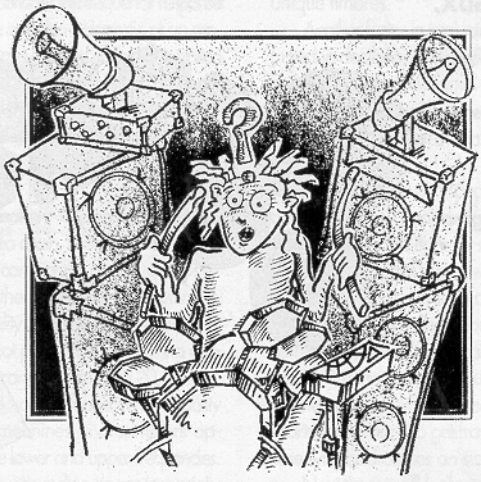
GETTING STARTED WITH ELECTRONIC PERCUSSION:

PART FOUR—SOUND SYSTEMS

By Norman Weinberg



THE PRIMARY DISTINCTION THAT separates electronic percussion instruments from their acoustic cousins is the fact that they are electronic. This statement may seem simplistic, but it highlights the reality that electronic instruments, by their very nature, require a way to translate electrical energy into sound. Sound systems can be extremely simple or incredibly sophisticated, depending upon the nature your rig.

Many factors play a part in determining the type of sound system that best serves the needs of the performer and the requirements of the performing space. A single drum machine won't need the same sound system as rack of eight or nine sound generators. And the system used in an arena is different from one used in a home studio (unless you're into sonic demolition).

As we've done in the past, this installment will take the "divide and conquer" approach. We'll explore the individual components that make up sound systems: mixers, outboard effects, amplifiers, and speakers.

Mixers—Its main function is to mix together the audio signals from several sources into one composite signal. Since most amplifiers (the next important step in the chain) only have one or two inputs, a mixer is required if you are using multiple sound generators.

Mixers often are defined by the number of inputs they can accommodate. Each input runs into a channel, and four- to 16-channel mixers are the norm for electronic music. The diagram on page 63 shows a typical mixer channel, along with the mixer's "master" section.

Each input channel should have a TRIM knob to adjust the level of the incoming signal. If the signal is too soft, added noise might be the result. If the signal is too hot, you run the risk of overloading the mixer and adding distortion. Often the mixer will include a peak indicator that will light to tell you when the signal is too strong.

In the diagram, you'll see that the SENDS are duplicated in the channel and master sections of the mixer. SENDS (also called EFFECT SENDS) are used to route a portion of the signal to an additional output. The channel's SEND knob adjusts an individual signal, while the MASTER SEND controls the levels of all channels at once. When turned fully to the left, no signal is being routed to the output; to the right, 100% of the signal is going to the output.

At the bottom of each channel, you'll find a fader; a slider or knob that controls the channel's volume level. Notice that the faders in the master section operate in a manner similar to the MASTER SENDS: the CHANNEL FADERS control individual signals while the MASTER FADERS control all the signals at once. Need a little less volume on the hi-hat? Turn down the channel fader. Does everything need to be louder? Turn up the master faders. Stereo mixers also will feature a PAN knob to adjust the left/right balance within the stereo field.

Many drum machines (as well as most rack-mounted sound generators) have individual audio outputs. The advantage? Each sound can be routed to a separate channel in a mixer, so the SEND controls can be used to adjust effects for each individual sound.

Outboard Effects—Outboard effects usually are not found in the mixing board itself. Audio signals are sent "out-the-board" to an effect, which alters the signal and then sends it back to the mixer. Outboard effects can be used to "color" the sound. Reverberation units, echo boxes, distortion pedals, and even graphic equalizers all fall under the umbrella of outboard effects.

Multi-effects processors are rack-mount units capable of adding two to four different effects to a signal at the same time. Multi-effect processors are quite versatile and offer great control over "sculpting" your sound.

Power Amplifiers—The amplifier's job is to boost the signal coming from the mixer (or directly from an instrument) and send it along to the speakers. While this is a relatively easy job to perform, it's difficult to

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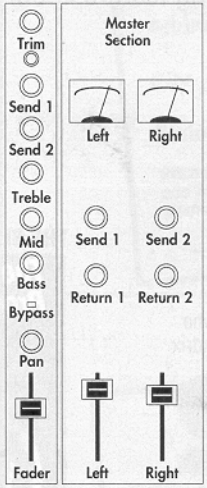
perform well. Amplifiers are rated and compared along two main lines—power and distortion.

An amplifier's power is rated in "watts RMS." In a small home studio, 25 to 50 watts RMS should provide enough good, clean power. For a public performance, consider 100-watt amps to be a minimum requirement.

Power rating is important, and you should buy as much power as you can afford—not because more power means more volume, but because increased power means a cleaner sound. A 500-watt amp running at one-tenth its rated power is going to have much more headroom than a 50-watt amp running full-tilt.

Headroom is another name for reserve power. Let's say that you're playing at a nominal level of 10 watts. Music with strong attack transients (shorts bursts of higher energy signal) can require up to 100 watts of power to handle those peaks. And guess what sounds generate the strongest attacks? Drums and percussion. If the amplifier doesn't have enough power to reproduce those transients, it will clip the signal. This will add distortion and destroy one of the most important characteristics of your sound.

Figure 1



An amplifier's distortion rating is determined by comparing the signal coming in with the signal coming out. If these signals are quite similar, there is a low distortion level. Higher distortion occurs when the signals are very different.

Twenty years ago, it was important to consider the frequency response and the signal-to-noise ratio of an amplifier. Lately, power amps have gotten so good that it's easy to find units with a rated frequency response of 10 to 50,000 cycles and a S/N ratio close to 100dB. In other words, they're quiet.

Speakers—Being the final link in the audio chain, speakers are the most critical component of any sound system. If the speakers aren't cutting it, the quality of the rest of the equipment is a moot point. Human hearing covers the range from 20 to 20,000Hz, and the sounds found in high-quality drum machines and samplers approach the extremes of these lower and upper frequencies.

Digital waveforms of low-sounding drums (especially bass drums and floor toms) require speakers that can push a lot of air. Generally, larger speakers are better at reproducing bass frequencies than smaller speakers. The standard size speaker required for these low frequencies is 15" in diameter.

Good speaker systems also need to produce crystal-clear highs. Cymbals and snare drums produce a lot of high frequency information and you'll need smaller speakers (tweeters or high-frequency horns) to reproduce their unique timbres.

Another factor in evaluating speakers is their sensitivity (rated in decibels, or dB). Each 3dB increase is an apparent doubling in volume. A speaker with a sensitivity of 100dB driven with 50 watts will produce the same volume as a speaker with a sensitivity of 97dB driven with 100 watts.

You must listen to a speaker to judge its effectiveness and quality. How clear do the cymbals sound? Is the bass drum punchy and tight, or does it sound distorted and mushy? If you're not happy with your speakers, you won't be happy with the system as a whole.

One last word about sound systems. Any system requires cables, and audio cables are a lot like sticks. You wouldn't go to a gig without a spare pair of sticks; nor should you go without a spare set of cables. If a cable shorts out or starts to get frayed, replace it. Don't waste time with bad cables on stage or in the studio.

Next time, we'll look at some little goodies to make your electronic percussion rig easier to manage. **D**