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World Radio History

# How to Use the 2001 Music Technology Buyer's Guide

**W**elcome to the 2001 edition of the *Music Technology Buyer's Guide*, the result of the combined efforts of the editorial staffs of *Keyboard* and *EQ* magazines. On the following pages, you'll find discussions of the various categories of components that go into making up a studio or keyboard rig. What each is, why you need it, as well as tips on what to look for as you're shopping. We've also put together extensive gear charts to get you started on your search. The usual disclaimers apply: While the charts are as comprehensive as we could make them, we may have missed an item here or there. Prices, specs, and availability are subject to change at the individual manufacturer's whim.

It's not necessary to purchase an item or items from every category in order to have a complete and functional studio or rig. The gear in some categories covers a number of functions, eliminating the need to spend money on other equipment, and some categories fall under the "nice to have, but optional" heading, depending on what you're trying to accomplish.

Nor is it necessary to purchase every single item at once in order to start working. If you're starting from scratch, put together the smallest number of items you can that will still allow you to get going making music. Then keep track of where your system is lacking functionality, and start filling in the blanks by purchasing gear from other categories.

As you're making your picks, look carefully at your current needs and try to speculate a bit as to what the future holds. The goal is to avoid spending money twice; buy the right thing now, and you won't have to upgrade or replace the product when next year's model comes out or when your engineering and musical skills improve and warrant better gear.

Which brings us to our final point: It's a great time to be putting a studio together, or for upgrading or expanding an existing rig. The equipment on today's market is of high quality, choices are plentiful in every category, and prices are at an all-time low. The old cliché, "It's not what you've got, but how you use it," has never been more applicable.

One last thing: If you're still feeling the need for even more information even after devouring the pages that follow, complete specs for all products can be found at [www.musicgearonline.com](http://www.musicgearonline.com) — there's no more comprehensive source of information on music and audio gear available anywhere.

Enjoy the Buyer's Guide!

Mitch Gallagher, Editor, *EQ* magazine

Ernie Rideout, Editor, *Music Gear Online*, Associate Editor, *Keyboard* magazine

## EQ/KEYBOARD MUSIC TECHNOLOGY™ BUYER'S GUIDE

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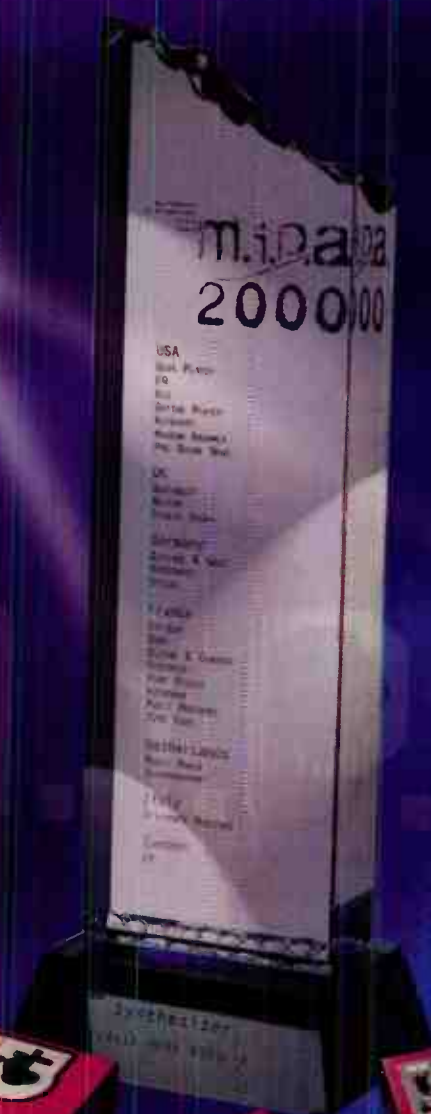


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\* 25 specialist journals from the USA, Great Britain, Germany, Austria, Switzerland, The Netherlands, France, Sweden and Italy have combined to select the Musikmesse International Press Award (m.i.p.a.). Among all the great manufacturers of synthesizers Clavia was chosen and won the prize for the most outstanding synthesizer 1999/2000 - Nord Modular.



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# Keyboards, Synths, and Samplers



For many of us, synths and samplers are primary sound generators in our studios and live rigs. If you're looking to update or add to the keyboards in your setup — or if you're looking for your very first keyboard — now is a great time to be shopping. Many companies have recognized the need for good-sounding, powerful instruments at an affordable price — even the “consumer” models have gotten pretty impressive.

Look for a unit that has sounds you like and plenty of polyphony to cover the parts you need. If you're sequencing, look for multitimbral support (the ability to simultaneously play different sounds on each MIDI channel). A few of the models are focused on particular types of sounds (such as analog synths, orchestral instruments, or dance sounds), but most are general-purpose, covering a broad range of timbres.

If you're a computer user, don't forget the new wave of software synths and samplers. Offering great bang-for-the-buck, these programs use the computer hardware you already own to generate sounds and play back samples. Plus, you get the ergonomic benefit of being able to control and edit the instrument using the computer screen rather than a limited LCD.

There's another option for those who are computer-based: the soundcard. A soundcard differentiates itself from an audio interface by providing a built-in

synthesizer in addition to some audio capabilities. This makes for a very economical package — as with personal multitrack studios, soundcards can be a cost-effective way to get your studio up and running.

As you're looking at soundcards, the same concerns apply as with audio interfaces and synthesizers. What kinds of computer slots and audio connectors are supported? How much polyphony and how many multitimbral parts does the card offer? Are there built-in effects and mixing?

And, very importantly, how's the quality of the synthesized sounds? There have recently been a number of semi-pro and pro cards released that have dramatically better sounds than the consumer-grade cards packaged with PCs. Having said that, don't completely discount consumer models such as the various SoundBlasters and their brethren. Many consumer cards have reasonable sound quality, and may even have digital I/O and other higher-end features. It pays to give the card a good listen before making your choice.

Also included here are digital pianos — whether you need one for use on stage, as a centerpiece for a home music-making setup, or as a cost-effective piano for your kids to practice on, you'll find suitable models here. If you don't need a full-size keyboard, consider one of the many excellent portable keyboards. Yes, in some ways, you'll find compromises with this category

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of gear: You won't get a disk drive, a weighted keyboard action, or other high-end features. But you will often get some nice extras at an excellent price. For example, many of the units listed here have built-in serial ports for connecting to a PC or Mac, eliminating the need for a separate MIDI interface. Plus, the sound quality of these keyboards is often surprisingly good — comparable to what higher-priced models sounded like only a few years ago.

For lovers of the sound of the classic Hammond B3 organ, there are many options, in keyboard and in module formats. Full-sized consoles are an option, too. Paired with a complementary Leslie-style rotating speaker or rotating speaker simulator, it's easy to create the exact electric organ tone you desire.

When it's time to take your keyboard playing to the masses, consider a keyboard combo amp. These units offer a combination of instrument and mic mixer, power amplifier, and speakers in one (relatively) compact and lightweight package.

— Mitch Gallagher

# CLASH OF THE TRITONS

THE RACK

KEY INFO #1



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KEY INFO #1

## Filters Explained

by JIM AIKIN

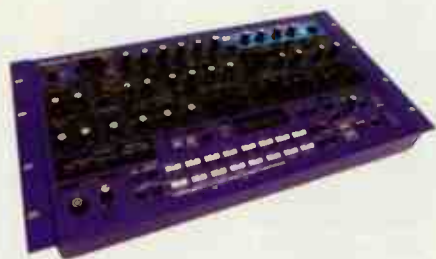
From the very beginning, filters have been a vital part of how synthesizers make and shape sound. With the popularity of dance music in general and analog sounds in particular, filter control and quality can be highly important when it comes to choosing a synthesizer, sampler, groove box, or software synth.

If you don't know what a filter sounds like, please feel free to turn on your synthesizer right now. Choose a sound that has a bright, buzzy tone. Go into edit mode, locate the filter cutoff parameter, and lower this parameter (bring it down toward zero) while playing notes on the keyboard. You should hear the sound get progressively darker and more muted as the cutoff is lowered. If you don't hear this effect, check to make sure the filter is set to lowpass mode. You may also need to lower the filter envelope amount; on some synths, this envelope can push the filter cutoff up very high even when the cutoff parameter itself is turned all the way down.

For you to understand what you've just heard, we have to back up a step and talk a little about the nature of sound itself.



Clavia Nord Lead 3



Roland JP-8080

## Analog and Analog Modeling Synths

MODEL	MSRP	SIZE   POLYPHONY   # PARTS
Big Briar Etherwave Theremin	\$369; kit \$299	table-top   1 voice   1 part
Big Briar MOOG Signature Series Etherwave theremin	\$399	table-top   1 voice   1 part
Clavia Nord Lead 2	\$1,799	49 keys   16 voices   4 parts
Clavia Nord Micro Modular	\$749	table-top   4 voices   1 part
Clavia Nord Modular Keyboard	\$1,999	25 keys   16 voices (exp. to 32)   4 parts
Clavia Nord Modular Rack	\$1,899	3U rackmount   16 voices (exp. to 32)   4 parts
Clavia Nord Rack 2	\$1,399	4U rackmount   16 voices   4 parts
Doepfer A-100	Price depends on config.	6U rackmount modular system
Future Retro FR-777	\$777	table-top   1 voice   1 part
Korg Electribe EA-1	\$499	table-top   2 voices   2 parts
Korg MS2000	\$1,150	44 keys   4 voices   1 part
Korg MS2000R	\$850	6U rackmount   4 voices   1 parts
Korg Trinity V3	\$3,550	61 keys   38 voices   16 parts
Korg Trinity V3 Pro	\$4,350	76 keys   38 voices   16 parts
Korg Trinity V3 Pro X	\$5,200	88 keys   38 voices   16 parts
Korg Z1	\$2,600	61 keys   12 voices   6 parts
Korg Z1ex	\$3,100	61 keys   18 voices   16 parts
Kurzweil K2600	\$6,256	76 keys   48 voices for samples, 192 total oscillators   16 parts
Kurzweil K2600R	\$5,175	3U rackmount   48 voices for samples, 192 total oscillators   16 parts
Kurzweil K2600X	\$6,820	88 keys   48 voices sample playback, 192 total oscillators   16 parts
Novation Drum Station Rack Module	\$699	1U rackmount   —   —
Novation Nova II Keyboard	Nova II X 24 Voice, \$2,499; Nova II XL 36 Voice, \$2,699	49 keys   36 voices   6 parts
Novation Nova Laptop Module	\$1,499	6U rackmount   8 voices   6 parts
Novation Supernova II Keyboard	24 voice, \$2,899; 36 voice PRO, \$3,199; 48 voice PRO X, \$3,399	61 keys   48   8 parts
Novation Supernova II Module	24 Voice, \$2,299; 36 Voice PRO, \$2,599; 48 Voice PRO-X, \$2,899	3U rackmount   48 voices   8 parts
Quasimidi Polymorph	\$1,199	rackmount   8/16-voice   4-part
Quasimidi QM-309	\$899	rackmount   mono synth plus analog drums   —
Quasimidi Raven	\$2,195	61 keys   21 voices   16 parts
Quasimidi Sirius	\$1,299	49 keys   24 voices   11 parts
Roland JP-8000	\$1,695	49 keys   8 voices   2 parts
Roland JP-8080	\$1,595	6U rackmount   10 voices   2 parts
Roland MC-307	\$995	table-top   64 voices   8 plus 24 parts
Synthesis Technology MOTM	\$89 - \$399 per module	5U rackmount   voices depend on modules   —
Technosaurus Microcon	\$329	table-top   monophonic   —
Wavefront Travel Case Theremin	\$625	table-top   monophonic   —
Wavefront Wavefront Classic Theremin	\$1,175	table-top   monophonic   —
Yamaha EX5	\$2,695	76 keys   128 voices   16 parts
Yamaha EX5R	\$2,195	3U rackmount   128 voices   16 parts
Yamaha EX7	\$2,195	61 keys   64 voices   16 parts
Yamaha VL70M	\$799.95	—   1   —



## THE FREQUENCY SPECTRUM

Let's start from the very beginning: Sound consists of vibrations in the air or some other medium. If we take the broadest possible view of the whole idea, we can identify two kinds of vibrations — periodic and non-periodic. Non-periodic (random) vibrations are known by the technical term "noise." Periodic vibrations, on the other hand, are those in which there are repeating (that is, non-random) cycles.

Sound cycles are measured in terms of

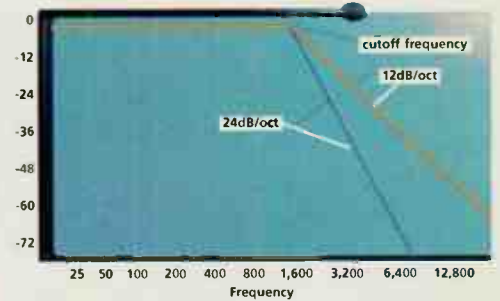
their frequency — that is, by the speed with which the cycles repeat. If, for example, the vibration repeats at a rate of 100 cycles per second, we say it has a frequency of 100Hz. ("Hz" is an abbreviation for "Hertz," which is just another way of saying "cycles per second.") Curiously, we can also talk about the frequency spectrum of noise, but that discussion can get pretty technical, and it isn't relevant our topic.

The lowest sounds that human ears can perceive as sound have a frequency of

about 20Hz, while the highest sounds we can hear have a frequency of about 20,000Hz. (The latter number is usually printed as 20kHz. The abbreviation "kHz" stands for "kiloHertz," which is just another way of saying "thousand Hertz.")

Most sounds — both in nature and in synthesizers — are not pure tones that vibrate at a single frequency. Most sounds are composites in which a number of frequencies are blended together. This is even true of noise, by the way: We can talk about

**Fig. 1.** The frequency response curve of a classic lowpass filter. Here's how to read the diagram: Frequencies are mapped along the horizontal axis, with low frequencies at the left and high frequencies at the right. The vertical axis represents the amplitude of the output of the filter in dB, given a constant input amplitude of 0dB. In other words, if we feed an 800Hz or lower frequency signal into the filter at a level of 0dB, the output will also be at 0dB: No filtering will take place. But if we send the filter a 0dB input at a frequency of 3,200Hz, the output will be lower. If the filter has a 12dB-per-octave rolloff slope (and the cutoff frequency is set to 800Hz, as shown), the output at 3,200Hz will be at a level of -24dB. With a rolloff slope of 24dB per octave, the signal will be at -48dB. That is, the signal will have been attenuated (reduced in level) by 48dB. Some synth filters have a selectable rolloff slope, while others have only a fixed slope.



## Workstation Synths

MODEL	MSRP	SYNTH TYPE   # KEYS	POLYPHONY   # PARTS   # TRACKS
E-mu / Ensoniq Fizmo	\$1,499	sample playback, Transwave synthesis   61 keys	48 voices   16 parts   16 tracks
E-mu / Ensoniq ZR-76	\$2,995	sample playback   76 keys	64 voices   16 parts   16 tracks
Generalmusic Equinox 61	\$1,995	sample playback   61 keys	64 voices   32 parts   16 tracks
Generalmusic Equinox 76	\$2,195	DSP modeling, sample playback   76 keys	64 voices   32 parts   16 tracks
Generalmusic SK760	\$2,495	sample playback   76 keys	64 voices   32 parts   32 tracks
Generalmusic SK880	\$2,995	sample playback   88 keys	64 voices   32 parts   32 tracks
Korg N264	\$2,400	AI2   76 keys	64 voices   16 parts   16 tracks
Korg N364	\$1,900	sample playback   61 keys	64 voices   32 parts   16 tracks
Korg N364	\$1,900	sample playback   61 keys	64 voices   16 parts   16 tracks
Korg Trinity	\$2,800	analog DSP modeling, sample playback   61 keys	32 voices   16 parts   16 tracks
Korg Trinity V3	\$3,550	analog DSP modeling, sample playback   61 keys	38 voices   16 parts   16 tracks
Korg Trinity V3 Pro	\$4,350	sample playback, analog DSP modeling   76 keys	38 voices   16 parts   16 tracks
Korg Trinity V3 Pro X	\$5,200	sample playback, analog DSP modeling   88 keys	38 voices   16 parts   16 tracks
Korg Triton	\$2,995	sample playback, physical modeling optional   61 keys	62 voices, 68 optional   16 parts   16 tracks
Korg Triton Pro	\$3,495	sample playback, physical modeling optional   76 keys	62 voices, 68 optional   16 parts   16 tracks
Korg Triton ProX	\$4,160	sample playback, physical modeling w/optional EXBMOSS board   88 keys	62 voices, 68 optional   16 parts   16 tracks
Kurzweil K2000VP	\$1,995	sample playback, VAST   61 keys	24 voices   16 parts   32 tracks
Kurzweil K2500	\$5,556	sample playback, VAST   76 keys	48 voices   16 parts   32 tracks
Kurzweil K2600	\$6,256	DSP modeling, sample playback, VAST   76 keys	48 voices for samples, 192 total oscillators   16 parts   32 tracks
Kurzweil K2600X	\$6,820	DSP modeling, sample playback, VAST   88 keys	48 voices sample playback, 192 total oscillators   16 parts   32 tracks
Roland XP-60	\$1,995	sample playback   61 keys	64 voices   16 parts   16 tracks
Roland XP-80	\$2,495	sample playback   76 keys	64 voices   16 parts   16 tracks
Yamaha EX5	\$2,695	DSP modeling, sample playback   76 keys	128 voices   16 parts   16 tracks
Yamaha EX7	\$2,195	analog DSP modeling, sample playback   61 keys	64 voices   16 parts   16 tracks

## Synths Under \$1,000

MODEL	MSRP	SYNTH TYPE   SIZE   POLYPHONY   # PARTS
Edirol Roland Sound Canvas SK-50	\$795	sample playback   61 keys   28 voices   16 parts
Roland XP-10	\$895	sample playback   61 keys   28 voices   16 parts
Yamaha CS2X Control Synthesizer	\$899	sample playback   61 keys   64 voices   16 parts

## Synths Over \$1,000

MODEL	MSRP	SYNTH TYPE   SIZE   POLYPHONY   # PARTS
Alesis QS6.1	\$1,099	sample playback   61 keys   64 voices   16 parts
Alesis QS7.1	\$1,399	sample playback   76 keys   64 voices   16 parts
Alesis QS8.1	\$1,999	sample playback   88 keys   64 voices   16 parts
Edirol Roland Sound Canvas SK-88 Pro	\$1,175	sample playback   37 keys   64 voices   32 parts
Korg N1	\$2,099	sample playback   88 keys   64 voices   32 parts
Roland XP-30	\$1,395	sample playback   61 keys   64   16 parts
Roland XV-88	\$2,995	sample playback   88 keys   128 voices   16 parts
Yamaha CS6x	\$1,795	sample playback opt. modeling   61 keys   64 voices (exp. opt.)   16 parts
Yamaha S30	\$1,295	sample playback, opt. modeling   61 keys   64 voices   17 parts
Yamaha S80	\$1,999	sample playback, opt. modeling   88 keys   64 voices   16 parts

## Synthesizer Modules

See also Percussion Sound Modules on page 60

MODEL	MSRP	SYNTH TYPE   SIZE   POLYPHONY   # PARTS
Alesis QSR	\$1,099	sample playback   1U rackmount   64 voices   16 parts
E-mu / Ensoniq Audity 2000	\$1,095	sample playback, digital filters, arpeggiator, pattern generator   1U rackmount   64 voices   16 parts
E-mu / Ensoniq B-3 Organ	\$895	sample playback   1U rackmount   64 voices exp. to 128   16 parts exp. to 32
E-mu / Ensoniq E4 Platinum Synthesizer	\$4,995	sample playback   3U rackmount   128 voices   32 parts
E-mu / Ensoniq Mo'Phatt	\$995	sample playback, loops, arpeggiator   1U rackmount   64 voices, exp. to 128   16 parts exp. to 32
E-mu / Ensoniq Orbit V2	\$795	sample playback, loops   1U rackmount   32 voices   16 parts
E-mu / Ensoniq Planet Earth	\$995	sample playback, loops, arpeggiator   1U rackmount   64 voices exp. to 128   16 parts exp. to 32
E-mu / Ensoniq Planet Phatt	\$795	sample playback, loops   1U rackmount   32 voices   16 parts
E-mu / Ensoniq Proteus 2000	\$995	sample playback, digital filters   1U rackmount   128 voices   32 parts
E-mu / Ensoniq Virtuoso 2000	\$1,395	sample playback   1U rackmount   128 voices   32 parts
E-mu / Ensoniq Xtreme Lead-1	\$995	sample playback, loops, arpeggiator   1U rackmount   64 voices exp. to 128   16 parts exp. to 32
E-mu / Ensoniq Xtreme Lead-1 Turbo	\$1,195	sample playback, loops, arpeggiator   1U rackmount   128 voices   32 parts
Korg MS2000R	\$850	DSP modeling, sample playback   6U rackmount   4 voices   1 part
Korg NIR	\$850	sample playback   1U rackmount   64 voices   32 parts
Korg Triton Rack	\$2,500	sample playback, physical modeling optional   2U rackmount   62 voices, 68 optional   16 parts
Kurzweil K2500R	\$4,475	sample playback, VAST   3U rackmount   48 voices   16 parts
Kurzweil K2600R	\$5,175	DSP modeling, sample playback, VAST   3U rackmount   48 voices for samples, 192 total oscillators   16 parts
Kurzweil PC2R	\$1,395	DSP modeling, sample playback   1U rackmount   64 voices expandable to 128   16 parts
Roland JP-8080	\$1,595	DSP modeling   6U rackmount   10 voices   2 parts
Roland JV-1010	\$595	sample playback   1U rackmount   64   16 parts
Roland JV-1080	\$1,195	sample playback   2U rackmount   64 voices   16 parts
Voce Electric Piano	\$599	additive modeling   1/2 rack module   32 voices   3 parts

high-frequency noise or low-frequency noise, even though the noise waveform itself doesn't have repeating cycles. There's a lot more to the story than this, and we're not going to get into the whole business of overtones, the harmonic series, and Fourier analysis right now. At this point, what you need to understand is that the sound you're feeding into a filter, even when it presents itself to your ears as a single tone, will most likely consist of a blend of frequencies from low to high.

