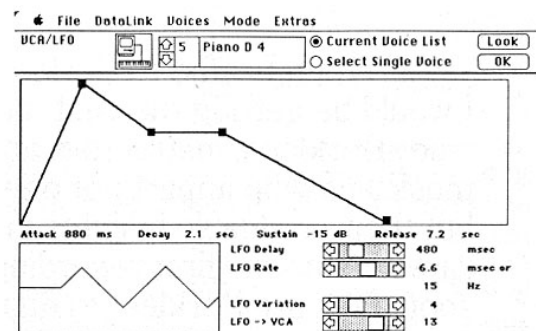
Sound Designer  
frequency analysis chart



Sound Designer  
digital mixer screen



Sound Designer  
multiple windows display



Sound Designer  
VCA/LFO programming screen

**Operation.** After you've booted the program, there are any number of things you can do as with all Mac programs, a series of pull down menus appears across the top of the monitor. These allow you to select whether you want to open a new file or choose from files that Sound Designer VCA/LFO module programming screen are already in the Mac's memory, and grab a file from the EII (any sample loaded into the EII can be transferred into Sound Designer as long as there is enough memory available). Until you load a file into the program, none of the other features will operate. In our torture test, we found that if you ask the computer to draw a waveform with absolutely nothing selected on the screen (not even a blank untitled file), the program locks up and needs to be re-booted. It's no problem since if you know what you're doing you won't do this anyway. Note that if you're using a HyperDrive and have the master disk installed in the floppy drive, you'll want to manually eject that disk before re-booting because the Mac will start up from the disk in the drive rather than the internal hard disk.

The Mac communicates to the EII over an RS422 interface. E-mu has updated the Emulator's software to accommodate remote control of the EII's functions by the Mac. Essentially, what happens is that the Mac talks MIDI to the EII over the RS422 port switching the EII into a mode that lets the Mac take control of it. Further communications occur at high speeds (500k baud). This means that any EII disk you intend to use with Sound Designer needs to be set to MIDI omni or poly mode. Some of the disks in the EII's sound library don't have MIDI turned on, so you should always check to see if MIDI is on or off before panicking:

**Now for the fun stuff.** After you select a sound file, its waveform is displayed in a window on the Mac's monitor. Up to three sound files can be displayed simultaneously. You have the choice of whether you want to see time and amplitude reference scales at the left and bottom of the screen, and you can change the magnification of the waveform.

Magnification changes are made by scrolling either the amplitude or the time axis. Dozens of different magnifications are possible, allowing you to go from a full 17-second waveform view to a view of a third of a millisecond's worth of samples. The latter allows you to actually view individual samples. The EII samples at 27,777 samples per second, so the magnification can get pretty intense.

What this is good for, besides showing you endless streams of squiggly lines on a display, is that you can find perfect loop points in a matter of minutes, as opposed to the hours it might take trying to use the Emulator II alone for this purpose. Finding zero crossings that are in phase and periodic enough to make a good loop is child's play with Sound Designer. It's a little more like Russian roulette with the EII alone.

In addition to being able to set loop start and stop points, Sound Designer gives you the ability to perform operations like cutting and pasting segments of samples together. For example, say you've got a great sample but it's got some garbage hanging at its end. With the EII, you'd attempt to truncate it by hunting around until you clipped off the unwanted portion. The process might take you minutes or a half hour depending how hard it is to isolate the gunk from the usable part of the sound. With Sound Designer, you can see exactly what's what visually. It's just a matter of scrolling up to the point where the gunk starts (or using an overview function to get there immediately), selecting the insertion/selection function from a menu at the left of the screen, and then dragging the cursor across the part of the sample you don't want. This selects whatever you drag the cursor across for a number of possible operations including cutting, copying, and reversing. Once a waveform segment is copied or cut, it can be pasted into another section or sections of a sample. So if you have a sample of someone saying "hi there," you could copy "there" and paste it into a number of places in the sample to get "there hi there there"

If you have some grunge at the end of a sample that you'd like to simply have fade to silence, you can set up another file of real silence - nothing in it - and actually cross-fade the sample with silence to produce a smooth fadeout. This is done using the digital mixer function, represented at the left of the screen by (what else) an icon of a Mix Master blender. This "module" of the program also lets you mix sounds (by setting the relative percentages of two samples), merge samples (the merge points are assigned by placing markers at the desired points in the waveform displays of each sound), and change a sample's gain.

Changing gain is wonderful for correcting samples that have low levels. Gain can be changed by a variable number of decibels (both positively and negatively) or by a percentage of the original volume. A change in one value will be reflected in both percentage and dB values. You can also normalize the volume, which increases the volume of the entire sample until the peak amplitude of its loudest individual sample reaches 100% or full scale. A peak value function locates the sample with the highest amplitude and displays its level as a percentage of full scale.

A handy feature of the gain change dialog box is that there is a display that tells you how many samples are clipped and how long the longest string of clipped samples is, both in terms of the number of samples and in seconds or fractions of seconds. Going back into the waveform display window, you will be able to see exactly which samples are clipped - an educational feature, since most people have never seen a clipped waveform in the flesh, although they hear them all the time. An interesting point you'll encounter when doing gain changes is that if you drive a sample to clipping and try to undo it by reducing the gain by some factor, the clipping will still be present, since you distorted the waveform. What you'll have to do is return to the original version of the waveform (as long as it's still in memory) and try to adjust the gain again. We would have liked to see a restore function in this module that would return the waveform to

its previous, unaltered state when selected.

