by Norman Weinberg

Electronics In Teaching: Part 1

Several months ago, a student came into my office with a digital drum machine. She had been singing in many of the local clubs, and had decided that a drummer with a volume knob was just what she had been looking for. This instrument had a much more realistic sound than I had heard before. (If the last drum machine that you heard was attached to an organ with color-glow keys, then you owe it to yourself to give some of the new models a closer listening.)

Not long after my student's visit, I read an ad in a computer magazine about a sequencing program that would enable any synthesizer (including drum machines) to "talk" to a computer. This communication with the computer would allow several possible options: (1) a performer could record onto a computer disk instead of tape, delivering almost infinite overdubs with "punch-in" and "punch-out" editing, (2) the recorded performance would play back through the instrument itself (which means zero loss of signal or addition of background noise), and (3) the program would allow the computer to print out the notation of what was recorded. (What was that? Print out in legible standard musical notation what was just performed—this was too much to believe!)

An interview in another magazine discussed how several of the pop and rock recordings made today are using drum machines. (Boo, hiss! "They are going to put a lot of drummers out of work.") But the focus of the article was a plea to drummers to embrace the new technology so that: (1) drummers would get to keep their jobs, and (2) the drum parts being programmed on drum machines wouldn't sound as if they were recorded by a keyboard player.

The night after I read that interview, I had a very strange and realistic dream: I was in my teaching studio, surrounded by electronic gadgets, and a student of mine was playing a snare drum etude. As I pulled the paper from the printer, I said something like: "No, that wasn't quite right. Your diminuendo was too fast, and your last flam didn't match the ones in the previous bar. Listen to it again, and this time, watch what you did." I woke up at just after 4:00 A.M., and spent the next five hours drawing up a diagram of connections and thinking about all the incredibly useful stuff that a system like this could do. By 10:00 A.M., I was in my dean's office asking how many thousands of dollars he would let me have to create this electronic studio in my office. He was quite a bit more supportive than I expected and suggested that I apply for a grant to cover the funds that the music program could not provide.

The next several weeks were filled with phone calls to various companies that manufacture electronic drums, software companies, software programmers, music stores, and keyboard players who had already embraced this technological revolution. A lot of people's brains were picked, a lot of magazine articles and reviews were read, and a lot of rough drafts of grant applications were made. In January, 1986, I was awarded a faculty grant from Del Mar College, which provided the funds for an E-mu *SP-12* drum machine, Roland *DDR-30* digital drums, an Apple Macintosh computer, three software programs, and a sound system to run it all through.

The concept is this: Today's musical market is changing. In order to provide their students with the job skills and knowledge necessary to earn a living in music, today's teachers are going to have to keep up with the expanding body of knowledge that is percussion—and this includes electronic percussion instruments. If new teaching techniques that might help students become better performers are available, then let's give them a try and see if they work. Computers have already been shown to be an aid in many aspects of academic training. It might be possible to adapt some of these training techniques to percussion performance.

Getting Started

Let's first examine some of the problems that might be encountered when trying to put together an electronic teaching studio. The first—and most difficult—problem is money. The system that I'm using ran about $8,500. In today's computer and synthesizer market, with prices always falling, it might be possible to build a system for several hundred dollars less. Funds can be obtained from grants, music department budgets, private sponsors, or other sources. When you think about it, $8,500 is about the cost of a decent set of timpani. Just as you can't teach timpani without the drums, you can't teach electronics without the necessary equipment.

Another problem that might be encountered is that of colleagues who believe that you are going to put your own students out of work. This is a difficult subject. There are some members of any faculty who believe that music made with electronic sounds (or anything that plugs into the wall) does not belong in a legitimate educational setting. But music is changing, and it is important to give students an education in music—not just certain types, but *all* music. We, as educators, should be doing our job for the benefit of the student. Please don't get me wrong. I am not advocating a "change from" any situation, only an "addition to" any program that needs it.