### LOWPASS & HIGHPASS

A filter shapes the sound that it receives by reducing the loudness of certain frequencies. It can also boost the loudness of other frequencies. The boost is accomplished with a form of controlled feedback.

A common music electronics term for "reducing the loudness" is attenuating. So when we say, for instance, that a filter attenuates the frequencies above 1kHz, what we're saying is that whenever a sound passes through the filter, any vibrations within the sound that have a frequency of 1,000Hz or greater are reduced in level. ("Amplitude" is another term for level. When we're talking about audio signals, amplitude is the same as loudness or volume.)

The most common type of synth filter is called a lowpass filter. A lowpass filter, as its name implies, allows low frequencies to pass through without being attenuated. But high frequencies are attenuated — that is, they're filtered out of the sound. It's a bit like looking at the world through rose-colored glasses. Red light passes through the lenses, but anything that's mainly green in color will look dark gray or black, because the green light is being filtered out.

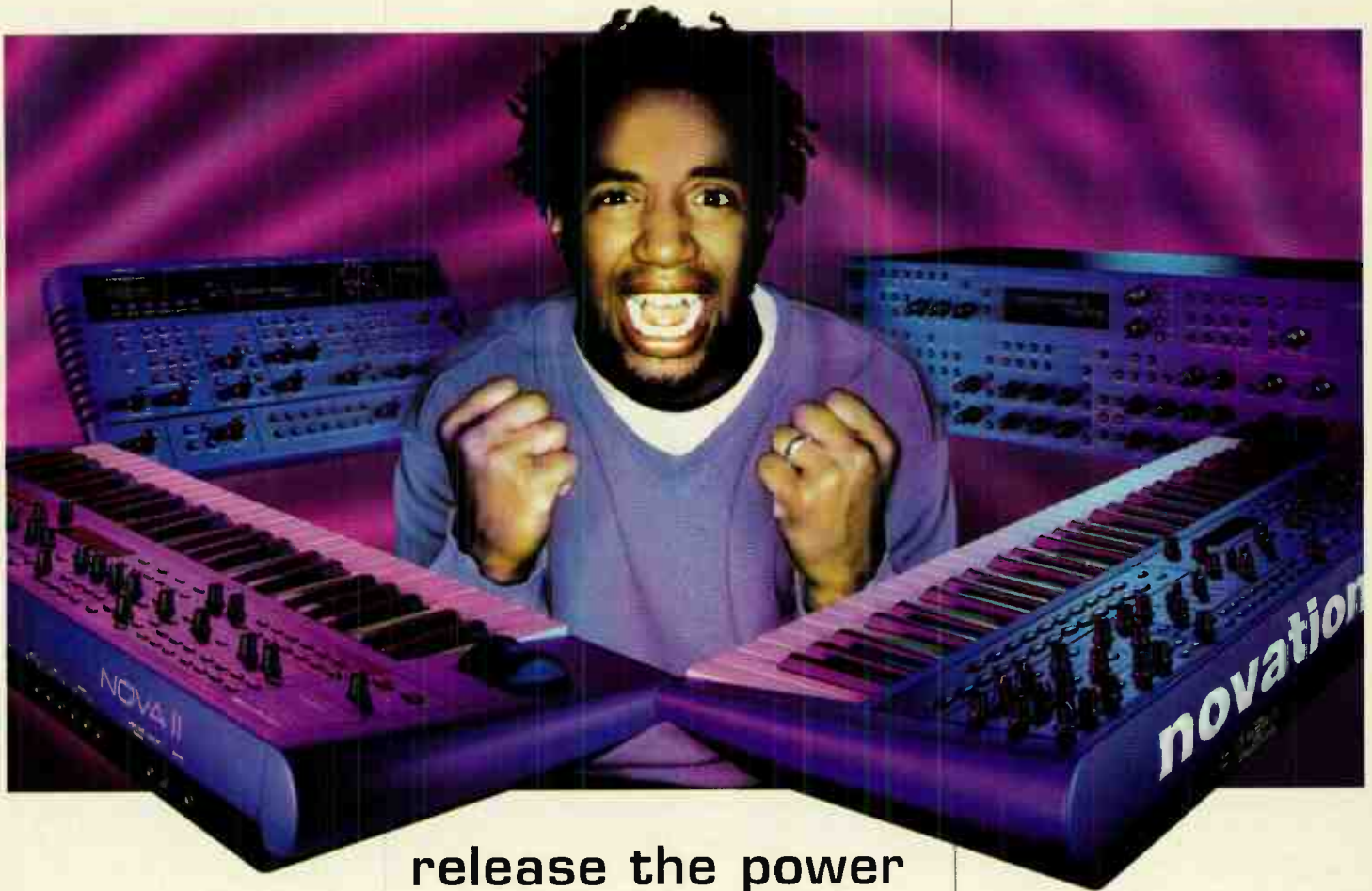
"Low" and "high" are relative terms. We need to be more specific. A synthesizer filter has a parameter called the cutoff frequency. This parameter defines, at any given moment, what "low" and "high" mean. In a lowpass filter, frequencies below the cutoff frequency are low, so they pass through without being filtered. Frequencies above



Digidesign Access Virus Plug-In



# C'MON!



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## Synthesizer Modules (cont'd)

See also Percussion Sound Modules on page 60

MODEL	MSRP	PLATFORM   FORMAT   SYNTH/SAMPLE TYPE   POLYPHONY
Yamaha CS6R	\$1,495	sample playback   2U rackmount   64 voices   16 parts
Yamaha EXSR	\$2,195	sample playback, analog, DSP modeling   3U rackmount   128 voices   16 parts
Yamaha FS1R	\$999.95	digital, FM   1U rackmount   32 voices   4 parts
Yamaha MU100	\$849.95	sample playback   1U rackmount   64 voices   32 parts
Yamaha MU100R	\$1,195	DSP modeling, sample playback   1U rackmount   64 voices   32 parts
Yamaha MU128	\$1,295	sample playback   2U rackmount   128 voices   64 parts
Yamaha MU90R	\$699.95	sample playback   1U rackmount   64 voices   32 parts

## Software Synths, Samplers, and Synth Plug-Ins

See Software on page 120

MODEL	MSRP	PLATFORM   FORMAT   SYNTH/SAMPLE TYPE   POLYPHONY
Audio Ease Nautilus Bundle	\$299	Mac   plug-in, MAS   granular synthesis, filter FX   monophonic
Audio Software Audio Architect	\$149	PC   stand-alone   digital, sample playback, virtual analog   10 voices
BitHeadz Black & Whites Virtual Piano	\$199	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound, Pro Tools DirectConnect, Unity   DSP modeling, sample playback   64 voices
BitHeadz Phrazer	\$199	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound, Pro Tools DirectConnect, Unity   sampling, sample playback   64 voices
BitHeadz Retro AS-1	\$259	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound, Pro Tools DirectConnect   analog modeling   128 voices
BitHeadz Tempo Tantrum	\$199	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound, Pro Tools DirectConnect, Unity   sampling, sample playback   256 voices
BitHeadz Unity DS-1	\$449	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound, Pro Tools DirectConnect   sampling; SDI/II, SoundFont 2.0, AIFF, Redbook audio, DLS, WAV, SampleCell II, Akai S1000 & S3000   256 voices
BitHeadz Voodoo MIDI Drum Machine	\$199	Mac, PC   stand-alone, FreeMIDI, OMS, ReWire, MAS, ASIO, Direct Sound   DSP modeling, sample playback   —
CreamWare Pulsar/Pulsar Plus	\$1,298/\$1,450	Windows   stand-alone, ASIO, ASIO 2.0, EASI, DirectSound, MME, tripleDAT, OMS, Sound Manager   sample playback, DSP/analog modeling   128 voices
CreamWare Scope/SP Studio Package	\$4,599	Mac, PC   stand-alone, TDM, ASIO 2.0, EASI, DirectSound, MME, tripleDAT, GigaSampler, OMS, Sound Manager   analog, digital, DSP modeling, sample playback   128 voices
Cycling '74 MSP	\$295	Mac   plug-in; Max   multiple synth types   —
Digidesign Access Virus	\$795	Mac, PC   plug-in; Pro Tools 24 MIX/MIXplus   analog modeling   16 voices
Digidesign Bruno/Reso	\$395	Mac, PC   plug-in; Pro Tools 24 MIX/MIXplus   realtime cross-synthesis   —
Edirol Roland VSC-SS0W	\$39	Windows   stand-alone   sample playback   128 voices
Emagic E51	\$99	Windows/Mac   plug-in for Logic Audio   analog modeling   16 voices
Emagic EX524	\$399	Mac, PC   plug-in; Logic Audio   sampling, sample playback   —
FXpansion Audio Series One Bundle	\$100	Mac, PC   plug-in, VST, Cakewalk, Emagic, Sonic Foundry   filter & pattern-based synthesis   —
Koblo Gamma9000	\$189	Mac   stand-alone, OMS, Digidesign, MAS, VST   analog modeling, sample playback   10 voices
Koblo Stella9000	\$189	Mac   polyphonic version of the Vibra9000   DSP modeling, sample playback   8 voices

the cutoff are attenuated. In a highpass filter, it's the other way around: Frequencies below the cutoff are attenuated, while those above it pass through.

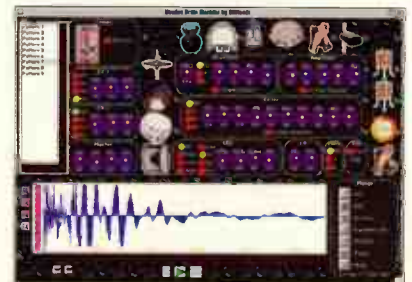
### THE ROLLOFF SLOPE

The question is, if frequencies above the cutoff are being attenuated (that is, reduced in level), how much are they being attenuated? For technical reasons, it's not easy to build a filter that completely stops all frequencies above the cutoff while having no effect on those below. (Such a filter is called a "brick wall" filter, by the way.) In a synthesizer, the filter is designed to kick in gradually, in such a way that the amount of filtering depends on the frequency of the input. Frequencies near the cutoff are attenuated only slightly. The farther beyond the cutoff a particular sound is, the more it will be attenuated. This idea is illustrated in **Figure 1** on page 13.

You may have heard the terms "two-pole" and "four-pole" being slung around when filters are being discussed. The terms "12dB per octave" and "24dB per octave" are also common. The term "pole" is a way of describing the response of a filter mathematically. Without getting too technical, the more poles a filter has, the steeper its rolloff slope. Each pole creates 6dB per octave of rolloff. A 24dB-per-octave (four-pole) rolloff is twice as steep as a 12dB-per-octave (two-pole) rolloff, as you can see in **Figure 1**.

The number of dB per octave is a measure of how much a frequency will be attenuated for each octave that it falls beyond the cutoff frequency. For reference, each musical octave represents a doubling of the frequency: A sound at 1,000Hz, for instance, is exactly one octave higher than a sound at 500Hz.

We're really just scratching the surface of filters here. Hopefully this will give you some insight to the sounds behind the specs, as well as encouraging you to experiment with the filters on your own synths and samplers.



Bitheadz VooDoo

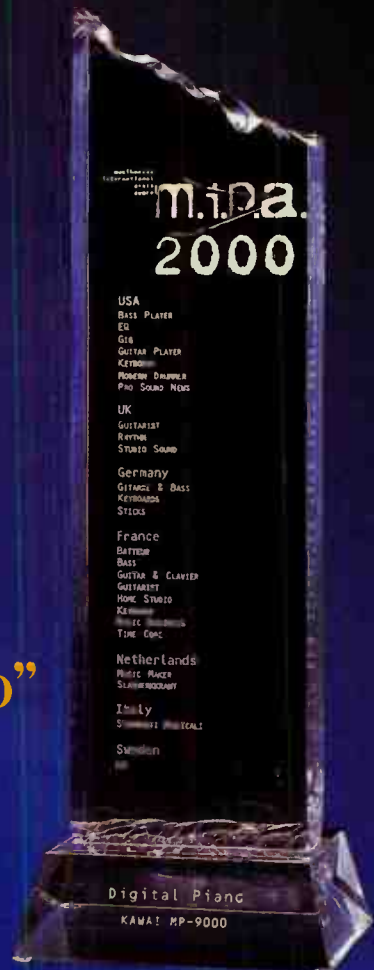


# MP9000 Professional Stage Piano



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Steinberg LM-4

## Software Synths, Samplers, & Synth Plug-Ins (cont'd)

See Software on page 120

MODEL	MSRP	PLATFORM   FORMAT   SYNTH/SAMPLE TYPE   POLYPHONY
Koblo Studio9000	\$720	Mac   stand-alone   32-bit analog modeling   1 voice
Koblo Vibra6000	\$95	Mac   stand-alone, OMS, VST, MAS   analog modeling   monophonic
Koblo Vibra9000	\$189	Mac   stand-alone, VST2   analog modeling   monophonic
LinPlug GakStoar Delta	\$75	PC   plug-in; VST   analog modeling   24 voices
Native Instruments B4	\$199	Mac, PC   VST   B-3 tonewheel and rotary speaker modeling   91 voices
Native Instruments Dynamo	\$199	Mac, PC   stand-alone   analog, DSP modeling, sample playback, granular, wavetable, FM   64 voices
Native Instruments Generator	\$298	Mac, PC   stand-alone   modular, oscillator-based modeling   64 per instrument
Native Instruments Pro 52	\$199	Mac, PC   stand-alone, VST2, ASIO   analog modeling   32 voices
Native Instruments Reaktor	\$499	Mac, PC   stand-alone   analog, DSP modeling, sample playback, granular, wavetable, FM   64 voices per part
NemeSys GigaSampler	\$299	PC   stand-alone   sampling, sample playback   —
NemeSys GigaStudio	GS150, \$699; GS96, \$399	PC   stand-alone   sampling, sample playback   160 or 36 voices
Norris, Mike SoundMagic FX	\$15	Mac   plug-in; MicroMat SoundMaker   granular synthesis   —
Seer Systems Reality	\$495	PC   stand-alone   analog, DSP modeling, sample playback, FM   128 voices
Seer Systems SurReal	\$129	PC   stand-alone   sampling, analog modeling, sample playback   64 voices
Software Vaz Technology	\$35	PC   stand-alone   sample playback, analog, DSP modeling, modular synthesis   —
Steinberg Dynasone	\$199	Mac, PC   plug-in; VST   subharmonic synthesis   —
Steinberg LM-4	\$99	Mac, PC   plug-in; VST   analog drum machine modeling   18 voices
Steinberg Model -E	\$199	Mac, PC   plug-in; VST   analog modeling   64 voices
Steinberg ReBirth 2.0	\$199	Mac, PC   stand-alone, ReWire, VST   physical modeling of Roland TB-303, TR-808, & TR-909   22 voices
Steinberg Waldorf PPG Wave	\$199	Mac, PC   plug-in; VST   digital wavetable oscillators, analog filter emulation   64 voices
Symbolic Sound Kyma 4.63	\$3,300	Mac, PC   comes with Copybara-320 Sound Computation Engine   digital, DSP modeling, analog, sample playback, granular, additive, subtractive, formant, modulation, resonator/exciter, group-additive, and combinations of the above   640 voices
TC Works Spark Modular	\$49 upgrade, \$499 Spark, \$699 Spark XL for TDM	Mac   plug-in; Spark   analog modeling   monophonic





# Turn Your Creativity Loose with Technics Digital Keyboards

## Understanding Hardware Sampler Features

by CRAIG ANDERTON

The digital sampler has evolved dramatically in recent years. Borrowing from synthesis, digital recording, computers, and digital signal processing, today's sampler is essentially a recording studio in a box.

Furthermore, synthesizers have copied samplers by not just including sampled sounds, but the ability to load samples and communicate with other devices. Several manufacturers offer sampling add-ons to synths, while others add onboard ROM sounds (just like a synth!) to samplers.

Now synthesizers do such tricks as offer optional "flash" RAM for storing samples, read Akai format samples, include a computer interface, and can even do limited hard disk recording. So is it a synth, a sampler, or a digital audio workstation? The boundaries are indeed blurring. To add to the mix, virtual software samplers are now available for Windows and MacOS machines that run entirely within the computer.

So let's ditch the definitions, and look at some of the most important features in today's samplers/synthesizers. We'll make sense of the sometimes bewildering options, so you can determine which are most important to your needs. Just remember that most of today's keyboards are so expandable that if you end up needing some feature further down the line, the odds are good it will be available as an add-on.

### FILE COMPATIBILITY

Early samplers could read only their own proprietary format, but more samplers can now read and translate samples from multiple formats. The most common file translations are for Akai and Roland format, which allows access to a huge library of quality sounds. Some samplers can read other formats only from a CD-ROM connected to the SCSI port (see below), while others can translate from floppy disks as well.

More and more samplers can read WAV

## Hardware Samplers

Also see Synth Workstations on page 13 and Software Synths, Samplers, and Plug-Ins on page 16, Groove Samplers on page 57

MODEL	MSRP	TYPE   STD MEM/EXP MEM   POLYPHONY   FILTERS
Akai S2000	\$899	rackmount sampler   2MB/32MB   32 voices   bandpass, resonant, lowpass, highpass, EQ
Akai S3000XL	\$1,499	rackmount sampler   2MB/32MB   32 voices   highpass, bandpass, EQ, lowpass, resonant
Akai S5000	\$2,099	rackmount sampler   8MB/256MB   64 voices/128 max   notch, resonant, lowpass, highpass, EQ, bandpass
Akai S6000	\$2,999	rackmount sampler   8MB/256MB   64 voices/128 max   lowpass, bandpass, notch, highpass, resonant
E-mu / Ensoniq E-Synth Ultra	\$2,895	rackmount sampler   16MB/128MB   64 voices/128 max   resonant, bandpass, EQ, highpass, lowpass
E-mu / Ensoniq E4 Platinum	\$4,995	rackmount sampler   128 MB/128 MB   64 voices/128 max   lowpass, notch, EQ, bandpass, highpass, resonant
E-mu / Ensoniq E4XT Ultra	\$3,595	rackmount sampler   64MB/128MB   128 voices   EQ, highpass, lowpass, resonant, bandpass
E-mu / Ensoniq E6400 Ultra	\$2,295	rackmount sampler   16MB/128MB   64 voices/128 max   bandpass, EQ, highpass, lowpass, resonant
E-mu / Ensoniq ESI 2000	\$749	rackmount sampler   4MB/128MB   64 voices   EQ, highpass, lowpass, resonant, bandpass
E-mu / Ensoniq ESI-4000 Turbo	\$1,695	rackmount sampler   16MB/128MB   64 voices   resonant, lowpass, highpass, bandpass, EQ
Kurzweil K2500RS	\$5,250	rackmount sampler   4MB/128MB   48 voices   resonant, notch, lowpass, highpass, EQ, bandpass
Kurzweil K2500S	\$6,440	keyboard sampler   4MB/128MB   48 voices   bandpass, EQ, highpass, lowpass, notch, resonant
Kurzweil K2500XS	\$7,000	keyboard sampler   4MB/128MB   48 voices   highpass, EQ, bandpass, lowpass, notch, resonant
Kurzweil K2600RS	\$5,950	rackmount sampler   64MB/128MB   48 voices, 192 osc   bandpass, EQ, highpass, lowpass, notch, resonant
Kurzweil K2600S	\$7,140	keyboard sampler   64MB/128MB   48 voices, 192 osc   EQ, bandpass, resonant, notch, lowpass, highpass
Kurzweil K2600XS	\$7,700	keyboard sampler   64MB/128MB   48 voices, 192 osc   EQ, highpass, lowpass, notch, resonant, bandpass
Roland VP-9000	\$3,295	rackmount sampler   —   6 realtime configurable voices   bandpass, EQ, highpass, lowpass, notch
Yamaha A3000 v.2	\$1,995	rackmount sampler   2MB/128MB   64 voices   bandpass, EQ, lowpass, notch, resonant, highpass
Yamaha A4000	\$1,595	rackmount sampler   4MB/128MB   64 voices   bandpass, EQ, highpass, lowpass, notch, resonant
Yamaha A5000	\$2,295	rackmount sampler   4MB/128MB   128 voices   bandpass, notch, lowpass, highpass, EQ, resonant



E-mu ESI 2000

files (Windows' native audio format) or AIFF (Mac format). For example, Kurzweil's K2XXX series samplers can read Roland, Akai, and Ensoniq EPS/ASR files and keymaps via SCSI, and Ensoniq and Akai floppies. It can also read/write WAV and AIFF files from/to disk or a SCSI device.