If you have pops in your sample you can literally draw them out with a freehand waveform drawing function, which is best used for this purpose. Utility screen functions include a zoom capability (to zoom in on any section of a sample and blow it up to fill the screen) and an auto-location feature (to automatically locate loop points and markers within a sample). Another function lets you move a vertical marker back and forth across the screen, while readout displays elapsed time from the beginning of the sample to the point corresponding to the vertical line in milliseconds and percent of amplitude scale. This is great for finding exact zero crossings for loop points when the display is magnified enough to see individual samples.

When you've modified a sample, you of course will want to hear it before making it permanent. There are two ways to listen to a sample from Sound Designer. One way sends the sample as stored in the Mac's working memory over to the EII where you can play it from the bottom two octaves of the keyboard. The other method uses the Mac's internal speaker to preview a sound. Of course, the quality of reproduction is awful through the Mac's speaker, but connecting the Mac's audio output to a better quality speaker gives you results which are certainly good enough to use in situations that require you to work on sounds in the absence of the EII (when you're on the road and don't want to bring the EII up to your hotel room, for example).

Aside from modifying and displaying samples, version 1.0 of Sound Designer includes an algorithm for simulating the waveform of plucked string instruments called KarplusStrong. It's very simple to use and yields sounds that definitely sound like plucked strings. All you have to do, once the Karplus-Strong function is selected from the synthesis menu, is enter the frequency you'd like the sound to center around, and then enter the number of samples to define the length of sound

(27,777 samples equals one second of sound). Low frequencies sound like jackhammers or thick steel cables being struck, while high frequencies sound like Clavinets. We're told that future updates (available for little more than the cost of the disk and enough to cover documentation - typically \$50 - \$100) will include some rather amazing algorithms gleaned from the leading edge of computer music research, including digital signal processing, FM algorithms with an infinite number of operators, FM with sampled sounds, and a lot more.

The current software offers the ability to look at FFT (Fast Fourier Transform) generated frequency analysis graphs, three-dimensional displays of frequency versus time versus amplitude. FFTs are generated in about 15 seconds, and right now, all you can do is look, vary the number of slices in the picture, change the resolution and scale, and so on. This is a useful educational tool, which schools and acousticians are bound to love, since displays like this can teach you so much about the nature of sound. Later versions will include the ability to interact with this display and re-synthesize waveforms.

**Emulator II Front Panel Mode.** When this is selected, a display of the EII's front panel is called up. This functions as a menu from which you select EII modules to enter and modify from the Macintosh. Selection is done by positioning the cursor in the desired module and hitting the button on the mouse. The filter, VCA/LFO, Voice Definition, Preset Definition, Real Time Control, and Special modules are accessible from the Mac; sequencing and sampling are not. When the program is in this mode, it basically lets you do the kinds of things you would do with voicing software for other synthesizers; i.e., set the control values of every parameter from the Mac and get visual displays of envelope settings, filter cutoff and Q settings, and so on.

Perhaps the most helpful of these displays is the one called up by activating the Special module. This accesses keyboard

set-up parameters normally set by the EII's Preset Definition module. Here, you get a visual display of the keyboard layout, including what keyboard ranges samples are assigned to, and whether there are positional or velocity cross-fades, or velocity switches. You can also determine the routing of each sample to any of the eight individual outputs. Note that, as on the EII you can't assign a sample to outputs that aren't adjacent to one another, for example, a sample can't be assigned to outputs 1 and 8, but can be assigned to outputs 1 through 8; 1,2,3, and 4; and so on.

When you're in the filter module, you get a graphic display of the filter cutoff frequency and Q that changes in real time. If you've never seen what this looks like, you're in for an education. Another very helpful feature is that as you change parameters such as cutoff or envelope settings, you get a readout that changes in real time of actual cutoff frequency. Envelope parameters are displayed in actual milliseconds and decibels rather than some meaningless 1-10 numbering scale as on most synthesizer front panels. This is a great addition.

The VCA/LFO module features similar functions, in that you get a real-time display of the LFO's rate in Hertz, and its initial delay setting in milliseconds in addition to a visual display of its output.

The Preset Definition display gives you control over the arpeggiator, including note values (quarter-note to thirty-second triplets), pattern (up, down, random, up/down, and so on), and its active range. Also in this display are the MIDI control settings.

The Voice Definition display gives you control over voice tuning, attenuation, VCF cutoff, VCF envelope attack time, VCF Q, VCA level, and so on. Again, all settings are displayed graphically and in actual values, milliseconds and dB. When you're changing tuning, you can either scroll through values, or grab the scroll bar and move it large amounts. However, when

you do this, the display isn't updated until you let go of the bar. If you scroll through by clicking on an arrow, the display increments through values. This is what happens in all the scroll bar displays.

The Real Time Control module lets you route different controllers to various parameters. It then displays that routing by listing the destination next to the source. Again, this handy to have displayed right there in front of you rather than trying to remember what you've set up inside the EII or taking the time to remember what the routing number codes mean on the EII's display.

**Conclusions.** We can't imagine anyone who owns an Emulator II not lusting after Sound Designer. Of course, the EII is a powerful instrument without it, but once you use Sound Designer and see how efficient it makes the EII, you won't want to live without it. And if the \$995.00 price tag for a piece of Mac software surprises you, consider on a practical level how much time you'll save by being able to set loop points in minutes and by being able to salvage less-than-perfectly-recorded samples. Also consider how much you'll be able to learn about the nature of sound.

We definitely recommend using the program with an internal-hard-drive-equipped Macintosh. However, this will add considerably to the necessary investment for the program, considering that the Mac itself will run you between \$1,500 and \$3,000, and the internal hard disk will be an extra \$1,500 to \$2,000.

The program offers quite a bit to Emulator II owners, and may entice sampling-machine shoppers and schools who own Macs already into considering investing in the EII instead of higher-priced higher-resolution machines. And with Digidesign's current update policy, it's easy to see that they have a great thing going.

**Dominic Milano**  
**Keyboard Magazine October 1985**