Benefits

Now, let's look at some of the benefits that an electronic percussion system can hold for you *and* your students. First, for you: You are going to spark an interest in your students to learn more about percussion, and your own personal knowledge is going to grow. Second, for your students: They will gain the knowledge of how to work with the different aspects and parts that make up the entire system, and they will improve their playing ability by confronting themselves with an examination of their own style. How does one program a drum machine, "sculpt" sounds on an electronic drumset, or use a sequencing program to drive electronic sounds? By answering these questions, the student gains a new perspective on his or her playing.

When a student starts to program a drum machine, the first decision is whether or not the end result is going to sound like electronics or a "live" drummer. If the style is rap or techno-pop, then just about anything is legal. If it is decided that the style of music being programmed calls for a real drum sound, then another approach must be considered. You might ask, why use a drum machine to try to imitate a "real drummer"? Because your students may very well be asked to do this at some point in their careers. Many keyboard players are now performing on the hotel club circuit as a single act. A club owner can make more money by paying one musician than by paying six. For this reason, some of these players are using drum machines as their rhythm section. Drummers who really know what can be done with a drum machine could program their songs for them, and the keyboard performers would have a better sound. In other words, someone could hire a drummer once, and use that drummer's great ideas and musical influence for every per-

formance. (Needless to say, this one-time session should have a larger fee than a normal gig—maybe even a small royalty. But this is a separate idea worthy of a great deal of discussion.)

Working With The System

How do students begin to create that "live" sound? If the "real drummer" sound is desired, then programming a pattern on the drum machine requires your students to pull their playing apart and analyze what is going on when they perform. Let's look at some of the factors that come into play when using this approach.

First might be the sound of the drumset. It is possible to program each pitch along with its amount of decay (length) for all the drum sounds on the machine. Once you have the sounds that you want, then comes the actual recording of patterns.

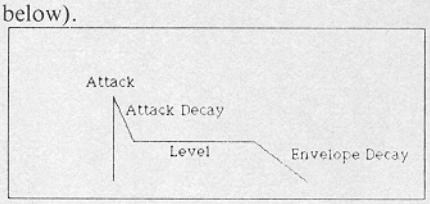
Another item to think about is the groove or feel of the patterns. "Swing factor" can be added to the patterns to distort the divisions of the beat. It can be set for 50% (straight 8ths), 54%, 58%, 63%, 67% (swing-style divisions of the beat), or 71% (shuffle). Some of these differences are subtle, but they really affect the groove and style of the performance.

A lack of natural dynamics is the first thing that comes to mind when listening to a drum machine that has been programmed in the "set-it-and-forget-it" mode. You can't create a "live" impression with only the two choices of loud and louder. Where are the stress points, pulse points, accents—the life and spirit of the patterns? How strong are the accents in relation to non-accented notes? Are all accents at the same level, or do they also have a shape? With a drum machine like the *SP-12*, all dynamics are memorized into the individual patterns. Where these dynamic differences occur in the patterns and at what level they are recorded determines quite a bit of the overall feel.

Another facet of creating a "live" impression is the tempo. Let's face it, it's possible—with auto-correct and a good, steady supply of current—to build a song with absolutely *perfect* time. While this may be a goal of many drummers, I believe that they are not looking for perfect time, but perfect *control* over time. I've never met anyone who can hear something and say, "It's between 110 and 111 beats per minute—closer to 110.4." With the drum machine, it is possible to program tempo with the accuracy of 1/10 of a beat per minute. It is also possible to program a ritardando or accelerando to occur between any two points. With this in mind, the tempo can push a little bit going into a chorus or drag back a little when the mood relaxes. These should be subtle changes, and thinking about them and working with them will make the student's ear more sensitive to tempo differences and fluctuations.

Few drummers get the chance to work with a mixing board in order to listen for—and experiment with—their overall balance. When you play live, your ears tell you the balance of the entire set and your body makes a series of constant adjustments to achieve what you want to hear. Just think of the balance differences (drums versus cymbals) between a big band sound and a rock sound. Each sound on the drum machine can be mixed at different levels without losing the subtle dynamics that were originally programmed. By experimenting with different settings, the student will gain the knowledge of how balance affects style. Students who really think about all of these factors and do some experimentation will improve their control on the drumset when they play live by giving themselves more options. They'll also gain an impetus for working toward more control.