One important point: transferring raw

audio is no big deal, but translating the associated synth-like parameters is more difficult — if a sampler processes a sound with resonant filters and you transfer the raw sample to a sampler lacking resonant filters, the final sound will be very different.

Many samplers still support the MIDI Sample Dump Standard (SDS) protocol for



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# Keyboards and Synthesizers

transferring digital audio via MIDI, but it's a glacially slow process (SDS dates from when samples were typically a few hundred KB of memory, not several MB). SMDI (SCSI Musical Data Interchange) is a newer protocol for transferring samples over SCSI instead of MIDI, and runs about 50 times faster than SDS.

## SCSI

SCSI (Small Computer System Interface) is a hardware/software protocol for transferring vast amounts of data quickly. If you're serious about sampling, SCSI ports are a must since you can connect hard drives, CD-ROMs, optical drives, and computers to the sampler. With 20 gig hard drives listing for \$200 and less, SCSI gives access to a lot of sounds for very little bucks. SCSI is also required for using SMDI.

## RAM EXPANSION

More memory allows loading more and/or longer samples. At 5 MB/minute for 44.1 kHz mono digital audio, 16 MB suffices to fly in a three minute vocal, while 128 MB allows almost 13 minutes of stereo sampling.



Creamware Pulsar



Korg SG Pro X

## Synth and Sampling Soundcards

Also see Audio Interfaces on page 1200, Software Synths, Samplers, and Plug-Ins on page 16

MODEL	MSRP	PLATFORM   CARD TYPE   SYNTH/SAMPLING TYPE   INPUTS
<b>CreamWare Scope</b>	\$7995	PC   PCI   sam-ling, multiple forms of synthesis   3 ADAT
<b>Digidesign SampleCell II Plus</b>	\$1,295	Mac, PC   PCI   sampling   two 1/4"
<b>E-mu / Ensoniq 8710 PS</b>	\$395	Win 95   PCMCIA   General MIDI   -
<b>E-mu / Ensoniq E-mu Audio Production Studio</b>	\$699	Win 95   PCI   sample playback, SoundFont 2.1   4 1/4" 2 S/PDIF coax
<b>Korg OASYS PCI</b>	\$2,200	Win 95/98, MacOS   PCI   physical modeling, FM synthesis, sample playback   1 stereo 1/4" 1 S/PDIF coax, 1 ADAT
<b>Mediatrix Audiatrix 3D-XG</b>	\$295	PC   ISA/EISA   sample playback, FM synthesis   2 1/8"
<b>Sonusor MEDI/O</b>	\$599	Win NT,95   MIDI/WAV card   FM synthesis, physical modeling, sample playback, subtractive analog modeling   2 stereo 1/4", 1 XLR, 1 S/PDIF optical 1 S/PDIF coax 1 ADAT
<b>Tracer Tracer SAS Card</b>	\$199	DOS, Win 95   PCI   FM synthesis, sample playback   two 1/8", 1 S/PDIF optical
<b>Turtle Beach Montego A3DXstream</b>	\$59.95	DOS, Win 3.1/95/NT   PCI   FM synthesis, sample playback   two 1/8"
<b>Turtle Beach Montego II</b>	\$79.95	Win NT,95   PCI   FM synthesis, sample playback   two 1/8"
<b>Turtle Beach Multisound Pinnacle</b>	\$549.95 w/ digital I/O, \$499.95 without	Win 95/NT/3.1   ISA/EISA   physical modeling, sample playback   two 1/8", 1 S/PDIF coax
<b>Turtle Beach Santa Cruz</b>	\$99	Win 2000/95/98/NT   MIDI/WAV card   -   -
<b>Yamaha SW1000XG</b>	\$699.95	Mac, Win 2000/95/98/NT   PCI   FM synthesis, physical modeling, sample playback,   1 (stereo) 1/8"

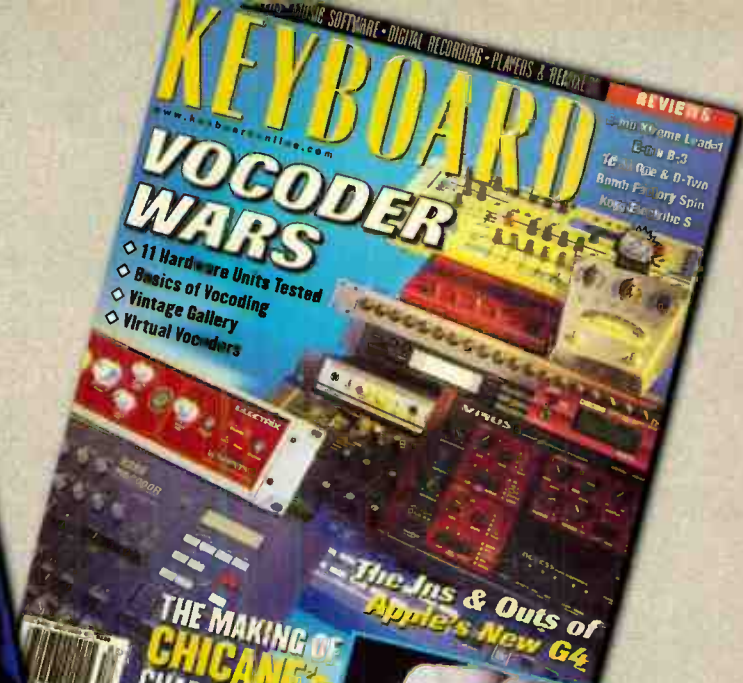
## Professional Digital Pianos

Also see Workstation Synths on page 13, Synths Over \$1,000 on page 14

MODEL	MSRP	# SOUNDS   # PROGRAMMABLE ZONES   WEIGHT/SIZE
<b>Alesis DG8</b>	\$2,499	88   3   80 lbs.
<b>Generalmusic PRO1</b>	\$1,295	32   2   57 lbs.
<b>Generalmusic PRO2</b>	\$1,895	48   2   58 lbs.
<b>Kawai MP9000</b>	\$2,195	16   2   73 lbs.
<b>Kurzweil MicroPiano</b>	\$550	32   -   1/2 rackspace
<b>Kurzweil PC88</b>	\$2,650	64   4   55 lbs.
<b>Kurzweil PC88mx</b>	\$3,150	269   4   55 lbs.
<b>Kurzweil SP76</b>	\$995	32   2   27.5 lbs.
<b>Kurzweil SP88</b>	\$1,295	32   2   30 lbs.
<b>Kurzweil SP88X</b>	\$1,399	32   2   30 lbs.
<b>Oberheim Mini Grand Piano Expander</b>	\$450	6   -   1/2 rackspace
<b>Roland A-90EX Controller</b>	\$2,995	128   8   60 lbs.
<b>Roland FP-1 Digital Piano</b>	\$1,595	5   1   53 lbs.
<b>Roland FP-9 Digital Piano</b>	\$2,795	24   2   57 lbs., 9 oz.
<b>Roland RD-100</b>	\$1,495	9   1   52 lbs., 15 oz.
<b>Roland RD-600</b>	\$2,495	128   4   54 lbs.
<b>Voce Electric Piano</b>	\$599	32   -   1/2 rackspace
<b>Yamaha P200</b>	\$2,395	13   2   66 lbs.
<b>Yamaha P80</b>	\$1,295	12   -   33.7 lbs.
<b>Yamaha S80</b>	\$1,999	256   4   53 lbs.



# Serious Keyboards.



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Most RAM is volatile, meaning that the samples have to be reloaded after a power-down. Some samplers provide for battery-backed RAM or "flash" ROM so that samples are accessible at all times. Battery-backed and flash RAM tends to be more costly than standard RAM, so a typical scenario is to keep your "greatest hits" in battery-backed RAM, and load other samples into standard RAM.

## POLYPHONY

With more voices, sustaining notes won't cut off when you play new notes, more notes and sounds are available for multi-timbral setups, and crossfades between samples are more realistic because voices aren't "stolen" when you run out of polyphony. Many samplers can provide 64 or 128 voices without even breaking a sweat.

## DIGITAL I/O

It's a digital audio world, and in addition to SCSI, many samplers now include built-in or optional AES/EBU, S/PDIF, or ADAT "light-pipe" interfacing. This has several applications: blast samples from audio CDs directly into a sampler from a CD player with S/PDIF, take tracks recorded on digital tape or hard disk and move them into the sampler (ideal for flying in vocals or adding background voices), and transfer samples between similar-equipped samplers.

## RESONANT FILTERS

Resonant filters are difficult to implement digitally, but many classic analog synth sounds (essential for today's cutting-edge dance music) rely on resonance. Fortunately, most newer samplers include resonant filters; but if you're trolling the classifieds for bargains on older samplers, try before you buy if resonant filter sounds are important to you.

## GRAPHIC INTERFACE

Although the graphic interfaces on samplers continue to improve (many have oversized LCDs that let you see the waveform, zoom in on loop points, and the like), nothing beats a good computer-based editor. If you're into editing, make sure there's a program available that's compatible with both your sampler and computer.

## Home Digital Pianos

MODEL	MSRP	# KEYS   # SOUNDS   # STYLES/SEQ. TRACKS   COMPUTER INTERFACE PORT   SPEAKERS
Baldwin Pianovelle GPS2600	see dealer	88 keys   1,064   192 styles internal + 216 on hard drive   Mac/PC port   speakers
Baldwin Pianovelle GPS3600	see dealer	88 keys   1,064   192 styles internal, 216 on hard drive   Mac/PC port   speakers
Baldwin Pianovelle PS1000	see dealer	88 keys   444   96 styles w/ 4 variations, 4 intros, 4 fills, 4 endings   Mac/PC port   speakers
Baldwin Pianovelle PS1300	see dealer	88 keys   444   96 styles w/ 4 variations, 4 intros, 4 fills, 4 endings   Mac/PC port   speakers
Baldwin Pianovelle PS2600	see dealer	88 keys   1,064   192 internal styles + 216 on hard drive   Mac/PC port   speakers
Baldwin Pianovelle RP100	see dealer	88 keys   48   1 track   Mac/PC port   speakers
Baldwin Pianovelle RP150	see dealer	88 keys   48   -   Mac/PC port   speakers
Baldwin Pianovelle RP200	see Dealer	88 keys   64   2 tracks   Mac/PC port   speakers
Baldwin Pianovelle RP70	see dealer	88 keys   444   -   speakers
Baldwin Pianovelle RP90	see dealer	88 keys   48   1 track   Mac/PC port   speakers
Kawai CA550	\$3,795	88 keys   8   -   -   speakers
Kawai CA770	\$4,245	88 keys   24   2 tracks   Mac/PC port   speakers
Kawai CA970	\$5,245	88 keys   33   2 tracks   Mac/PC port   speakers
Kawai CN370	\$2,495	88 keys   8   2 tracks   Mac/PC port   speakers
Kawai CN470	\$3,245	88 keys   18   2 tracks   Mac/PC port   speakers
Kawai CP150	see dealer	88 keys   300   128 styles   -   speakers
Kawai CP170	see dealer	88 keys   300   128 styles   -   speakers
Kawai ES1	\$1,245	88 keys   16   2 tracks   Mac/PC port   speakers
Kawai HS600	\$6,395	88 keys   10   2 tracks   -   speakers
Kawai PN70	\$1,995	88 keys   3   -   -   speakers
Kawai PN81	\$2,395	88 keys   8   2 tracks   -   speakers
Korg C-8500	\$3,850	88 keys   10   4 tracks   Mac/PC port   speakers
Korg C1500	\$2,150	88 keys   8   -   -   speakers
Korg C-150	\$2,099	88 keys   6   1 track   Mac/PC port   speakers
Korg C-4500	\$2,675	88 keys   6   2 tracks   Mac/PC port   speakers
Kurzweil Mark 1	see dealer	88 keys   4   -   -   speakers
Kurzweil Mark 110	see dealer	88 keys   127   32 styles   -   speakers
Kurzweil Mark 12	see dealer	88 keys   325   64 styles   -   speakers
Kurzweil Mark 152	see dealer	88 keys   325   64 styles   -   speakers
Kurzweil Mark 2	see dealer	88 keys   4   -   -   speakers
Kurzweil Mark 3	see dealer	88 keys   12   -   -   speakers
Kurzweil Mark 6	see dealer	88 keys   42   -   -   speakers
Kurzweil Mark 8	see dealer	88 keys   62   32 styles   -   speakers
Music Industries Madison CGD-88	\$1,695	88 keys   19   2 tracks   -   speakers
Music Industries Madison CSL-88	\$1,095	88 keys   19   -   -   speakers
Music Industries Madison GND-88	\$1,495	88 keys   14   -   -   speakers
Music Madison Standard 88 Industries	\$899.95	88 keys   18   -   -   speakers
Roland C-80 Digital Harpsichord	see dealer	61 keys   8   -   -   speakers
Roland ep-70 Digital Piano	\$795	76 keys   8   -   -   speakers



## Home Digital Pianos (cont'd)

MODEL	MSRP	# KEYS   # SOUNDS   # STYLES/SEQ. TRACKS   COMPUTER INTERFACE PORT   SPEAKERS
Roland EP-75	see dealer	76 keys   241   11 tracks   —   speakers
Roland EP-85	see dealer	88 keys   241   11 tracks   —   speakers
Roland ep-90 Digital Piano	\$1,095	88 keys   8   —   —   speakers
Roland EP-95	see dealer	88 keys   241   11 tracks   —   speakers
Roland FP-1 Digital Piano	\$1,595	88 keys   5   —   —   —
Roland FP-9 Digital Piano	\$2,795	88 keys   24   —   Mac/PC port   speakers
Roland HP-126	see dealer	88 keys   4   1 track   —   speakers
Roland HP-236	see dealer	88 keys   6   1 track   —   speakers
Roland HP-245	see dealer	88 keys   8   2 tracks   —   speakers
Roland HP-335	see dealer	88 keys   222   22 styles   —   speakers
Roland HP-535	see dealer	88 keys   222   22 styles   —   speakers
Roland HP-555G	see dealer	88 keys   222   22 styles   —   speakers
Roland KR-375	see dealer	88 keys   434   120 styles   —   speakers
Roland KR-575	see dealer	88 keys   499   227 styles   —   speakers
Roland KR-75	see dealer	88 keys   394   111 styles   —   speakers
Roland MP-300	\$1,795	88 keys   4   —   —   speakers
Suzuki HG-500e	see dealer	88 keys   128   50 styles   —   speakers
Suzuki HP-120D	see dealer	88 keys   7   2 tracks   —   speakers
Suzuki HP-150ex	see dealer	88 keys   128   20 styles   —   speakers
Suzuki HP-200e	see dealer	88 keys   128   50 styles   —   speakers
Suzuki HP-300e	see dealer	88 keys   128   50 styles   —   speakers
Suzuki HP-76ex	see dealer	76 keys   128   20 styles   —   speakers
Suzuki HP-80D	see dealer	88 keys   7   2 tracks   —   speakers
Suzuki HP-900	see dealer	88 keys   7   2 tracks   —   speakers
Suzuki HP100-D	see dealer	88 keys   13   2 tracks   —   speakers
Suzuki KM-88	see dealer	88 keys   —   2 tracks   —   —
Technics SX-P30	see dealer	88 keys   2   —   —   —
Technics SX-PC25	see dealer	88 keys   6   —   —   speakers
Technics SX-PR53/M	see dealer	88 keys   300   512 styles   —   speakers
Technics SX-PR603/M	see dealer	88 keys   1,022   512 styles   Mac/PC port   speakers
Technics SX-PR703/M	see dealer	88 keys   1,044   512 styles   Mac/PC port   speakers
Technics SX-PR903R/C/B	see dealer	88 keys   1,044   512 variations   Mac/PC port   speakers
Technics SX-PX336/M	see dealer	88 keys   350   16 styles   Mac/PC port   speakers
Technics SX-PX338B	see dealer	88 keys   350   16 styles   Mac/PC port   speakers
Technics SX-PX552/M	see dealer	88 keys   8   —   Mac/PC port   speakers
Technics SX-PX554/M	see dealer	88 keys   6   —   Mac/PC port   speakers
Van Koevering Baby Grand VIP1950	see dealer	88 keys   128   100 styles   built-in PC   speakers
Van Koevering Ensemble VIP1300	see dealer	88 keys   128   100+ styles   built-in PC   speakers
Van Koevering Petite Grand VIP1900	see dealer	88 keys   128   100+ styles   built-in PC   speakers
Viscount Allegro	\$3,495	88 keys   12   1 track   —   speakers
Viscount Andante	\$1,995	88 keys   6   1 track   —   speakers
Viscount Concerto 4000 Baby Grand	\$7,495	88 keys   12   —   —   speakers
Viscount Concerto 500 Petite Grand	\$4,995	88 keys   12   1 track   —   speakers

## LOTS OF DISCRETE OUTPUTS

More outputs simplify life in the studio, as you can send different instrument sounds to different outputs for external processing and/or mixing. Some samplers come with multiple outputs, whereas others provide only stereo, and require an optional-at-extra-cost board if you want to add more outputs.

## SUPPORT SOFTWARE

Check for utility programs that make your job easier. For example, Alesis includes Sound Bridge with their synths; this program can transfer sounds from your computer to PCMCIA cards. Stuffing a card into the synth is an incredibly fast way to load new sounds, and avoids the hassles of SCSI and other types of transfers.

CD-ROMs also come under the heading of support, but just about all samplers these days have substantial, high-quality libraries available, and file compatibility makes even more options available.

## FILE MANAGEMENT

With all those megabytes of sound, you can get lost without some way to find and load sounds. More samplers, as well as digital audio editing programs, now include database-like functions that make it easier to mark and retrieve samples.

## HARD DISK RECORDING

So far this is available with only a few samplers, but it probably won't be long before we see this showing up in more and more machines. While onboard hard disk recording can't compete with a spiffy computer-based system, it can be very handy when you want some vocals or guitars to go along with sequenced samples.

## DSP

This includes standard (and always welcome) effects such as equalization, chorus, etc., however, many samplers go beyond the norm with options such as time-stretch algorithms for changing a sample's length without changing its pitch, as well as a sample rate conversion routines.

Look for the option to resample using the DSP effects. One way to use this would be if you wanted a tough gated reverb sound on the snare, and room reverb on the rest of the kit. Simply resample the snare through the gated reverb, then use the onboard reverb on the kit as a whole. In some cases

# Keyboards and Synthesizers

you can expand DSP with add-on cards that install within the sampler.

## SAMPLE THIS!

When you go to a store to sample a sampler, don't forget such factors as the keyboard feel (or if a rack, editing function accessibility). And of course, the sound of the unit is the ultimate arbiter — although these days, samplers are more alike than dissimilar when it comes to sound quality. One quick check is to take a cymbal and transpose it way down (two octaves or so). The smoother and less grainy it is, the better. Also check the filter sweeps for smoothness, and pay attention to controller options such as LFOs and envelopes.

In any event, whether you use samplers for dance mixes, orchestral emulation for sound tracks, or a compositional tool, the current crop has a lot to offer.



Alesis DG8



Kurzweil PC2X

## Home Digital Pianos (cont'd)

MODEL	MSRP	# KEYS   # SOUNDS   # STYLES/SEQ. TRACKS   COMPUTER INTERFACE PORT   SPEAKERS
Viscount Concerto 5000 Grand	\$8,295	88 keys   12   —   —   speakers
Viscount Institutional 50H Oak	\$2,495	88 keys   5   —   —   speakers
Viscount Maestro	\$5,795	88 keys   399   144 styles   —   speakers
Viscount Opera	\$4,295	88 keys   25   1 track   —   speakers
Yamaha CLP920	\$2,195	88 keys   4   —   Mac/PC port   speakers
Yamaha CLP930	\$2,695	88 keys   8   2 tracks   Mac/PC port   speakers
Yamaha CLP950	\$3,295	88 keys   12   2 tracks   Mac/PC port   speakers
Yamaha CLP950C	\$3,495	88 keys   12   2 tracks   Mac/PC port   speakers
Yamaha CLP950M	\$3,495	88 keys   12   2 tracks   Mac/PC port   speakers
Yamaha CLP970A	\$4,195	88 keys   25 plus 480 XG   16 tracks   Mac/PC port   speakers
Yamaha CLP970AC	\$4,395	88 keys   25 plus 480 XG   16 tracks   Mac/PC port   speakers
Yamaha CLP970AM	\$4,395	88 keys   25 plus 480 XG   16 tracks   Mac/PC port   speakers
Yamaha CVP109	\$8,695	88 keys   710   192 styles   Mac/PC port   speakers
Yamaha CVP103	\$4,395	88 keys   675   160 styles   Mac/PC port   speakers
Yamaha CVP103M	\$4,895	88 keys   675   160 styles   Mac/PC port   speakers
Yamaha CVP105	\$5,495	88 keys   675   170 styles   Mac/PC port   speakers
Yamaha CVP107	\$6,695	88 keys   710   182 styles   Mac/PC port   speakers
Yamaha CVP700	\$9,999	88 keys   710   182 styles   Mac/PC port   speakers
Yamaha YDP1015	\$1,295	88 keys   5 plus 1 variation each   2 tracks   —   speakers
Yamaha YPP15	\$499.95	61 keys   5   —   —   speakers
Yamaha YPP35	\$699.95	61 keys   8   —   —   speakers
Yamaha YPP55	\$1,195.95	76 keys   8   —   —   speakers
Yamaha YPR50	\$499.95	76 keys   5   20 tracks   —   speakers



## Portable Keyboards and Auto-Arrangers

MODEL	MSRP	CONFIG   # SOUNDS   # STYLES   # SEQ. TRACKS
Casio CTK-431	\$159.99	61 keys   100 sounds   100 styles   —
Casio CTK-451	\$149	61 keys   100 sounds   100 styles   —
Casio CTK-541	\$249	61 keys   100 sounds   100 styles   —
Casio CTK-551	\$199	61 keys   100 sounds   100 styles   —
Casio CTK-560L	\$269.99	61 keys   100 sounds   50 styles   —
Casio CTK-620L	\$589.99	61 keys   128 sounds   —   2 tracks
Casio CTK-631	\$299.99	61 keys   200 sounds   100 styles   6 tracks
Casio CTK-651	\$299	61 keys   200 sounds   100 styles   6 tracks
Casio CTK-731	\$699.99	61 keys   232 sounds   100 styles   6 tracks
Casio CTK-811EX	\$899.99	61 keys   232 sounds   100 styles   6 tracks
Casio LK-30	\$269.99	61 keys   100 sounds   50 styles   —
Casio MZ-2000	\$1,799	61 keys   561 sounds   130 styles   16 tracks
Casio WK-1300	\$499.99	61 keys   200 sounds   100 styles   6 tracks
Casio WK-1600/1630	\$499	76 keys   232 sounds   130 styles   6 tracks
Casio WK-1800	\$699	76 keys   232 sounds   130 styles   6 tracks
Kawai ACR20	\$1,398	table-top auto-arrange module   226 sounds   100 styles   16 tracks
Kawai Z-1000	\$4,995	61 keys   200 sounds   100 styles   16 tracks
Korg i30	\$2,495	61 keys   468 sounds   176 styles   16 tracks
Music Industries Farfisa 7-XII	\$1,995.95 (black), \$2,050.95 (silver)	table-top auto-arrange module   640 sounds   576 styles   16 tracks
Music Industries Farfisa G-7	\$2,295, black; \$2,350, red or silver	61 keys   640 sounds   64 styles   16 tracks
Roland EM-2000 Creative Keyboard Arranger	\$3,195	61 keys   1,161 sounds   128 + 441 styles   16-track sequencer, 8-track arranger
Roland G-1000 Arranger Workstation	\$2,995	76 keys   1,161 sounds   128 + 441 styles   16-track sequencer, 8-track arranger
Suzuki SP-40e	see dealer	61 keys   128 sounds   100 styles   —
Suzuki SP-50e	see dealer	61 keys   128 sounds   100 styles   2 tracks
Suzuki SP-70e	see dealer	61 keys   128 sounds   100 styles   3 tracks
Technics SX-KN1400	see dealer	61 keys   375 sounds   128 styles   16 tracks
Technics SX-KN6000	see dealer	61 keys   1,000 sounds   800 rhythm variations   16 tracks
Technics SX-KN930	see dealer	61 keys   200 sounds   128 styles   16 tracks
Yamaha DJXII	\$399.95	61 keys   203 sounds   70 dance styles with 10 variations each   —
Yamaha DJXIIIB	\$295.95	table-top auto-arrange module   203 sounds   70 dance styles with 10 variations each   —
Yamaha PSR-G X76	\$399.95	76 keys   246 sounds   100 styles   6 tracks
Yamaha PSR160	\$149.95	49 keys   100 sounds   100 styles   —
Yamaha PSR262	\$219.95	61 keys   100 sounds   100 styles   —
Yamaha PSR282	\$295.95	61 keys   246 sounds   100 styles   6 tracks
Yamaha PSR340	\$499.95	61 keys   100 + 128 sounds   100 styles   6 tracks
Yamaha PSR540	\$699.95	61 keys   215 + 480 sounds   106 styles   16 tracks
Yamaha PSR640	\$1,095.95	61 keys   223 + 480 sounds   160 styles   16 tracks
Yamaha PSR740	\$1,395	61 keys   267 + 480 sounds   160 styles   16 tracks
Yamaha PSR9000	\$3,495	61 keys   331 + 480 sounds   125 + 85 styles   16 tracks

# Keyboards and Synthesizers

## Digital Pianos Under \$1,000

MODEL	MSRP	# KEYS   # SOUNDS   # STYLES/SEQ. TRACKS   COMPUTER PORT   SPEAKERS
Korg SP-100	\$999	88 keys   6 sounds   —   —   —
Kurzweil SP76	\$995	76 keys   32 sounds   —   —   —
Music Industries Madison Standard 88	\$899.95	88 keys   18 sounds   —   —   speakers
Roland ep-70 Digital Piano	\$795	76 keys   8 sounds   —   —   speakers
Suzuki Keyman	\$995	88 keys   8 sounds   —   —   —
Yamaha YPP15	\$499.95	61 keys   5 sounds   —   —   speakers
Yamaha YPP35	\$699.95	61 keys   8 sounds   —   —   speakers
Yamaha YPR50	\$499.95	76 keys   5   20 tracks   —   speakers

## Digital Organs

MODEL	MSRP	CONFIG   # DRAWBAR SETS   ORGAN FX
Hammond Suzuki A-20S	see dealer	2 manuals   four 9-drawbar sets   percussion, chorus, key click, Leslie simulation, overdrive
Hammond Suzuki XB-3A	see dealer	2 manuals   four 9-drawbar sets   percussion, chorus, key click, Leslie simulation, overdrive
Hammond Suzuki XC-3A	see dealer	2 manuals   four 9-drawbar sets   percussion, chorus, key click, Leslie simulation, overdrive
Hammond/Suzuki XK-2 Drawbar Keyboard	\$1,895	1 manual   one 9-drawbar set   chorus, key click, Leslie simulation, overdrive, percussion
Hammond/Suzuki XM-1/XMC-1 Module/Controller	\$1,325	table-top   one 9-drawbar set   percussion, chorus, key click, Leslie simulation, overdrive
Korg CX-3	\$2,600	1 manual   two 9-drawbar sets   percussion, chorus, key click, Leslie simulation, overdrive
Music Industries Baby B	\$895	table-top   one 9-drawbar set   key click, percussion, Leslie simulation, overdrive
Music Industries Blue Chip OX-7	\$1,595	table-top   one 9-drawbar set   overdrive, Leslie simulation, percussion, key click
Oberheim OB3 Squared	\$899	table-top   one 9-drawbar set   key click, Leslie simulation, overdrive, percussion, chorus
Oberheim OB3 Squared Keyboard	\$1,399	1 manual   one 9-drawbar set   chorus, key click, Leslie simulation, overdrive, percussion
Roland VK-7 Combo Organ	\$2,495	1 manual   one 9-drawbar set   chorus, key click, Leslie simulation, overdrive, percussion
Roland VK-77 Combo Organ	\$5,795	2 manuals   two 9-drawbar sets   chorus, key click, Leslie simulation, overdrive, percussion
Voce Micro B II	\$599	table-top   —   Leslie simulation, overdrive, key click, chorus, percussion
Voce V3	\$1,395	rackmount   —   chorus, key click, Leslie simulation, overdrive, percussion
Voce V5	\$975	table-top   one 9-drawbar set   chorus, key click, overdrive, percussion



Hammond Suzuki XPK-100

## MIDI Pedal Controllers

MODEL	MSRP	# PEDALS
Hammond Suzuki XPK-100	see dealer	13 pedals, programmable
Roland PK-S Dynamic MIDI Pedal	\$495	13 pedals, programmable
Studiologic by Fatar MP-113 Pedalboard	\$450	13 pedals, programmable



# Keyboards and Synthesizers

## Rotating Speakers and Simulators

MODEL	MSRP	TYPE   AMPLIFIER CONFIG   WEIGHT
Hammond/Suzuki Leslie 122A	see dealer	rotating speaker cabinet   Vacuum tube, 40W RMS   149 lbs.
Hammond/Suzuki Leslie 122XB	see dealer	rotating speaker cabinet   Vacuum tube, 40W RMS   149 lbs.
Hammond/Suzuki Leslie 147A	see dealer	rotating speaker cabinet   vacuum tube, 40W RMS   149 lbs.
Hammond/Suzuki Leslie 303	see dealer	rotating speaker cabinet   2 channels, 100W   115 lbs.
Hammond/Suzuki Leslie 323	see dealer	rotating speaker cabinet   2 channels, 100W   115 lbs.
Hammond/Suzuki Leslie 716, 723	see dealer	rotating speaker cabinet   2 channels, 60W   160 lbs.
Hammond/Suzuki Leslie 750	see dealer	rotating speaker cabinet   3 channels, 100W   160 lbs.
Hammond/Suzuki Leslie 771	see dealer	rotating speaker cabinet   biamped horn and drum channels   149 lbs.
Hammond/Suzuki Leslie 912, 914	see dealer	rotating speaker cabinet   3 channels, oak (912) or walnut finish (914)   160 lbs.
Hughes & Kettner Tube Rotosphere	\$499	floor pedal simulator   vacuum tube   3 lbs.
Mesa/Boogie Revolver II	\$1,599	rotating speaker cabinet   one 12" speaker, 8 ohms   78 lbs.
Motion Sound KBR-M	\$1,129	rotating speaker cabinet   3 channels, rotary channel 12AX7 tube overdrive, 12" driver and 4X4 dynamic horn, 130W RMS full range, 40W RMS rotary horn   58 lbs.
Motion Sound Low-Pro LP-120	\$949	rotating speaker cabinet   All functions and speeds controlled by PRO-3T via 5-pin DIN cable, 12" 150W speaker, 130W power amp   58 lbs.
Motion Sound Pro-3T	\$799	rotating speaker cabinet   1 channel, 45W >800Hz to horn driver, stereo low rotor simulator   27 lbs.
Motion Sound R3-147	\$1,199	rackmount rotating speaker   2 channels, 4 mics on horn with mix control, enhanced stereo low rotor simulator, 12AX7 tube pre-post-gain, MIDI control   24 lbs.
Motion Sound SR-112	\$579	rotating speaker cabinet   150W 12" guitar speaker, adjustable fast, slow, or stop, and acceleration controls, powered by external amplifier   35 lbs.
Rocktron Multivalve	\$959	rackmount simulator   2 channels, 12AX7, effects processor   —
Songworks Little Lanilei Rotary Wave	\$549	rotating speaker cabinet   60W, 8 ohm speaker   18 lbs.
Voce Spin II	\$525	floor pedal simulator   MIDI controllable   3 lbs.



Roland VK-77

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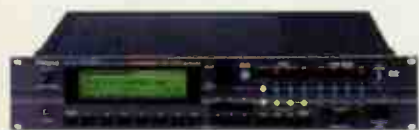
www.sweetwater.com  
(800) 222-4700

## Keyboard Combo Amps

MODEL	MSRP	# CHANNELS   SPEAKERS   POWER   WEIGHT
Barbetta Sona 31c Pro Combo	\$849	5 ch.   2 X 8" woofers, 5" tweeter   175W   34 lbs.
Barbetta Sona 32C Pro Combo	\$849	5 ch.   15" woofer, 4 X 10" horn tweeter   200W   41 lbs.
Barbetta Sona 41c Pro Combo	\$1,099	5 ch.   2 X 10", 5" tweeter   200W   44 lbs.
Fender SFX Keyboard 200	\$999.99	2 ch.   12", 10", & piezo horn   80W/channel, 160W RMS   82 lbs.
Fender SFX Satellite	\$749.99	1 ch.   12"   80W   55 lbs.
JBL EON 15PAK	\$899	3 ch.   15" differential drive woofer, 2" compression driver   130W low, 50W high   47 lbs.
Motion Sound KBR-3D	\$1,599	22 ch.   2 X 10", 2 X 4 X 4 dynamic horns, 1 pro-3T rotating horn   100W/100W/45W, 800Hz to rotary horn   65 lbs.
Motion Sound KBR-M	\$1,129	2 ch.   12", 1 X 4X4 horn for full-range channels, 1 PD-40 horn driver for rotary horn   130W RMS on full range, 45W for rotary horn   58 lbs.
Music Industries Prime KB-15	\$119.95	2 ch.   1 X 8"   15W   15 lbs.
Music Industries Prime KB-30	\$199.95	2 ch.   10" full-range   30W RMS   20 lbs.
Peavey Envoy 110	\$269.99	2 ch.   10"   40W   23 lbs.
Peavey KB/A 100	\$449.99	3 ch.   15" speaker, piezo horn tweeter   75W   57 lbs.
Peavey KB/A 15	\$125.99	2 ch.   8" full-range speaker   50W   15 lbs.
Peavey KB/A 30	\$349.99	4 ch.   10" coax speaker   40W low, 10W high   34 lbs.
Peavey KB/A 300	\$739.99	3 ch.   15" Scorpion w/compression driver for highs   150W   86.6 lbs.
Peavey KB/A 60	\$399.99	2 ch.   12" coax speaker   50W   46.5 lbs.
Peavey StudioPro 112	\$349.99	2 ch.   12"   65W   32.6 lbs.
Roland DB-500 D-Bass Amplifier	\$999	1 ch.   12", HF horn tweeter   160W RMS   52 lbs.
Roland JC-120 Jazz Chorus	\$1,099	2 ch.   2 X 12"   120W (60W X 60W stereo)   61 lbs., 12oz.
Roland JC-90 Jazz Chorus	\$799	1 ch.   2 X 10"   80W RMS (40W X 40W stereo)   42 lbs.
Roland KC-100	\$449	4 ch.   12" woofer and tweeter   60W   31 lbs. 15 oz.
Roland KC-300	\$599	4 ch.   12" woofer and horn driver   100W   38 lbs., 10 oz.
Roland KC-500 K	\$799	4 ch.   15" woofer and horn driver   150W   69 lbs., 8 oz.
Samson 5D8	\$759.99	8 ch.   —   —   34.8 lbs.
Yorkville 100K	\$579	3 ch.   12" woofer, horn tweeter   100W   49 lbs.
Yorkville 200K	\$699	4 ch.   15" woofer, horn tweeter.   200W   65 lbs.
Yorkville 300K	\$1,149	3 ch.   10" woofer, horn tweeter.   190W per channel at 4 ohms   75 lbs.
Yorkville 50K	\$369	2 ch.   10" woofer, tweeter   50W   35 lbs.
Zeta AE-12 Educator Amplifier	\$395	2 ch.   1 X 12" and horn   40W   37 lbs.



Samson KM200 Keyboard Amplifier



Roland XV-5080



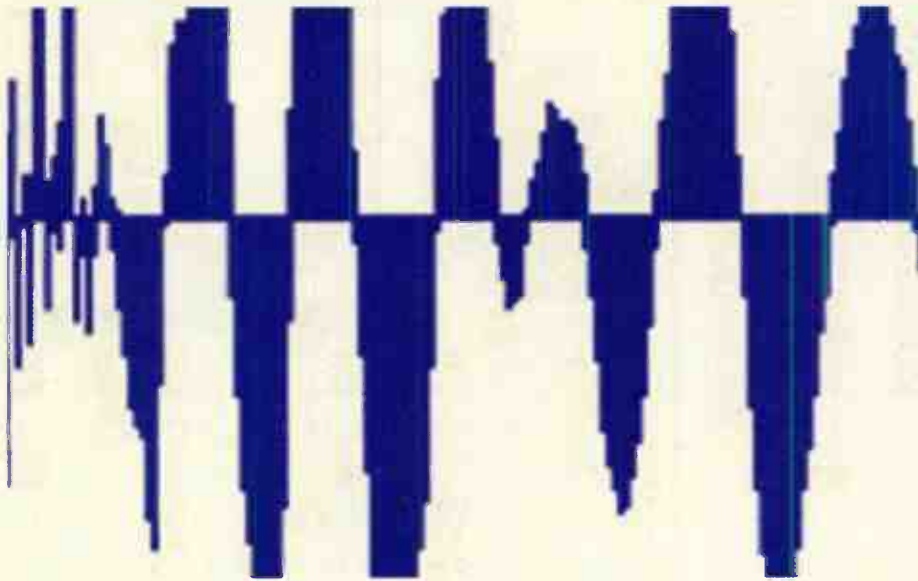
Technics SX-KN6000



Korg SP-100



# SOUNDWARE



**S**o you've got a bright, shiny new sampler in your studio. Or maybe you've got a new synth that supports new patches or samples. Or maybe you've got one of those cool new computer programs that lets you create cutting edge music using loops. Whichever of these situations you find yourself in, you're going to need one thing: New sounds to feed to your gear.

Fortunately, soundware manufacturers are way ahead of you; there are literally thousands and thousands of new sounds available, in formats that support an incredible range of synths and samplers, offer direct support for computer programs, or can be loaded directly into digital audio software as audio files.

To make it easy to find the sounds you want and need, we've broken down the *Music Technology Buyer's Guide* Soundware section into several sub-sections. First up are products that provide orchestral samples; here you'll find everything from CDs spotlighting one particular orchestral instrument to complete libraries that cover the entire orchestra.

"Synth and Keyboard Samples" covers products that let you load the sounds of various keyboards into your sampler or audio program: You'll find vintage analog synths, electric pianos, B3 organs, acoustic

pianos, Mellotrons, and much more.

"Instrumental and Vocal Collections" is a broad-ranging section. Here you'll find collections of samples that cover wide music production needs. You'll find all-guitar, all-bass, and all-vocal discs. Discs by particular drummers or percussionists that cover a wide range of styles are also found here, and they may contain single hits, loops, or a combination of the two.

The discs in "Style and Genre Sample Collections" are all-inclusive products that aim to provide you with all the parts you'll need to create tracks in a specific style of music: drum loops and instrumental parts for funk, rock, techno, dance styles, hip-hop, new age, jazz, and more. In short, you'll find all kinds of looped, phrase, multsampled, or single-hit material for use in a particular type of music.

In the "Ambient, FX, & Sound Design" category we've grouped together all of those sounds don't really fall under any traditional instrument label — largely because they've been processed, deranged, and distorted beyond recognition. Textures, washes, loops, creative noise explorations, sound effects for film — you'll find the weird, wonderful, and wild here.

The last Soundware subsection is "Synth Patches and Sampler Disks." Under this heading you'll find model-specific synthesizer

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Ambient, FX, & Sound Design	43
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<b>Drum Loop Basics</b>	
by Craig Anderton	32

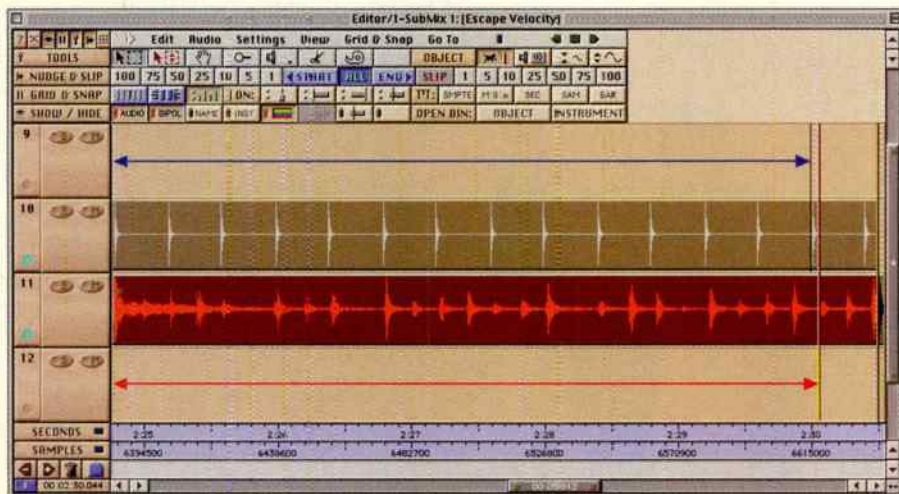
patches and sounds on floppy disks for older samplers. New programs for the latest synths, vintage pre-MIDI synths, as well as those old 12-bit samplers are listed. If you're looking to give you synth a "sound-lift," this is the place to look.