While you can mold the color and sound of the drums with the drum machine, many more variations of color are available with the electronic drumset. Where the drum machine allows pitch changes of a little more than an octave in half-step divisions, the drumset's pitch range spans two octaves in quarter-tone divisions. Instead of determining overall length of the sound with the drum machine, the *DDR-30* permits fairly sophisticated control of the wave's envelope (as shown below).



The student can also control the amount of bend a sound has (pitches falling due to stronger attacks), how long that bend takes to fall, how far it falls, and the dynamic sensitivity at which the bend is activated. Other aspects that can be used to

mold the sound into the desired color are two separate sound gates that are fully controllable, as well as a modest equalizer.

When all of these parameters are present, the student programmer is required to really think about what types and levels of these controls make up a given sound. When the student is looking for some far-out space sound, anything is possible. But there is a certain value in trying to make up (I like the term "sculpt") a pure, acoustic sound. I have found myself thinking about the lengths of attack on different snare drums, the difference in the volume between the time the stick hits the snare and the short amount of decay that follows, and even the distance that the pitch falls in relation to its attack volume. What really are the differences in the attack and sustain of a single- and double-headed tom-tom? These are questions that few people have ever thought about. But when you try to sculpt drum sounds from their basic ingredients, it requires a new kind of analyzation. It forces you to think just about the sound itself and hear it in a new manner. I believe that this can be transferred directly to acoustic drums as well. Pitch, stroke, level of sustain, and decay can all be controlled, to a large degree, by the player's hands. By working with the sounds on the electronic set, students just might get a better idea of what they want their hands to achieve.

Once these ideas are sculpted into the student's sounds, they can be combined to form different drumsets that can be stored in the electronic drum's memory and recalled at the push of a button. Using the memory cartridge, the *DDR-30* holds 24 different sounds for each pad. Why do drummers use certain types of drums for different playing situations? Most likely the answer involves the combination of different sounds to best blend with the music. With so many drums available at the touch of a button, students can really hear the difference between a good "heavy metal set" or a "jazz quartet set." The student working on orchestral excerpts can even try out 24 different snare drum sounds in order to hear which type of drum would be the best choice for that particular passage or work.

Sequencing programs are so named because they record the data that tells the instruments what to play. This sequence of data can be changed and molded in many different ways. When the computer is used to trigger the sounds on the electronic instruments, the additional memory of the computer permits much finer resolution and control of ideas. A sequencing program is to music what a word processor is to text.

The programs used in my project are *Total Music* by Southworth Music Systems, and *Midi Performer* and *Professional Composer* by Mark of the Unicorn. While all three programs can only be described as amazing, they are not perfect in all respects. One program will do a particular job easier or better than the other, depending on what that task happens to be. What follows is just a short list of some of the tasks that can be performed by the combination of programs: (1) overdub or multi-track an almost limitless number of times (how about a 400+ track tape deck), (2) include a metronome that performs the recorded material at any setting from 20 to 400 bpm without changing the pitch, (3) have a rhythmic accuracy of 480 attacks per quarter note (for all you number crunchers, this amounts to a mind-boggling "theoretical" 3,200 notes per second), (4) play and print out just about any polyrhythm that you can dream up (i.e., five against seven against nine against 13 against 17—all at the same time), and (5) control 128 levels of dynamics over any time span.

By working with the computer, students learn about recording studio techniques, such as overdub and punch-in/punch-out, notational problems with percussion, and working with MIDI. These, too, are valuable skills in today's musical job market.

So far, we have been looking at how students could use an electronic system like this in order to gain technical knowledge that may help them in the marketplace (as well as helping them to examine their own playing from a new perspective). In my next article, I will focus on several techniques that I have used with this system to help students solve specific performance problems.