— Mitch Gallagher

## Orchestral Sample CDs

<b>BIG FISH</b>	
<b>East Collexion Orchestra</b>	<b>Ak</b>
MSRP \$99.95	
<b>East Collexion Strings</b>	<b>Ak</b>
MSRP \$99.95	
<b>Orchestral Strings</b>	<b>R</b>
MSRP \$199.95	
<b>The Orchestra Gold Edition</b>	<b>● SF</b>
MSRP \$39.95	
<b>The Orchestral Collection</b>	<b>Ak K SC Y</b>
MSRP \$299.95	
<b>E M U / ENSONIQ</b>	
<b>Peter Siedlaczek's Advanced Orchestra</b>	<b>Em</b>
MSRP \$999 QTY 6	
<b>EASTWEST</b>	
<b>Advanced Orchestra</b>	<b>✓ Ak Em G R</b>
MSRP \$495 CD; \$995 CD-ROM QTY 5 (6 E-mu)	
<b>Advanced Orchestra Brass &amp; FX</b>	<b>Ak</b>
MSRP \$249.95 QTY 1	
<b>Advanced Orchestra Compact Edition</b>	<b>Y</b>
MSRP \$149.95	
<b>Advanced Orchestra Compact Edition</b>	<b>Ak</b>
MSRP \$149.95 QTY 1	
<b>Advanced Orchestra Compact Edition</b>	
MSRP \$149.95 Emagic EXS24 QTY 1	
<b>Advanced Orchestra Compact Edition</b>	
MSRP \$149.95 Pulsar QTY 1	
<b>Advanced Orchestra Percussion, Harp</b>	<b>Ak Em G R</b>
MSRP \$249.95 QTY 1	
<b>Advanced Orchestra Solo Strings</b>	<b>Ak</b>
MSRP \$249.95 QTY 1	
<b>Advanced Orchestra String Ensembles</b>	<b>Ak</b>
MSRP \$249.95 QTY 1	
<b>Advanced Orchestra Strings</b>	<b>G</b>
MSRP \$299.95 QTY 2	
<b>Advanced Orchestra Upgrade</b>	<b>Ak</b>
MSRP \$399.95 QTY 3	
<b>Advanced Orchestra Woodwinds</b>	<b>Ak</b>
MSRP \$249.95 QTY 1	

**Sample CD formats:** ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



**Fig. 1.** The blue line shows the duration of 13 beats on the click track; the red line shows the same number of beats for the CD's drum part. With PARIS (the program shown in this screen shot), placing the red-and-yellow cursor at a specific location provides a time readout in the lower left-hand corner. Calculating the difference between readings for the beginning and end of a region provides the overall duration. In this example, the click track is 148 BPM and the CD drum part is 146 BPM.

## Turning Drum Loops into Drum Parts

by CRAIG ANDERTON

On a recent recording project, one of the songs had been composed with drums in mind, but the tracks didn't include a drum part because the writer figured I could add one after the fact. Sounds simple if you have a hard disk recorder, right? Well, if you want to get the most out of sample CDs, heed these tips.

### GETTING STARTED

If there's even the slightest chance that drums will be added later, record any basic tracks while playing along with a click or repetitive drum machine pattern, which should be recorded in its own track. The click track will help keep the players in time while recording, but later on will also provide a visual reference against which you can line up drum hits to make sure they're in time with the tune.

You also need to decide what type of drum part you're going to add. This particular project was all-acoustic, so I needed the flow and realism of a human-generated and acoustically recorded drum part,

as opposed to using MIDI to drive drum module samples (which didn't "mesh" properly with the acoustic instruments). So instead of just doing a "tap tempo" operation to set sequencer timing, it was necessary to take the more complex approach of pulling recorded acoustic drum loops off sample CDs.

The CD that worked for me, Double Platinum Drums (distributed by Ilio), includes patterns, intros, and fills for each represented musical style, which makes it easy to assemble complete parts. Individual hits are also included, which is important for reasons we'll cover later.

When choosing drum loops, the primary issue is tempo-matching. The loop should come as close as possible to the song's tempo, because stretching or compressing the loop too much compromises sound quality. The song tempo was around 148 BPM; several rock styles on the CD were at 146 BPM, which was "in the ballpark."

To bring the loops into your project, do a digital transfer from CD player to computer, and simply record all the loops back-to-back on an individual track. You can then copy and paste from this track into the tune as needed. The transfer process is easy if your CD player has a digital out and the computer includes a digital in; however, several programs let you import ("rip") audio

- Orchestra** SC  
MSRP \$199.95 QTY 1
- Orchestral Colors** ✓ Ak Eq  
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1
- Orchestral Flavours** ✓  
MSRP \$29.95 QTY 1
- Scoring Tools** Ak GR  
MSRP \$199.95 QTY 1
- String Textures** ✓ ● ●  
MSRP \$29.95 audio/WAV/AIFF
- Symphonic Adventures** ✓ Ak GR  
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1
- The Love & Pop String Thing** ✓  
MSRP \$99.95 QTY 1
- Ultimate Strings** Ak GR  
MSRP \$399.95
- Woodwind and Brass** ✓ ● ●  
MSRP \$29.95

### ILIO

- Miroslav Vitous Classical Perc & Harp** Ak Em KR SC  
MSRP \$795
- Miroslav Vitous MINI Orchestral Library** Ak Em G KR SC U  
MSRP \$349
- Miroslav Vitous Orchestral Library** Ak Em G KR SC  
MSRP \$3,899 QTY 5
- Miroslav Vitous Solo Instruments I** Ak Em G KR SC  
MSRP \$795 QTY 1
- Miroslav Vitous Solo Instruments II** Ak Em G KR SC  
MSRP \$795 QTY 1
- Miroslav Vitous String Ensembles** Ak Em G KR SC  
MSRP \$1,595
- Miroslav Vitous Violin Ensembles** Ak SC  
MSRP \$349
- Miroslav Vitous Woodwinds & Brass** Ak Em G KR SC  
MSRP \$795
- Propeller Island Cathedral Organ** ✓ Ak Em K  
MSRP \$99 CD, \$249 CD-ROM QTY 1
- Sonic Reality: Interactive String Section** Ak Em K SC U  
MSRP \$299 QTY 1
- Synclavier Library Brass and Winds** Ak Em K  
MSRP \$249 QTY 1
- Synclavier Library Strings** Ak Em KR SC  
MSRP \$249 QTY 1
- Synclavier Orchestral audio CD** ✓  
MSRP \$99 QTY 1
- Virtuoso Series Strings by Kirk Hunter** Ak Em KR SC  
MSRP \$995 QTY Multi-disc set

### MASTERBITS

- Classical Instruments - Climax Collection** ✓  
MSRP \$49 QTY 1
- Online Orchestra, Sound Solution Vol. 6** ✓ ●  
MSRP \$39 QTY 1
- Orchestra Plus** ✓  
MSRP \$69 QTY 1
- Violins - Climax Collection, Vol. 5** ✓ Ak  
MSRP \$49 QTY one audio CD w/ AKAI backup data

### NORTHSTAR

- Symphonique** Em  
MSRP \$249 QTY 1

### Q UP ARTS

- Denny Jaeger Master Violin Library** Ak Em Eq  
MSRP \$999 Akai/E-mu; \$249 EPS-16, \$495 E-mu condensed disc QTY 3  
Akai/E-mu: 1 others
- Denny Jaeger Private Collection, Vol. 1** Ak Em KR SC  
MSRP \$249

### SAMPLEHEADS

- New York City Percussionworks** ✓ ● ● Ak Em GR SC SF U Y  
MSRP \$99.95 audio CD set; \$249.95 CD-ROM set QTY 2

### SONIC SCIENCE

- Sonic Source Music for Multimedia** ● ●  
MSRP \$125 QTY 2
- Sonic Source Music Library** ✓  
MSRP \$795 QTY 10

**Sample CD formats:** ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



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# Soundware

Keyboard & Synthesizer Sample CDs

directly from audio CDs placed in the computer's CD-R (or sometimes even CD-ROM) drive. You can then export this file, and pull it into your hard disk recording program. If all else fails, there's always the old standby analog-out-to-analog-in transfer.

## A QUESTION OF TIMING

Now you have to match tempos. First, figure out the ratio between the song tempo and loop tempo. In the example above, the 146 BPM track had to be sped up to match the song's 148 BPM tempo. The formula is simple:

loop tempo / song tempo = ratio needed to change loop tempo

Plugging in the numbers (146/148) gives a ratio of 0.98486. If you're using a time-stretch algorithm, you would multiply the loop length by 0.98486 to shorten it to 148 BPM...at least, in theory. There's no guarantee that the click track recorded on the hard disk was at exactly the right tempo, or that the drum loops are perfectly calibrated. Even the slightest difference will cause the loop to drift out of sync, but there are ways to tighten the timing.

One helpful technique is to define the stretch/compress ratio as accurately as possible by not accepting tempo indications at face value, but by visually lining up the loop with the click track (see **Figure 1**). The peaks should be obvious enough that you can tell whether the loop is faster (peaks closer together than the click) or slower (peaks further apart). Measure the time between an equal number of beats for the CD track and the click track, then get out the calculator. Divide the measured loop length by the measured click length to derive the ratio.

## WHICH STRETCH METHOD?

There are many ways to change the length of a digital audio signal. Time compression/expansion algorithms have a difficult task to accomplish, especially with stereo loops. A standard pitch shift function that doesn't compensate for duration (in other words, when you shift pitch up, the file becomes shorter; shift pitch down,

### SWEETWATER

Classical Instruments **K**  
MSRP \$329 QTY 1

### SYNTEC

Wall of Sounds, Vol. 6 Super Strings **Em**  
MSRP \$275

## Keyboard & Synthesizer Sample CDs

### BIG FISH

Acoustic Pianos Vol. 1 **Ak**  
MSRP \$299.95 QTY 2, 1 for \$1000, 1 for \$5/6000

Analog Keyboard Bass **✓**  
MSRP \$79.95

Analog Analog Grooves **✓ ● Ac**  
MSRP \$79.95 audio, \$99.95 CD-ROM

Classic Keyboards and Vintage Synths **✓ Ak**  
MSRP \$99.95 audio CD, \$199.95 CD-ROM

Discovery Keyboards **K**  
MSRP \$199.95 CD-ROM

DX7 **Ak K**  
MSRP \$99.95

East Collection Piano **Ak**  
MSRP \$99.95

East Collection Vintage 1: Sustain **Ak**  
MSRP \$99.95

East Collection Vintage 2: Decay **Ak**  
MSRP \$99.95

East Collection Vintage 3: Synth **Ak**  
MSRP \$99.95

First Call Vintage Keyboards **Ak SC Y**  
MSRP \$299.95

History of Analog **K**  
MSRP \$199.95

History of Korg **✓ Ak**  
MSRP \$79.95 audio CD, \$99.95 CD-ROM

History of Roland **✓ Ak**  
MSRP \$79.95 audio CD, \$99.95 CD-ROM

Pianos & Organs Gold Edition **● SF**  
MSRP \$39.95

Post Accordions **Ak G**  
MSRP \$99.95 QTY 2

Post Pristine Piano **Ak Em G**  
MSRP \$99.95 Akai, E-mu, \$199.95 GigaSampler

Producer Series Vol. 1 **K**  
MSRP \$199.95

Protonus Grand Piano **Ak Em KR**  
MSRP \$199.95

SoundScan 09: Old School Keyboards **✓ ● ● Ak**  
MSRP \$49.95 QTY 2

SoundScan 12: Analog & Synth Bass **✓ ● ● Ak**  
MSRP \$49.95 QTY 2

SoundScan 17: Acoustic Keyboards **✓ ● ● Ak**  
MSRP \$49.95

Synclavier FM **Ak SC**  
MSRP \$199.95

Synth City **Ak**  
MSRP \$99.95 QTY 2

Synth City 2 **Ak**  
MSRP \$99.95 QTY 2

Synthesizers Gold Edition **● SF**  
MSRP \$39.95

Vintage **Ak**  
MSRP \$99.95

### BOLDER SOUNDS

Bolder Pianos **Ak Em G K**  
MSRP \$129

Fortepianos **Ak Em G K**  
MSRP \$39.95 QTY 1



EastWest AMG Sample and Hold by Metal Dog

### COAKLEY, W. D.

Perfect Piano Series **Ak Em Eq KR SC**  
MSRP \$299

### DISCOVERY FIRM

DX7 CD-ROM **Ak Em Eq KR Y**  
MSRP \$79.95 QTY 1

History of Korg **Ak Em KR Y**  
MSRP \$79.95 QTY 1

History of Korg **✓**  
MSRP \$59.95 QTY 1

History of Roland **✓**  
MSRP \$59.95 QTY 1

History of Roland **Ak Em KR Y**  
MSRP \$79.95 QTY 1

Vintage CD-ROM **Ak Em Eq KR Y**  
MSRP \$79.95 QTY 1

### EASTWEST

Besonderer Giga-Piano **G**  
MSRP \$199.95

Elleog **Em**  
MSRP \$199.95 QTY 1

Rhodesattacks **✓**  
MSRP \$99.95

Steinway B Giga-Piano **G**  
MSRP \$199.95

Synth Bass Loops Creative Essentials **✓ ● ●**  
MSRP \$29.95

Synth Collector 1 **✓ Ak Em**  
MSRP \$99.95

Total Piano **Ak Em G**  
MSRP \$199.95 QTY 2

Ultimate Piano **Ak Em R**  
MSRP \$199.95 QTY 1

Vintage Keyboards **✓**  
MSRP \$29.95

### GREYTSOUNDS

Classic Keyboards & Vintage Synthesizers **✓ Ak Eq K**  
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1

Philip Wolfe's Rock Keyboards **Ak Em Eq K P SC**  
MSRP \$199.95 QTY 1

The Patrick Moraz Private Collection **Ak K**  
MSRP \$199.95 QTY 1

### ILIO

Analog Meltdown **Ak K**  
MSRP \$199

Double Platinum Rock Piano **Ak Em K SC**  
MSRP \$149 QTY 1

Miroslav Vitous Acoustic Piano **Ak Em G KR SC**  
MSRP \$349

Propeller Island Cathedral Organ **✓ Ak Em K**  
MSRP \$99 CD, \$249 CD-ROM QTY 1

Propeller Island The Legendary M400 **✓ Ak Em K**  
MSRP \$79 CD, \$149 CD-ROM includes audio QTY 1

Sonic Reality: Concert Grand Pianos **Ak Em K SC U**  
MSRP \$199 QTY 1

Sample CD formats: **✓** audio CD; **●** AIFF; **●** WAV; **Ac** Acid; **Ak** Akai; **Em** E-mu; **Eq** Ensoniq; **G** GigaSample; **K** Kurzweil; **M** MIDI; **Mx** Mixman; **P** Peavey; **R** Roland; **SC** SampleCell; **SF** SoundFont; **U** Bitheadz Unity DS-1; **Y** Yamaha.



and it lengthens) often has better fidelity. Also, the ratio required to shift is the same — except that we're applying it to frequency instead of time.

Another excellent option is Steinberg's ReCycle, which allows stretching a sound with minimal sonic artifacts, although you now need to incorporate a MIDI sampler and sequencer into the act. Yet another option is to load the drum loop into Sonic Foundry's ACID, change the tempo as required, and use ACID's output as the basis of creating a file you can import into your hard disk editing program. Either of these programs will give better results than standard pitch-shift algorithms because of the way they use a drum sound's percussive transient to intelligently shorten or lengthen the file.

In any event, once you decide which method to use, apply it to the entire track or file of loops and fills so they'll all be ready to go.

<b>Sonic Reality: Vintage Timetraveler</b>	Ak Em Eq K SC U
MSRP \$199 QTY 1	
<b>MASTERBITS</b>	
<b>Analog Age, Sound Solution Vol. 8</b>	●
MSRP \$39 QTY 1	
<b>B-3 Organ - Climax Collection, Vol.8</b>	✓ Ak
MSRP \$39 QTY 1	
<b>DX Classics, Vintage Series Vol.1</b>	✓
MSRP \$29 QTY 1	
<b>Inspiration Zone, Sampling Collection 1200</b>	✓
MSRP \$49 QTY 1	
<b>Mello Zone</b>	✓ ●
MSRP \$59 QTY 2	
<b>Sample Zone, Sampling Collection 1100</b>	✓ Ak
MSRP \$49 QTY 1	
<b>Sampling Collection 1000</b>	✓
MSRP \$39 QTY 1	
<b>Sampling Collection 500</b>	✓
MSRP \$19 QTY 1	
<b>Sampling Collection 700</b>	✓
MSRP \$39 QTY 1	
<b>Sampling Collection 800</b>	✓
MSRP \$29 QTY 1	
<b>Sampling Collection 900</b>	✓
MSRP \$39 QTY 1	
<b>Total Zone</b>	Ak Em Eq
MSRP \$129 QTY 1	
<b>Vintage Voltage I</b>	Ak Em Eq K R
MSRP \$69 QTY 1	
<b>Vintage Voltage II</b>	Ak Em Eq K R
MSRP \$69 QTY 1	
<b>Virtual Zone I, Sampling Collection 1300</b>	✓ Ak
MSRP \$59 QTY 1	
<b>NORTHSTAR</b>	
<b>Grand Gold Pianos</b>	Em
MSRP \$249 QTY 1	
<b>PRO-REC</b>	
<b>State of the Art Prophecy CD-ROM</b>	Ak
MSRP \$99; \$149 for 2 QTY 1	
<b>State of the Art Synths CD-ROM</b>	Ak K
MSRP \$99; \$149 for 2 QTY 1	

## CONSTRUCTION TIME

Next, piece together the part using the various available phrases. Here are a few tips:

- Use loops that don't include ambience. Dry sounds glide more easily into each other, and adding a bit of reverb afterward can smooth over any rough transitions.
- Line up the loop downbeat to the click track downbeat. If necessary, cut the loop into smaller pieces, and "nudge" the timing ever-so-slightly for each piece to line them up properly with the click.
- Place the fills and main patterns on different tracks if possible. There will often be overlaps between hits on the two files (e.g., the intro ends on the downbeat with a cymbal crash, whereas the pattern it leads into starts with a kick without a cymbal crash), and it helps to be able to change the two levels independently.

<b>SynthSonic</b>	Ak K
MSRP \$99; \$149 for 2 QTY 1	
<b>Ultimate CD CD-ROM for Akai</b>	Ak
MSRP \$99; \$149 for 2 QTY 1	
<b>Ultimate CD CD-ROM for K2000</b>	K
MSRP \$99; \$149 for 2 QTY 1	
<b>Ultimate CD-ROM for ASR-10</b>	Eq
MSRP \$99; \$149 for 2 QTY 1	
<b>Q UP ARTS</b>	
<b>The Holy Grail Piano</b>	Ak Em R
MSRP \$499	
<b>ROLAND</b>	
<b>L-CDX-02 Keyboard Instruments</b>	R
MSRP \$199	
<b>SWEETWATER</b>	
<b>Grand Piano Collection</b>	K
MSRP \$329 QTY 1	
<b>Triple Strike Stereo Grand Piano</b>	Y
MSRP \$79.95 QTY 1	
<b>Young Chang Stereo Grand</b>	K
MSRP \$99	
<b>SYNTEC</b>	
<b>Wall of Sounds, Vol. 5 Oberheim Matrix 12</b>	Em
MSRP \$110	
<b>Wall of Sounds Vol. 7 World of FM</b>	Em
MSRP \$110	
<b>Instrumental and Vocal Sample CD Collections</b>	
<b>ANALOGUE SOLUTIONS</b>	
<b>Sounds of Old</b>	✓
MSRP \$49 QTY 1	

- Add individual drum hits to add variety. For example, it's common to have a crash cymbal come in from time to time, but these often aren't included with main patterns because you don't want a crash cymbal to loop every time. Throwing in the occasional off-beat high-hat, or extra snare backbeat, can add much variety (place the individual hits on the track containing the fills).

## CLOSING DOWN

Once you've cut, copied, and pasted the various pieces to make a coherent drum part, don't forget to work the drum faders during mixdown. For example, boost the faders rhythmically to emphasize beat 1 (or maybe the backbeat on 2 and 4), or bring up a fill to make it more prominent. Play with the part dynamically, and the end results will be far more life-like.

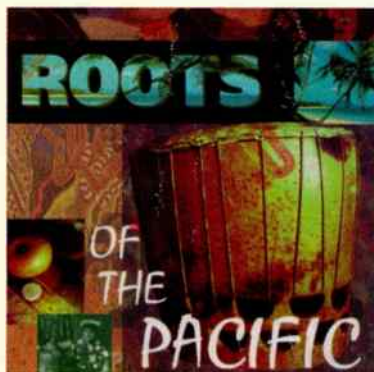
<b>BIG FISH</b>	
<b>Black II Black Killer Vocals, Vols. 1-3</b>	✓
MSRP \$89.95 ea. QTY 2	
<b>Bruce Gary's Drum Vocabulary</b>	✓
MSRP \$79.95	
<b>Church Organs</b>	Ak
MSRP \$299.95 QTY 2	
<b>Dave Samuels - Marimba &amp; Vibes</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$149.95 CD-ROM	
<b>Didgeridoo and Other Primitive Instruments</b>	✓ Ak K SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>Discovery Guitar</b>	✓ K
MSRP \$199.95 CD-ROM, \$79.95 ea. audio CD QTY 1 CD-ROM, 3 audio CDs	
<b>East Collection Bass</b>	Ak
MSRP \$99.95	
<b>East Collection Drum, Vol. 1 Dry</b>	Ak
MSRP \$99.95	
<b>East Collection Drum, Vol. 2 Wet</b>	Ak
MSRP \$99.95	
<b>East Collection Drum, Vol.3 Dance</b>	Ak
MSRP \$99.95	
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MSRP \$99.95	
<b>East Collection Horn &amp; Brass</b>	Ak
MSRP \$99.95	
<b>East Collection Percussion</b>	Ak
MSRP \$99.95	
<b>From East Europe</b>	✓
MSRP \$79.95	
<b>Groove Activator - Gota Yashiki</b>	✓ Ak
MSRP \$89.95 audio CD, \$179.95 CD-ROM	
<b>Guitar: Clean, Comp. Chorus, Wah Wah</b>	✓ K
MSRP \$79.95 ea. audio CD; \$199.95 CD-ROM	
<b>Guitar Expressions</b>	✓ Ak Em K
MSRP \$99.95 audio, \$299.95 CD-ROM QTY 2	
<b>Guitarras Atomicas</b>	✓
MSRP \$89.95 QTY 1	
<b>Mediterranean Instruments</b>	Ak
MSRP \$299.95 QTY 2	
<b>NYC Drumworks</b>	✓ Ak Em G R SC
MSRP \$99.95 audio CD; \$249.95 CD-ROM QTY 2	
<b>NYC Percussionworks</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$249.95 CD-ROM QTY 2	

**Sample CD formats:** ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.

# Soundware

Instrumental and Vocal Sample CD Collections

<b>Performance Loops: Drums Vol. 1</b>	✓ ● Ac
MSRP \$99.95 audio CD, \$99.95 CD-ROM QTY 2	
<b>Peter Erskine - Living Drums!</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$149.95 CD-ROM	
<b>Phil Gould on Drums</b>	✓ ● ●
MSRP \$89.95 audio/WAV/AIFF QTY 2	
<b>Pocket Syndrome Vol. 1 - Funk Guitar</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$149.95 CD-ROM	
<b>Pocket Syndrome Vol. 2 - Rock Guitar</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$149.95 CD-ROM	
<b>R.A.D.S. Pocket Fuel</b>	●
MSRP \$99.95 WAV/SoundDesigner II QTY 3	
<b>Sound Palette Drums</b>	✓ ● ●
MSRP \$29.95	
<b>SoundFont Toolbox</b>	● SF
MSRP \$69.95	
<b>SoundScan 04: Electric &amp; Acoustic Guitar Loops</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 06: Electric &amp; Acoustic Bass</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 07: Crazy Processed Drumloops</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 10: Acoustic Drums</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 15: Acoustic Percussions</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 18: Funky Vocals</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 22: Vintage Blues Guitars</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 25: Big Beat Drumloops</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 30: Electric Bass Grooves</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>Steamin' - Tony Mason</b>	✓
MSRP \$89.95	
<b>TB-303</b>	✓ K
MSRP \$79.95 audio CD, \$199.95 CD-ROM	
<b>The Beat Machine</b>	✓ Ak
MSRP \$99.95 audio/CD-ROM QTY 2	
<b>The Drum Doctor Does Drums</b>	✓ Ak Em K SC
MSRP \$79.95 audio CD, \$199.95 CD-ROM	
<b>The Drum Doctor's Drums 2</b>	✓ Ak G K SC
MSRP \$79.95 audio CD, \$199.95 CD-ROM	
<b>The Global SoundScan</b>	Ak
MSRP \$99.95 Akai CD-ROM	
<b>The Progression - Miles Bould</b>	✓ ● ●
MSRP \$99.95 audio/WAV/AIFF QTY 2	
<b>The Rhythm Guitar Project</b>	SC
MSRP \$299.95 QTY 2	
<b>The Treasure Chest</b>	✓
MSRP \$99.95	
<b>The Will Lee Bass Library</b>	✓ Ak Em G R SC
MSRP \$99.95 audio, \$149.95 CD-ROM	
<b>Top Secret Guitars</b>	✓
MSRP \$99.95	
<b>TR-808</b>	✓ K
MSRP \$79.95 audio CD, \$199.95 CD-ROM	
<b>TR-808/TR-909</b>	✓ K
MSRP \$199.95 CD-ROM, \$79.95 audio CD	



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Q Up Arts The Holy Grail Grand Piano

<b>TR-909</b>	✓ K
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<b>Wave Kit</b>	●
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<b>Eclectic</b>	Ak K
MSRP \$129 QTY 1	

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<b>TB-303 Sampling CD</b>	✓
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<b>TR-808 Sampling CD</b>	✓
MSRP \$89.95 QTY 1	
<b>TR-909 Sampling CD</b>	✓
MSRP \$59.95 QTY 1	
<b>Vintage Rhythm</b>	✓
MSRP \$39.95 QTY 1	

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<b>Custom banks for MPC2000</b>	Ak
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<b>Emulator Classic I &amp; II Series</b>	Em
MSRP \$95 ea. QTY 20 discs available	
<b>EOS Producer Series, Vo. 1-51</b>	Em
MSRP \$149 each QTY 1	
<b>ModuleMania Series</b>	SF
MSRP \$29 each, \$99 for 5 QTY 1	

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<b>Bernard Purdie Turbo Edition</b>	✓ Mi
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<b>Bob Clearmountain Drums 1</b>	✓ Ak Em
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Bob Clearmountain Drums 2</b>	✓ Ak G
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Bob Clearmountain Percussion/Bass</b>	✓ Ak Em
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Brass Elements Creative Essentials</b>	✓
MSRP \$29.95 audio/WAV/AIFF QTY 1	
<b>Brass Super Section</b>	✓ Mi
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Brit Horns</b>	✓
MSRP \$99.95 QTY 2	

<b>Chronic Horns</b>	✓
MSRP \$99.95 QTY 2	
<b>Classical Choir</b>	✓
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Crunchy Nut Drum Loops</b>	✓
MSRP \$99.95 QTY 1	
<b>Dance Drums Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Dave Ruffy's Drums</b>	✓
MSRP \$49.95	
<b>Dave Samuels Marimba &amp; Vibes</b>	Em
MSRP \$149.95	
<b>Deep Inside Tim Farris</b>	✓
MSRP \$99.95	
<b>Diamond Vocals</b>	✓
MSRP \$99.95 QTY 1	
<b>Drum &amp; Percussion Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Drumskills</b>	✓
MSRP \$99.95	
<b>Early Patches</b>	
MSRP Akai \$149.95, SoundFont \$89.95	
<b>Extended Classical Choir</b>	Ak G
MSRP \$249.95	
<b>Gajate-Garcia, Percussion Ensembles</b>	✓
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MSRP \$299.95	
<b>Gigapack 2 Roland</b>	R
MSRP \$299.95 QTY 2	
<b>Gigapack Kurzweil</b>	K
MSRP \$299.95 QTY 2	
<b>Gigapack Samplecell</b>	SC
MSRP \$299.95 QTY 3	
<b>Gota Yasuhiko Groove Activator</b>	✓
MSRP \$99.95 audio/ Akai \$199.95	
<b>Groove Masters Bass</b>	✓
MSRP \$99.95 QTY 1	
<b>Groove Masters Drums</b>	✓ G
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>Guitar Odyssey</b>	✓
MSRP \$99.95 QTY 1	
<b>Guitar Separates Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
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MSRP \$99.95 QTY 1	
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MSRP \$99.95 audio, \$199.95 Akai	
<b>Interface Guitar</b>	✓
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<b>Keith LeBlanc Kickin' Lunatic Beats Vol. 2</b>	✓
MSRP \$99.95	
<b>Killer Horns</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Killer Horns 2 Swing Out</b>	✓
MSRP \$99.95 QTY 1	
<b>Live Bass Grooves Creative Essentials</b>	✓
MSRP \$29.95 QTY 1	
<b>MIDI Cube</b>	Mi
MSRP \$49.95	
<b>MIDI Cube 2</b>	Mi
MSRP \$49.95	
<b>Neil Conti Funky Drums From Hell</b>	✓ R
MSRP \$49.95 audio, \$199.95 CD-ROM	
<b>On Drums Phil Gould</b>	✓
MSRP \$99.95 QTY 1	
<b>On The Beaten Track Steve White</b>	✓
MSRP \$99.95	
<b>Percussion Grooves</b>	✓
MSRP \$29.95 QTY 1	
<b>Percussion Wall Featuring Dick Gail</b>	✓
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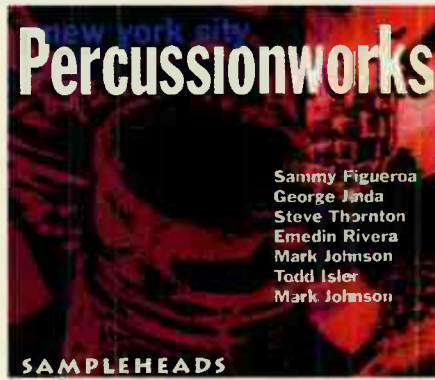
<b>Percussive Adventures</b>	✓
MSRP \$149.95 audio/\$399.95 CD-ROM	
<b>Phantom Horns</b>	✓ Ak
MSRP \$99.95 audio/\$199.95 CD-ROM	
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<b>Soundcube</b>	✓ ● Ak
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<b>Steve Stevens</b>	✓ Ak R SC
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<b>The Art of Sampling</b>	✓
MSRP \$99.95	
<b>The Drummers of Motown</b>	✓
MSRP \$99.95	
<b>The Progression Miles Bould</b>	✓
MSRP \$99.95	
<b>Upfront Lead Guitar Creative Essentials</b>	✓ ● ●
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<b>Vocal Pearls</b>	✓
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MSRP \$49.95	
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MSRP \$99.95 QTY 2	
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<b>MPC60/MPC2000/MPC3000</b>	Ak
MSRP \$10 per disk	
<b>Sound Source audio Sampling CD</b>	✓
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<b>Wolfe/Crozier Saxophones</b>	Ak Eq K
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MSRP \$99 CD, \$199 CD-ROM includes audio QTY 1	
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<b>Spectrasonics Hans Zimmer Guitars 2</b>	✓ Ak Em K R SC
MSRP \$99 audio CD, \$299 CD-ROM QTY 1	
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<b>Syndavler Essential audio CD</b>	✓
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George Janda  
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Eminin Rivera  
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MSRP \$187 QTY 1	
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MSRP \$187 QTY 1	

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<b>Baby Pink/808 909</b>	✓
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<b>Yellow Green/Ultimate Snare Collection</b>	✓
MSRP \$49 QTY 1	

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<b>Bass - Climax Collection, Vol. 7</b>	✓ Ak R
MSRP \$69 QTY 1	
<b>Binary Zone</b>	✓
MSRP \$69	
<b>Grooves - Climax Collection, Vol. 4</b>	✓
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<b>Guitars - Climax Collection, Vol. 3</b>	✓ Ak
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# Soundware

Instrumental and Vocal Sample CD Collections

<b>Hot Keys - Edition Series, Vol. 3</b>	✓ Ak Eq
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<b>MasterBeat Bundle</b>	●
MSRP \$69.95 QTY 2	
<b>MasterBeat Percussion Library</b>	●
MSRP \$39.95 QTY 1	
<b>Music Instinct - Edition Series, Vol. 3</b>	Ak Em K R
MSRP \$69 QTY 1	
<b>Saxophone - Climax Collection, Vol. 6</b>	✓ Ak
MSRP \$49 QTY 1	
<b>SonIQ Elements</b>	● Ak Eq
MSRP \$69 QTY 1	
<b>SonIQ Source</b>	Eq
MSRP \$129 QTY 1	
<b>Soundclips Vol. I</b>	●
MSRP \$49.95 QTY 10	
<b>Soundclips Vol. II</b>	●
MSRP \$49.95 QTY 10	
<b>Studio Selection, Sound Solution Vol. 2</b>	✓ ●
MSRP \$39 QTY 1	
<b>Terminator Plus, Sound Solution Vol. 7</b>	● Ak Eq
MSRP \$39 QTY 1	
<b>TRMinator</b>	● Ak Eq
MSRP \$69 QTY 1	
<b>Vocals II - Rapsody ClimaxCollection, Vol.9</b>	✓ Ak
MSRP \$69 QTY 1	
<b>Vocals III Add Lips - Climax Series, Vol. 10</b>	✓ ●
MSRP \$69 QTY 1	

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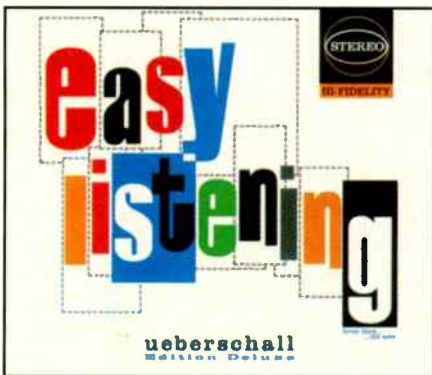
<b>Funky Ass Guitars</b>	✓
MSRP \$99 QTY 2	
<b>MPC Hip-Hop to R&amp;B waves</b>	✓ ● ●
MSRP \$49.95	
<b>Powerhouse</b>	Eq K
MSRP \$199	
<b>Vocal Bytes</b>	✓
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<b>Darwin Chamber</b>	●
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<b>Gloss</b>	✓ ● Mx
MSRP \$49.95 QTY 2	

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<b>Drumscapes 770</b>	R
MSRP \$249 QTY 1	
<b>Drumscapes EIII</b>	Em
MSRP \$249 QTY 1	
<b>Drumscapes, Vol. 1</b>	✓
MSRP \$89.95 QTY 1	
<b>Global Instruments 1</b>	R
MSRP \$149 QTY 1	
<b>Global Instruments 2</b>	R
MSRP \$149 QTY 1	
<b>Max 1</b>	Em
MSRP \$99 QTY 1	
<b>Max 2</b>	Em
MSRP \$99 QTY 1	



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<b>NewGold 1</b>	Ak
MSRP \$195 QTY 1	
<b>NewGold 2</b>	Ak
MSRP \$295 QTY 1	
<b>NewGold 3</b>	Ak
MSRP \$195 QTY 1	
<b>Phase 2</b>	Em
MSRP \$249, full version; \$99, lite QTY 1	
<b>Phase 3</b>	Em
MSRP \$249, full version; \$99, lite QTY 1	
<b>Phase 4</b>	Em
MSRP \$495 Full Version; \$199 Lite QTY 1	
<b>Phase 5</b>	Em
MSRP \$249, full version; \$99 lite QTY 1	
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MSRP \$199 QTY CD-ROM	
<b>SampleCell, Vol. 1</b>	SC
MSRP \$195 QTY 1	
<b>Son of Drumscapes, Vol. 2</b>	✓
MSRP \$89.95 QTY 1	
<b>Studio Acoustic Guitar</b>	Em
MSRP \$249, full version; \$99, lite QTY 1	
<b>Zdisk Vol. 1</b>	K
MSRP \$195 QTY 1	
<b>Zdisk Vol. 2</b>	K
MSRP \$195 QTY 1	

## PATCHMAN MUSIC

<b>Producer Series CD-ROM for SampleCell II</b>	SC
MSRP \$195	
<b>Studio Series CD-ROM for BitHeadz Unity DS-1</b>	U
MSRP \$195	

## PRO-REC

<b>Bits of Expressive Guitar</b>	Ak
MSRP \$99; \$149 for 2 QTY 1	
<b>Drums &amp; Percussion</b>	✓
MSRP \$29; \$49 for 2 QTY 1	
<b>Ecstatic Acid Bytes</b>	✓
MSRP \$29; \$49 for 2 QTY 1	
<b>Mega-Synth CD-ROM for K2000</b>	K
MSRP \$99; \$149 for 2 QTY 1	
<b>Mega-Synth CD-ROM for Mac SampleCell</b>	SC
MSRP \$99; \$129 for both QTY 1	
<b>State of the Art CD-ROM</b>	Em
MSRP \$149 QTY 1	
<b>State of the Art Natural CD-ROM</b>	Ak K
MSRP \$99; \$149 for 2 QTY 1	
<b>Synth Collections Sample Disk Sets</b>	● Ak Em Eq K P
MSRP \$69.90; \$129 for 3 QTY 7 or 8 floppies per title	
<b>Ultimate CD-ROM for Mac SampleCell</b>	SC
MSRP \$99; \$129 for both QTY 1	

## Q UP ARTS

<b>Drum Scores by Steve Gadd</b>	✓ ● Ac Ak
MSRP \$99 audio; \$199 CD-ROM; \$79 WAV QTY 2 audio, 1 CD-ROM	
<b>Heavy Guitars</b>	✓ Em
MSRP \$99 audio CD; \$149 CD-ROM	
<b>Jason Miles Psychic Horns</b>	Ak Em K
MSRP \$99	
<b>Johnny C's Vintage &amp; Custom Snares</b>	✓ Ak Em
MSRP \$99 audio CD; \$149 CD-ROM	
<b>The Heavy Hitters Greatest Hits</b>	✓ Ak Em K R SC
MSRP \$99 audio CD; \$149 CD-ROM	
<b>The World</b>	Ak K SC
MSRP \$149	

## ROLAND

<b>L-CDX-01 Rhythm Section Instruments</b>	R
MSRP \$199	
<b>L-CDX-03 Brass &amp; Woodwinds</b>	R
MSRP \$299 QTY 2	
<b>L-CDX-04</b>	R
MSRP \$299 QTY 2	



Big Fish Breakbeat 2

## SAMPLEHEADS

<b>Dave Samuels: Marimba &amp; Vibes</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD; \$149.95 CD-ROM QTY 1	
<b>Mark Walker: Latin Drums</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD; \$149.95 CD-ROM QTY 1	
<b>New York City Drumworks</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD set; \$249.95 CD-ROM set QTY 2	
<b>New York City Percussionworks</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD set; \$249.95 CD-ROM set QTY 2	
<b>Peter Erskine: Living Drums!</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 CD; \$149.95 CD-ROM QTY 1	
<b>Pocket Syndrome 1: Funk Guitar</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 CD; \$149.95 CD-ROM QTY 1	
<b>Pocket Syndrome 2: Rock Guitar</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD; \$149.95 CD-ROM QTY 1	
<b>Ultra Freakin' Bass: Will Lee 2</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 CD; \$149.95 CD-ROM QTY 1 CD-Rom; 2 audio	
<b>Will Lee Bass Library</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 CD; \$149.95 CD-ROM QTY 1	

## SONIC DESKTOP

<b>SmartSound Audio Palette CD-ROM Series</b>	● ●
MSRP \$69-\$129 QTY 16	

## SONIC IMPLANTS

<b>Drum Series 1</b>	Ak K SF
MSRP \$199.95	
<b>General MIDI Monstrosity</b>	✓ SF
MSRP \$149.95	
<b>Guitars &amp; Basses</b>	✓ SF
MSRP \$99.95	

## SONIC SCIENCE

<b>Sonic Source Music for Multimedia</b>	● ●
MSRP \$125 QTY 2	
<b>Sonic Source Music Library</b>	✓
MSRP \$795 QTY 10	

## SONOMIC

<b>Sonomic 1.0 Online Sounds</b>	● ●
MSRP Varying membership and one-time prices	

## SOUNDSACTIONS

<b>Drum Sample CD</b>	✓
MSRP \$49 QTY 1	
<b>Git-tar Licks!</b>	✓
MSRP \$79.95 QTY 1	
<b>Sample Bank CD-ROM</b>	● Eq K Y
MSRP \$69 QTY 1	
<b>Wave Pool CD-ROM</b>	●
MSRP \$49 QTY 1	

## SWEETWATER

<b>American Standard Collection</b>	K
MSRP \$329 QTY 1	
<b>E4 Premium Rhythm Section</b>	Em
MSRP \$129 QTY 1	
<b>E4 Value</b>	Em
MSRP \$199.99 QTY 1	
<b>Electron Bomb</b>	K
MSRP \$99 QTY 1	

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



# Soundware

Style and Genre Sample CD Collections



## EastWest PwerFX Systems Lo Fi and Illbient

<b>ESI Premium Rhythm Section CD</b>	Em
MSRP \$99.99 QTY 1	
<b>Exotic Instruments and Synths</b>	K
MSRP \$57 QTY 1	
<b>Performance Instruments</b>	✓ ● ● Ak Em Eq K P
MSRP \$119	
<b>RSI Sample Collection</b>	K
MSRP \$357 QTY 1	
<b>Sound Arsenal</b>	K
MSRP \$249 QTY 1	
<b>SweetBeats</b>	Ak Em Eq K P
MSRP \$33.95 QTY 1	
<b>Total Stereo Session Drums</b>	K
MSRP \$329 QTY 1	
<b>Ultimate Guitars</b>	K
MSRP \$329 QTY 1	

### SYNTEC

<b>Wall of Sounds, Vol. 1</b>	Eq
MSRP \$65	
<b>Wall of Sounds, Vol. 2</b>	Eq
MSRP \$60	
<b>Wall of Sounds, Vol. 3</b>	Em
MSRP \$190	
<b>Wall of Sounds, Vol. 4</b>	Em
MSRP \$110	

### TIME+SPACE

<b>Guitar Odyssey</b>	✓
MSRP \$99.95 QTY 1	
<b>Phantom Horns</b>	✓ Ak
MSRP \$89.95 CD, \$199.95 Akai	

### UBIQUITY

<b>Master Drummers: Mike Clark</b>	✓
MSRP \$15.98 QTY 1	

## Style and Genre Sample CD Collections

### BEATBOY DRUM SEQUENCES

<b>Richie Gajate-Garcia Percussion Ensembles</b>	✓
MSRP \$69.95	

### BIG FISH

<b>160dB The Drum 'n' Bass Interface</b>	✓
MSRP \$89.95	
<b>260dB The Drum 'n' Bass Interface</b>	✓
MSRP \$89.95	
<b>Advacatabla</b>	✓
MSRP \$89.95	

<b>Asian Traditions</b>	✓
MSRP \$99.95 QTY 2	
<b>Basicussions</b>	✓ Ak
MSRP \$99.95 QTY 2	
<b>Blackbeat 96th Street</b>	✓
MSRP \$99.95	
<b>BlackIIBlack</b>	✓
MSRP \$89.95	
<b>BlackIIBlack Bangin' Beatboxes</b>	✓
MSRP \$99.95 QTY 2	
<b>BlackIIBlack Vol. 2</b>	✓
MSRP \$89.95	
<b>BlackIIBlack Vol. 3</b>	✓
MSRP \$89.95 QTY 2	
<b>BlackIIBlack Vol. 3</b>	✓
MSRP \$89.95 QTY 2	
<b>BlackIIBlack Vol. 4</b>	✓
MSRP \$89.95 QTY 2	
<b>Breakbeat</b>	✓ Ac Ak SC
MSRP \$99.95; \$149.95 SampleCell CD-ROM	
<b>Breakbeat 2</b>	✓
MSRP \$99.95	
<b>Brotherhood</b>	✓
MSRP \$79.95	
<b>Carib'Bean Killers</b>	✓ Ak
MSRP \$129.95 QTY 2	
<b>Coldcut's Kleptomaniac!</b>	✓
MSRP \$99.95	
<b>Cur'n It Up</b>	✓
MSRP \$99.95 QTY 2	
<b>D-Day</b>	✓
MSRP \$99.95 QTY 2	
<b>Diffusion Series: Pop Diffusion</b>	✓ ●
MSRP \$49.95	
<b>Disc Jam!</b>	✓
MSRP \$49.95	
<b>Dope Headz</b>	✓ Ak
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>Drum Loops Vol. 1</b>	✓
MSRP \$79.95	
<b>Drum Loops Vol. 2</b>	✓
MSRP \$79.95	
<b>Loops Vol. 3</b>	✓
MSRP \$79.95	
<b>Drum 'n' Bass Carnage</b>	✓
MSRP \$89.95	
<b>Flamenco</b>	✓
MSRP \$89.95	
<b>Flamenco</b>	✓ Ak
MSRP \$299.95 QTY 2	
<b>Freaky Jazzy Funky</b>	✓
MSRP \$99.95 QTY 3	
<b>Full Phat</b>	✓
MSRP \$89.95	
<b>Funk Stew 2</b>	✓
MSRP \$99.95 QTY 2	



Discovery Firm The Legend of China

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.

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# Soundware

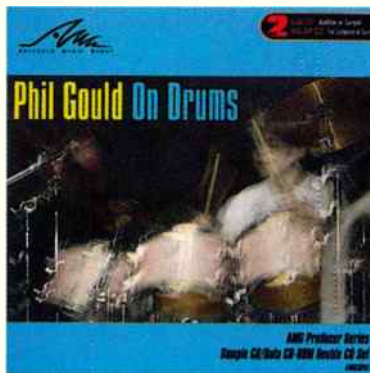
Instrumental and Vocal Sample CD Collections

<b>Greek Beats - From East Europe 2</b>	✓ ●
MSRP \$49.95	
<b>Greene Machine</b>	✓
MSRP \$79.95	
<b>Groove Dimensions</b>	✓ ●
MSRP \$99.95 audio CD, \$99.95 CD-ROM	
<b>Groove Master</b>	K
MSRP \$199.95	
<b>Heiter Skelter</b>	✓
MSRP \$99.95 QTY 1	
<b>Hip Hop Beats</b>	✓ K
MSRP \$49.95 audio CD, \$199.95 CD-ROM	
<b>Hip Hop Beats/Jazz, R&amp;B</b>	✓ K
MSRP \$199.95 CD-ROM, \$49.95 ea. audio CD	
<b>Jazz/R&amp;B</b>	✓ K
MSRP \$49.95 audio; \$199.95 CD-ROM	
<b>Jazzistic</b>	✓ Ak
MSRP \$129.95 audio; \$299.95 CD-ROM incl. audio QTY 2	
<b>Keith Le Blanc Kickin' Lunatic Beats Vol. 1</b>	✓
MSRP \$99.95	
<b>Keith Le Blanc Kickin' Lunatic Beats Vol. 2</b>	✓ Ak
MSRP \$89.95 audio; \$179.95 CD-ROM inc. Vol. 1	
<b>Kitch '70s</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>Komputer Inside</b>	✓
MSRP \$89.95	
<b>L.A. Riot 4</b>	✓
MSRP \$99.95 QTY 4	
<b>Leopoldious</b>	✓
MSRP \$99.95	
<b>Loopzilla</b>	✓
MSRP \$99.95 QTY 2	
<b>Loopzilla Funk Guitar and Bass</b>	✓
MSRP \$99.95 QTY 2	
<b>Loopzilla Underground</b>	✓ ● Ac
MSRP \$99.95 audio CD, \$99.95 CD-ROM	
<b>Loopzilla Vol. 2</b>	✓
MSRP \$99.95 QTY 2	
<b>Loopzilla Vol. 3</b>	✓
MSRP \$99.95 QTY 2	
<b>Mark Walker - Latin Drums</b>	✓ Ak Em G R SC
MSRP \$99.95 audio CD, \$149.95 CD-ROM	
<b>Megaton Bomb</b>	✓
MSRP \$99.95 QTY 2	
<b>Megaton House Bomb</b>	✓
MSRP \$99.95 QTY 2	
<b>Millennium Garage</b>	✓ ● ●
MSRP \$99.95 QTY 2	
<b>Modular Series - Big Beat &amp; Electro</b>	✓ ● MI
MSRP \$69.95 audio/WAV/MIDI QTY 2	
<b>Modular Series - Drum 'n' Bass</b>	✓ ● MI
MSRP \$69.95 audio/WAV/MIDI QTY 2	
<b>Modular Series - UK Garage</b>	✓ ● MI
MSRP \$69.95 audio/WAV/MIDI QTY 2	
<b>MPC 2000 Production Tools</b>	Ak
MSRP \$99.95	
<b>Music Bank</b>	✓ ● ● MI
MSRP \$79.95 audio or AIFF/WAV/MIDI	
<b>Neo Groove: Combo</b>	✓ K
MSRP \$199.95 CD-ROM, \$49.95 audio CD	
<b>Neo Groove: Jungle Techno</b>	✓ K
MSRP \$49.95 audio CD; \$199.95 CD-ROM	
<b>Neo Groove: Neo Break Beats</b>	✓ K
MSRP \$49.95 audio CD; \$199.95 CD-ROM	
<b>Neo Groove: Techno Trance</b>	✓ K
MSRP \$49.95 audio CD; \$199.95 CD-ROM	
<b>Neo Jungle</b>	✓ K
MSRP \$49.95 audio CD; \$199.95 CD-ROM	
<b>Off the Hook</b>	✓
MSRP \$99.95 QTY 2	
<b>Oriental Groove</b>	✓
MSRP \$79.95	
<b>Pascal Gabriel's Dance Samples</b>	✓
MSRP \$99.95	
<b>Percussion Slam</b>	Ak
MSRP \$199.95	
<b>Phatter Phunkier</b>	✓ Ak SC
MSRP \$99.95 audio; \$199.95 CD-ROM inc. audio QTY 3	



## F7 Sound and Vision Concept:FX2

<b>Prime Funk - Keith Le Blanc Vol. 3</b>	✓
MSRP \$89.95	
<b>Raricussions</b>	✓ Ak MI
MSRP \$99.95 QTY 2	
<b>Reggae Beats</b>	✓ K
MSRP \$49.95 audio CD, \$199.95 CD-ROM	
<b>REMIX! Vol. 2</b>	✓
MSRP \$99.95	
<b>Roots of India</b>	✓ Ak
MSRP \$99.95 audio; \$199.95 CD-ROM/audio	
<b>Roots of South America</b>	✓ Ak Y
MSRP \$99.95 audio; \$199.95 CD-ROM/audio	
<b>Roots of the Middle East &amp; North Africa</b>	✓ Ak
MSRP \$99.95 audio; \$199.95 CD-ROM/audio	
<b>Roots of the Pacific</b>	✓ Ak
MSRP \$99.95 audio; \$199.95 CD-ROM/audio	
<b>Ruff Cutz - Dave Ruffly</b>	✓
MSRP \$89.95	
<b>Salsa All Stars</b>	✓
MSRP \$99.95	
<b>Sample &amp; Hold</b>	✓
MSRP \$89.95	
<b>Siggi's Sugarloops</b>	✓
MSRP \$99.95	
<b>Skip to My Loops - Fat Boy Slim</b>	✓
MSRP \$44.95	
<b>Slam on the Breaks</b>	✓ ●
MSRP \$89.95 audio/WAV QTY 2	
<b>SloFunk</b>	✓ ●
MSRP \$99.95 audio/WAV QTY 2	
<b>Sound Palette Hip-Hop</b>	✓ ● ●
MSRP \$29.95	
<b>Sound Palette Techno</b>	✓ ● ●
MSRP \$29.95	
<b>SoundScan 01: Hard &amp; Loud Techno</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 02: Hip Hop Underground</b>	✓ ● ● Ak
MSRP \$49.95	
<b>SoundScan 03: Pure Electro</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 05: Explosive Jungle</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	



## EastWest AMG Phil Gould on Drums

<b>SoundScan 08: Jazz &amp; Latin Drumloops</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 11: Dance &amp; Groove Drums</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 16: Bossa Brazil</b>	✓ ● ● Ak
MSRP \$49.95	
<b>SoundScan 19: Hip Hop R&amp;B</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 21: Disco House Vol. 2</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 24: Industrial Loops</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 26: Big Beat Sample &amp; More</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 31: Miro's Hip Hop Grooves</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 32: Roots Disco</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 34: Burning Grunge Hip Hop</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>Strictly 12-inch</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Strictly Hip Hop</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Strictly House</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Strictly R&amp;B</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Techno Flesh &amp; Blood</b>	✓
MSRP \$79.95	
<b>Terminalhead</b>	✓
MSRP \$89.95	
<b>Terminalhead Vol. 2</b>	✓
MSRP \$89.95	
<b>The Beats, the Whole Beats, and Nothin' But the Beats</b>	✓
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<b>The LP Percussion Library, Afro-Brazilian</b>	✓
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<b>The LP Percussion Library, Afro-Caribbean</b>	✓
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MSRP \$99.95	
<b>Titanium Rhythms 2</b>	✓
MSRP \$99.95	
<b>Too Phat 2</b>	✓
MSRP \$89.95	
<b>Vince Clarke Lucky Bastard</b>	✓ ●
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<b>Vinylistics</b>	✓ ●
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<b>Vinylistics 2</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Vinylistics 3</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>Wall of Vinyl</b>	✓
MSRP \$99.95	
<b>Wall of Vinyl 2</b>	✓
MSRP \$99.95	
<b>Wall of Vinyl 3</b>	✓
MSRP \$99.95 QTY 2	
<b>West Coast Funk Stew</b>	✓
MSRP \$99.95 QTY 2	
<b>Whole Lotta Country</b>	✓ Ak Em G R SC
MSRP \$99.95 audio; \$249.95 CD-ROM QTY 2	
<b>World Groove</b>	✓ K
MSRP \$49.95 audio CD, \$199.95 CD-ROM	
<b>World Groove/Reggae Beats</b>	✓ K
MSRP \$199.95 CD-ROM, \$49.95 audio CD	
<b>X Files of Techno</b>	✓ ●
MSRP \$99.95 QTY 2	
<b>X-Files of Hip Hop</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	
<b>X-Files of Jungle</b>	✓ ●
MSRP \$99.95 audio/Tc/WAV QTY 2	

**Sample CD formats:** ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; MI MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



<b>X-Static Goldmine 1</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>X-Static Goldmine 2</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>X-Static Goldmine 3</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>X-Static Goldmine 4</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>X-Static Goldmine 5</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>XPerts of Techno</b>	✓ ● Ac
MSRP \$99.95 audio CD \$99.95 CD-ROM	
<b>XTFiles of House</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	
<b>XTortion</b>	✓ ●
MSRP \$99.95 audio/TC/WAV QTY 2	

### DISCOVERY FIRM

<b>Asian Hits/Hip-Hop</b>	✓
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<b>Asian Hits/Techno</b>	✓
MSRP \$19.95 QTY 1	
<b>Breakbeat Ammo/Drum 'n' Bass</b>	✓ R
MSRP \$24.95 QTY 1	
<b>Breakbeat Ammo/Hip-Hop</b>	✓ R
MSRP \$24.95 QTY 1	
<b>Hip-Hop Beats</b>	✓
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<b>Jazz, R&amp;B</b>	✓
MSRP \$19.95 QTY 1	
<b>Jungle Techno</b>	✓
MSRP \$19.95 QTY 1	
<b>Neo Break Beats</b>	✓
MSRP \$19.95 QTY 1	
<b>Neo Jungle</b>	✓
MSRP \$19.95 QTY 1	
<b>Oriental Groove</b>	✓
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<b>Reggae Beat</b>	✓
MSRP \$19.95 QTY 1	
<b>Techno Flesh &amp; Blood</b>	✓
MSRP \$19.95 QTY 1	
<b>Techno Trance</b>	✓
MSRP \$39.95 QTY 1	

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<b>Formula 4000 Series</b>	Em
MSRP \$79 each; \$295 for 5-disc Pentapack QTY 1 CD-ROM, 5 CD-ROMs in Pentapack	
<b>Spin Series</b>	✓
MSRP \$29.95 QTY 2	

### EASTWEST

<b>160dB The Drum 'n' Bass Interface</b>	✓
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<b>1ST Contact</b>	Ak
MSRP \$59.95 QTY 1	
<b>260dB The Drum 'n' Bass Interface</b>	✓
MSRP \$99.95 QTY 1	
<b>96th Street Blackbeat</b>	✓
MSRP \$59.95 QTY 1	
<b>Abracatabela</b>	✓ Ak
MSRP \$99.95 QTY 1	
<b>Abracatabela</b>	Ak
MSRP \$99.95	
<b>Action Cutz</b>	✓
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>Advanced Media Trax</b>	✓ Ak
MSRP \$199.95 QTY 5	
<b>Alibaba &amp; The 40 Ravers</b>	✓
MSRP \$99.95 QTY 2	
<b>Beats In The Hood</b>	✓
MSRP \$99.95 QTY 1	
<b>Beneath The Planet of The Breaks</b>	✓
MSRP \$99.95 QTY 1	
<b>Best of XX Large</b>	✓
MSRP \$99.95 QTY 2	
<b>Big Beat</b>	✓
MSRP \$99.95 QTY 1	



Sampleheads Mark Walker Latin Drums

<b>Bill Laswell DubTactic Manual</b>	✓
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<b>Black Beta</b>	✓
MSRP \$99.95 QTY 1	
<b>Black Butta 2</b>	✓
MSRP \$99.95 QTY 1	
<b>BlackIIBlack Bangin' Beatboxes</b>	✓
MSRP \$99.95	
<b>BlackIIBlack Killer Vocals Vol. 1</b>	✓
MSRP \$99.95 QTY 2	
<b>BlackIIBlack Killer Vocals Vol. 2</b>	✓
MSRP \$99.95 QTY 2	
<b>BlackIIBlack Killer Vocals Vol. 3</b>	✓
MSRP \$99.95 QTY 2	
<b>BlackIIBlack Volume 1</b>	✓
MSRP \$99.95 QTY 2	
<b>BlackIIBlack Volume 2</b>	✓
MSRP \$99.95	
<b>BlackIIBlack Volume 3</b>	✓
MSRP \$99.95	
<b>BlackIIBlack Volume 4</b>	✓
MSRP \$99.95	
<b>Blackbeat Freekee Jack Swing</b>	✓
MSRP \$99.95	
<b>Coldcut's Kleptomaniac</b>	✓
MSRP \$49.95 QTY 1	
<b>Complete Celt</b>	✓
MSRP \$99.95 QTY 3	
<b>da nu R&amp;B Hip Hop</b>	✓ Ac
MSRP \$99.95 audio + ACID \$49.95 QTY 2	
<b>Dance Industrial 1</b>	✓ Ak Em SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>Dance Industrial 2</b>	✓ Ak SC
MSRP \$199.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Dance Mega Add-On</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Mega Disco/House</b>	✓ ● ● Ak Em
MSRP \$99.95	
<b>Dance Mega Drums</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Mega Drums 2</b>	✓ Ak Em
MSRP \$99.95 QTY 2	



Sweetwater Session Drums

<b>Dance Mega Electric/House</b>	✓ ● ● Ak Em
MSRP \$99.95	
<b>Dance Mega Hip Hop 2</b>	✓ ● ● Ak Em
MSRP \$99.95	
<b>Dance Mega Hip-Hop/Electro</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Mega House/Dance</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Mega Jungle/Rave</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Mega Synth</b>	✓ Ak Em
MSRP \$99.95 QTY 2	
<b>Dance Vocals Creative Essentials</b>	✓
MSRP \$99.95 audio/WAV/AIFF	
<b>Deepest India</b>	✓
MSRP \$129.95 QTY 3	
<b>dh V2.0 Deep House</b>	✓ ●
MSRP \$99.95 QTY 2	
<b>Drum 'n' Bass Construction Kit</b>	✓
MSRP \$99.95 QTY 2	
<b>Drum 'n' Bass Elements</b>	●
MSRP \$39.95 QTY 1	
<b>Drum 'n' Bass Resonance</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>Easy Listening</b>	✓
MSRP \$99.95 QTY 1	
<b>Electronica</b>	✓
MSRP \$99.95 QTY 1	
<b>Electroshock</b>	✓ Ak
MSRP \$99.95 mixed-mode audio/CD-ROM	
<b>Electroshock 2</b>	✓ Ak
MSRP \$99.95 mixed-mode audio CD/CD-ROM	
<b>Ethnic 2</b>	✓
MSRP \$99.95	
<b>Ethnic Flavours Creative Essential</b>	✓
MSRP \$29.95	
<b>ExtremeRockFunkRage</b>	✓
MSRP \$99.95	
<b>Festa Latina Guitars &amp; Keyboards</b>	✓
MSRP \$99.95 QTY 2	
<b>Festa Latina Volume 3 Horn Sections</b>	✓
MSRP \$99.95 QTY 2	
<b>Flamenco Made In Spain</b>	✓
MSRP \$99.95	
<b>Flamenco Sounds</b>	✓
MSRP \$99.95 QTY 1	
<b>Freak Beats</b>	✓ ●
MSRP \$99.95 QTY 2	
<b>Fresh Killed Meat: Drum 'n' Bass Carnage</b>	✓
MSRP \$99.95	
<b>Fresh Killed Meat: Prime Funk</b>	✓
MSRP \$99.95 QTY 1	
<b>Full Phat</b>	✓
MSRP \$99.95 QTY 1	
<b>Funk Construction Creative Essentials</b>	✓
MSRP \$29.95 QTY 1	
<b>Funk Master John Jab'O Starks</b>	✓
MSRP \$99.95 QTY 1	
<b>Funky Ass Loops</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Funky Element</b>	✓ Ak SC
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Hip Hop Master</b>	✓ Ak
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>Hip Hop Raw Flava</b>	✓
MSRP \$99.95 QTY 1	
<b>Hip-hop &amp; Swing Breakdown</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Hot &amp; Sweaty House Cuts</b>	✓
MSRP \$99.95 QTY 1	
<b>House &amp; Garage Construction</b>	✓
MSRP \$29.95 QTY 1	
<b>Housemaster</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Housework!</b>	✓ Ac Ak
MSRP \$99.95 audio \$199.95 ROM	
<b>Ill Jointz</b>	✓
MSRP \$99.95	

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ak Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bithreadz Unity DS-1; Y Yamaha.

# Soundware

Instrumental and Vocal Sample CD Collections

<b>Independance</b>	✓
MSRP \$99.95 QTY 1	
<b>Interface Dance</b>	✓
MSRP \$99.95 QTY 1	
<b>Jam Box</b>	✓ ● Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Jungle Frenzy 2 Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Jungle Frenzy Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Jungle Warfare 2</b>	✓
MSRP \$99.95 QTY 1	
<b>Jungle Warfare 3</b>	✓
MSRP \$99.95 QTY 1	
<b>Kick'n Jazz</b>	✓
MSRP \$99.95 QTY 1	
<b>L.A. Riot 3</b>	✓ Ak R
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 2	
<b>Loop Soup</b>	✓ Ak
MSRP \$99.95 audio \$199.95, Akai	
<b>Loopmatic</b>	✓ Ak
MSRP \$99.95 QTY 1	
<b>Lost in Loops</b>	✓
MSRP \$99.95 QTY 3	
<b>Megabass Remix 1</b>	✓
MSRP \$49.95	
<b>Megabass Remix 2</b>	✓
MSRP \$99.95	
<b>MPC Expanded</b>	✓ Ak
MSRP \$79.95 QTY 1	
<b>MPC Loopstation</b>	Ak
MSRP \$79.95 QTY 1	
<b>N.Y. Cutz</b>	✓
MSRP \$99.95 QTY 2	
<b>Old School Flavour House Party</b>	✓
MSRP \$99.95 QTY 1	
<b>Old School Flavour Rare Groovin'</b>	✓
MSRP \$99.95 QTY 1	
<b>Old School Flavour Vintage Soul</b>	✓
MSRP \$99.95	
<b>Old School Flavours Super Funk</b>	✓
MSRP \$99.95 QTY 1	
<b>Oliver Lieb</b>	✓
MSRP \$99.95 QTY 1	
<b>Orient Odyssey</b>	✓
MSRP \$99.95 QTY 1	
<b>Overdub</b>	✓
MSRP \$99.95 QTY 1	
<b>Pascal Gabriel's Dance Samples</b>	✓
MSRP \$49.95	
<b>Pascal's Bongo Massive Most Wanted Beatz</b>	✓
MSRP \$99.95 QTY 2	
<b>Phat &amp; Phunty</b>	✓ Ak R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 2	
<b>Planet of The Breaks</b>	✓
MSRP \$99.95 QTY 1	
<b>Rave 'n' Dance Elements</b>	●
MSRP \$35 QTY 1	
<b>Real Megadrums 2</b>	Ak
MSRP \$99.95 QTY 2	
<b>Reggae Connection Creative Essentials</b>	✓
MSRP \$29.95	
<b>Reggae Drumsplash Sly Dunbar</b>	✓
MSRP \$99.95	
<b>Sample + Hold Metalog</b>	✓
MSRP \$99.95	
<b>Sequencer Works</b>	✓
MSRP \$99.95	
<b>Skip To My Loops</b>	✓
MSRP \$99.95	
<b>Slim On The Breaks</b>	✓ ● ●
MSRP \$99.95	
<b>Smooov Grooves</b>	✓ Ak R
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Soun' Bwoy Kritikal Massive</b>	✓
MSRP \$99.95	
<b>Spices Of India</b>	✓
MSRP \$29.95	

<b>Technophobia</b>	✓
MSRP \$99.95 QTY 1	
<b>Technotrance</b>	✓ ● ● Ak SC
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>Tekno/Industrial</b>	✓
MSRP \$99.95 QTY 1	
<b>Terminalhead Underfire Vol. 1</b>	✓
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>Terminalhead Underfire Vol 2</b>	✓
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>That Jungle Flavour 2</b>	✓
MSRP \$99.95	
<b>The Legend Of China</b>	✓
MSRP \$99.95	
<b>The Love &amp; Pop String Thing</b>	✓
MSRP \$99.95 QTY 1	
<b>The Vinyl Frontier</b>	✓
MSRP \$99.95	
<b>Tony Mason Smokin'</b>	✓ Ak
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>Tony Mason Steamin'</b>	✓
MSRP \$99.95	
<b>Too Phat 2</b>	✓
MSRP \$99.95	
<b>Total Drum 'n' Bass</b>	✓ ●
MSRP \$99.95 QTY 3	
<b>Total Funk</b>	✓ ●
MSRP \$99.95 QTY 3	
<b>Total Hip Hop</b>	✓
MSRP \$99.95	
<b>Total House</b>	✓ ●
MSRP \$99.95	
<b>Twisted City</b>	✓
MSRP \$99.95	
<b>Vince Clarke Lucky Bastard</b>	✓
MSRP \$99.95	
<b>Vindaloops</b>	✓
MSRP \$99.95 QTY 1	
<b>Voices of Africa</b>	✓ ● ●
MSRP \$29.95	
<b>Voodoo Grooves</b>	✓
MSRP \$99.95 QTY 1	
<b>World Class Breaks</b>	✓ ● ●
MSRP \$29.95	
<b>World Colors</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large</b>	✓ Ak SC
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>XX Large Analogue Dreams</b>	✓ Ak R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large Bass</b>	Ak Em
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>XX Large Extreme</b>	✓ R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large Extreme 2</b>	✓ R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large Extreme 3</b>	✓ R SC
MSRP \$99.95 audio, \$199.95 CD-ROM	
<b>XX Large Most Wanted</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large No Kick</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX Large Pads</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 2 audio, 1 CD-ROM	
<b>XX Large String Machines</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 2 audio, 1 CD-ROM	
<b>XX Large the Killer</b>	✓ Ak
MSRP \$99.95 CD, \$199.95 CD-ROM QTY 1	
<b>XX Large the Killer 2</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>XX-Large Extreme 4 House/Disco</b>	✓ Ak Em R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>XX-Large Extreme 5 Drum 'n' Bass</b>	✓ Ak Em
MSRP \$99.95 audio CD, \$199.95 CD-ROM	
<b>XX-Large Production Effects</b>	✓ Ak R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM	

## GREYTSOUNDS

<b>Audio Assassin</b>	✓
MSRP \$99.95 QTY 1	
<b>Killer Loops</b>	✓
MSRP \$99.95 QTY 1	
<b>Marco's Loop-d-Loops/John Wilmer's Live Loops</b>	✓
MSRP \$99.95 QTY 1	

## ILIO

<b>Digital Boy - Modern Synths and Dance</b>	Ak Em R
MSRP \$299 QTY 2	
<b>Ethno Techno by Bashiri Johnson</b>	✓ Ak Em K R
MSRP \$129 audio, \$299 samples w/Groove Control QTY multiple discs	
<b>Fuel Series - Ethnicity</b>	✓ Ak
MSRP \$149 (includes audio CD) QTY 1	
<b>Fuel Series - Opium</b>	✓ Ak
MSRP \$149 QTY 1	
<b>Hot Steel Blues</b>	✓ Ak Em K R
MSRP \$99 audio, \$199 CD-ROM incl. audio	
<b>IK Multimedia AXE</b>	✓ ● ●
MSRP \$49.95 QTY 1	
<b>IK Multimedia Contaminated</b>	● ●
MSRP \$49 QTY 1	
<b>IK Multimedia Drumbastic</b>	● ●
MSRP \$49 QTY 1	
<b>IK Multimedia Teknostorm</b>	✓ ● ●
MSRP \$49.95	
<b>IK Multimedia's House Party</b>	● ●
MSRP \$49.95	
<b>Propeller Island Complete Gamelan</b>	✓ Ak Em K
MSRP \$99 CD, \$249 CD-ROM QTY 1	
<b>Skippy's Big Bad Beats</b>	✓ Ak Em K R SC
MSRP \$99 audio, \$199 CD-ROM w/Groove Control & audio	
<b>Spectrasonics Backbeat</b>	✓ Ak Em K R SC
MSRP \$99 audio CD, \$199 CD-ROM & audio QTY 1	
<b>Spectrasonics Brazilian</b>	✓ Ak Em K R SC
MSRP \$99 audio CD, \$199 CD-ROM & audio QTY 1	
<b>Spectrasonics Burning Grooves</b>	✓ Ak Em K R SC
MSRP \$99 CD, \$199 CD-ROM & audio QTY 1	
<b>Spectrasonics Heart of Africa Tribal Voices and Phrases</b>	R
MSRP \$199 QTY 1	
<b>Spectrasonics Heart of Africa, Vol. 1</b>	✓ Ak Em K SC
MSRP \$129 CD, \$299 CD-ROM (includes CD) QTY 2	
<b>Spectrasonics Heart of Africa, Vol. 2</b>	✓ Ak Em K
MSRP \$99 CD, \$199 CD-ROM QTY 1	
<b>Spectrasonics Heart of Asia</b>	✓ Ak Em K R SC
MSRP \$129 CD, \$399 CD-ROM QTY 2	
<b>Spectrasonics Liquid Grooves</b>	✓ Ak Em K R SC
MSRP \$99 CD, \$199 CD-ROM (includes CD) QTY 1	
<b>Spectrasonics Liquid Grooves w/Groove Control</b>	Ak Em K R
MSRP \$199 QTY 1	
<b>Spectrasonics Retro Funk</b>	✓ Ak Em K R
MSRP \$99 audio CD, \$199 CD-ROM & audio QTY 1	
<b>Spectrasonics Supreme Beats African/Cont...</b>	Ak Em K R SC
MSRP \$199 QTY 1	
<b>Spectrasonics Supreme Beats International</b>	✓
MSRP \$99 QTY 1	
<b>Spectrasonics Supreme Beats Percussion Lib 1-4</b>	✓
MSRP \$249 QTY 4	
<b>Spectrasonics Supreme Beats World/Dance</b>	Ak Em K R SC
MSRP \$199 QTY 1	
<b>Spectrasonics Vocal Planet</b>	✓ Ak Em K R SC
MSRP \$149 audio CD, \$399 CD-ROM QTY multiple	
<b>Stum</b>	● ●
MSRP \$49.95	

## KAERU CAFE

<b>Red/SPI2000 Break Beats &amp; Hot Spice</b>	✓
MSRP \$49 QTY 1	

## MADMINN AUDIO

<b>Black Butta III by MadJef</b>	✓ ● ●
MSRP \$79 QTY 2	
<b>Mad Franklin DJ</b>	✓ ● ●
MSRP \$99 QTY 1	

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



**MASTERBITS**

<b>Africa - World Zone, Vol. 2</b>	✓
MSRP \$69 QTY 1	
<b>Dance Delight, Sound Solutions Vol. 3</b>	✓ ● Ak Eq
MSRP \$39 QTY 1	
<b>Dance T.R.A.X.</b>	✓ ● Ak Eq
MSRP \$69 audio, #129 CD-ROM QTY 1	
<b>Far East - World Zone, Vol. 1</b>	✓ ● Mi
MSRP \$59 QTY one audio CD	
<b>FX Zone, Sound Solution Series Vol. 1</b>	✓ ●
MSRP \$39 QTY 1	
<b>House T.R.A.X.</b>	●
MSRP \$69 QTY	
<b>House T.R.A.X.</b>	✓
MSRP \$39 QTY 1	
<b>Interactive RaveMachine Vol. 12</b>	✓ ●
MSRP \$39 QTY 1	
<b>MIDitation World, Sound Solutions Vol. 10</b>	✓ ● Mi
MSRP \$39 QTY 1	
<b>Rave T.R.A.X.</b>	✓ ●
MSRP \$69 QTY 1	
<b>Rave T.R.A.X. 2</b>	✓ ●
MSRP \$69 QTY 1	
<b>Ravers Revenge, Sound Solution Vol. 5</b>	✓ ●
MSRP \$39 QTY 1	
<b>Salsa Picante - World Zone, Vol. 3</b>	✓
MSRP \$69 QTY 1	
<b>Soundclips Vol. 1</b>	●
MSRP \$49.95 QTY 10	
<b>Soundclips Vol. II</b>	●
MSRP \$49.95 QTY 10	
<b>Tekno T.R.A.X.</b>	✓ ● Ak Eq
MSRP \$129 QTY 1	
<b>Tekno Therapy, Sound Solution Vol. 4</b>	✓ ● Ak Eq
MSRP \$39 QTY 1	

**MIXMAN**

<b>George Clinton</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>Hardcore</b>	✓ ● Mx
MSRP \$49.95	
<b>Heaven 17</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>K-Klass</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>Lo-Fi Transmission</b>	✓ ●
MSRP \$49.95 QTY 2	
<b>Skinny Puppy</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>Smoke</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>Street Level</b>	✓ ● Mx
MSRP \$49.95 QTY 2	
<b>Tremor</b>	✓ ● Mx
MSRP \$49.95 QTY 2	

**NORTHSTAR**

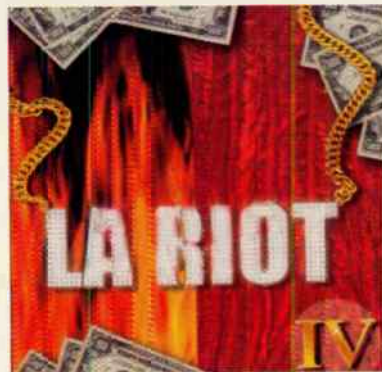
<b>Dancescapes</b>	✓
MSRP \$89.95 QTY 1	
<b>Graham Lear's Latin Rock Dancescapes, Vol. 3</b>	✓
MSRP \$89.95 QTY 1	
<b>Russian Masters</b>	Em
MSRP \$249, full version; \$99 lite QTY 1	
<b>World X1</b>	SC
MSRP \$195 QTY 1	
<b>World X2</b>	SC
MSRP \$195 QTY 1	

**PRO-REC**

<b>TechnoLogic audio Sampling CD</b>	✓
MSRP \$29; \$49 for 2 QTY 1	

**Q UP ARTS**

<b>Dream Experience</b>	✓ Ak G
MSRP \$99 audio CD; \$199 CD-ROM	
<b>Kodish Drum 'n' Bass</b>	✓ Ak Em R
MSRP \$99 audio CD; \$199	



Big Fish/Chronic Music L.A. Riot 4

<b>Latin Groove Factory Afro-Cuban</b>	✓ Ac Ak R SC
MSRP \$99 audio CD; \$249 CD-ROM	
<b>Latin Groove Factory Brazil</b>	✓ Ak R SC
MSRP \$99 audio CD; \$299 CD-ROM	
<b>Latin Groove Factory Caribbean</b>	✓ Ak R SC
MSRP \$99 audio CD; \$299 CD-ROM	
<b>StreetBeats by Poogie Bell</b>	✓ Ac Ak G R SC
MSRP \$99 audio CD; \$199 CD-ROM	
<b>The World</b>	Ak K SC
MSRP \$148	
<b>Voices of Native America, Vol. 1</b>	✓ Ac Ak Em G K R SC
MSRP \$99 audio CD; \$249 CD-ROM	

**SAMPLEHEADS**

<b>Mark Walker: Latin Drums</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD; \$149.95 CD-ROM QTY 1	
<b>Whole Lot'n Country</b>	✓ ● ● Ak Em G R SC SF U Y
MSRP \$99.95 audio CD set; \$249.95 CD-ROM set QTY 2	

**SONOMIC**

<b>Sonomic 1.0 Online Sounds</b>	● ●
MSRP Varying membership and one-time prices	

**STEINBERG**

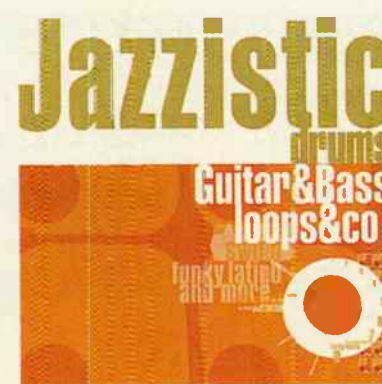
<b>Sounds&amp;Cycles</b>	● ●
MSRP \$59 each QTY 3	

**SWEETWATER**

<b>Finger Juice Essential Hip-Hop Production Tools</b>	K
MSRP \$99 QTY 1	
<b>Finger Juice for E4/e64/E-Synth</b>	Em
MSRP \$194 QTY 1	
<b>Finger Juice for ESI-32/ESI-4000</b>	Em
MSRP \$99 QTY 1	

**SYNTAUR PRODUCTIONS**

<b>Let There Be Phat!</b>	Eq
MSRP \$169.95 QTY 1	
<b>Supersonic</b>	Eq
MSRP \$169.95	



Big Fish Universal Sound Bank Jazzistic

**TIME+SPACE**

<b>Chemical Beats</b>	Ak
MSRP \$199.95 QTY 1	
<b>Chubsphere 1-5</b>	✓
MSRP \$39.95 each QTY 2	
<b>Creative Essentials Series</b>	✓ ● ●
MSRP \$29.95 each QTY 1	
<b>Deepest India</b>	✓
MSRP \$129.95 QTY 3	
<b>Flamenco Sounds</b>	✓
MSRP \$99.95 QTY 1	
<b>George Clinton Mixman Soundisc</b>	✓ ● Mx
MSRP \$39.95 QTY 2	
<b>Gloss Mixman Soundisc</b>	✓ ● Mx
MSRP \$39.95 QTY 1	
<b>Jungle Warfare Series</b>	✓
MSRP \$99.95 each QTY 1	
<b>K-Klass Mixman Soundisc</b>	✓ ● Mx
MSRP \$39.95 QTY 2	
<b>NY Cutz by Vinnie Zumbo</b>	✓
MSRP \$99.95 QTY 1	
<b>Old School Flavours Series</b>	✓
MSRP \$99.95 each	
<b>Skinned</b>	✓
MSRP \$99.95 QTY 1	
<b>Skinny Puppy Mixman Soundisc</b>	✓ ● Mx
MSRP \$39.95 QTY 2	
<b>Street Level Mixman Soundisc</b>	✓ ● Mx
MSRP \$39.95 QTY 1	
<b>Twisted City</b>	✓
MSRP \$99.95 QTY 1	

**UBIQUITY**

<b>Beat Head Breaks</b>	✓
MSRP \$15.98 QTY 1	
<b>Boston Baked Beats</b>	✓
MSRP \$15.98 QTY 1	
<b>Drum Crazy Vols. 1-6</b>	✓
MSRP \$15.98 each QTY 1	
<b>Jaw Breaks</b>	✓
MSRP \$15.98 QTY 1	
<b>Master Drummers Bernard Purdie 1 &amp; 2</b>	✓
MSRP \$15.98 QTY 1	
<b>Red Hot Beats</b>	✓
MSRP \$15.98 QTY 1	

**BIG FISH**

<b>Alien Artifacts</b>	✓ ● Ak
MSRP \$99.95	
<b>Alien Guitars</b>	✓ Ak SC
MSRP \$99.95 audio CD; \$199.95 CD-ROM/audio QTY 2 audio, 4 CD-ROM	
<b>Atomizer</b>	✓
MSRP \$99.95	
<b>Big Beat</b>	✓
MSRP \$99.95 QTY 2	
<b>Discovery SFX 3 - Fiction &amp; Fantasy</b>	✓ ●
MSRP \$69.95 audio/wav CD-ROM	
<b>Discovery Sound Effects</b>	✓ K
MSRP \$199.95 QTY 1	
<b>Discovery Sound FX 1 - Life</b>	✓
MSRP \$49.95	
<b>Discovery Sound FX 2 - Industry</b>	✓
MSRP \$49.95	
<b>Discovery Sound FX 3 - Traffic</b>	✓
MSRP \$49.95	
<b>Discovery Sound FX 4 - War</b>	✓
MSRP \$49.95	
<b>Discovery Sound FX 5 - Animal</b>	✓
MSRP \$49.95	

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.

# Soundware

Ambient, FX, & Sound Design Samples

<b>Discovery Sound FX 6 - Nature</b>	✓
MSRP \$49.95	
<b>Fear - Pod 2</b>	✓ ● Ac
MSRP \$99.95 audio CD, \$99.95 CD-ROM	
<b>Infinite Sound - Ambient Atmospheres</b>	✓
MSRP \$99.95	
<b>Pod</b>	✓ ●
MSRP \$99.95	
<b>Pro FX</b>	Ak K SC
MSRP \$299.95 QTY 2	
<b>Smokin' - Tony Mason</b>	✓
MSRP \$89.95	
<b>SoundScan 13: Ethereal Atmospheres</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 14: Twisted Special FX</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>SoundScan 33: Disjoncted Textures</b>	✓ ● ● Ak
MSRP \$49.95 QTY 2	
<b>Things That Go Bump In The Night</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM/audio QTY 2	
<b>Things That Go Bump in the Night 2</b>	✓ ● ● Ac Ak
MSRP \$99.95 audio, WAV/Aiff, \$199.95 Akai QTY 2	

## BOLDER SOUNDS

<b>Granular Collection</b>	Ak K
MSRP \$129	

## EASTWEST

<b>AD-FX</b>	✓
MSRP \$99.95 QTY 1	
<b>Advanced Dance Collection</b>	Y
MSRP \$199.95	
<b>Advanced Mega Effects</b>	✓ Ak
MSRP \$149.95 QTY 3	
<b>Advanced Mega Effects</b>	● ●
MSRP \$99.95	
<b>Ambient</b>	✓
MSRP \$99.95 QTY 1	
<b>Ambient 2</b>	✓
MSRP \$99.95 QTY 1	
<b>Black Box Cosmic Gold</b>	✓
MSRP \$199.95 QTY 8	
<b>Blue Box</b>	✓ ● ●
MSRP \$299.95 QTY 16	
<b>Blue Box, The Best of</b>	G
MSRP \$149.95	
<b>Clockwork</b>	✓
MSRP \$49.95 QTY 1	
<b>Cuckooland Ambience Creative Essentials</b>	✓
MSRP \$29.95 QTY 2	
<b>Cuckooland Asylum</b>	✓
MSRP \$99.95 QTY 1	
<b>Cuckooland Ghost In The Machine</b>	✓
MSRP \$99.95 QTY 1	
<b>Cuckooland Unhinged</b>	✓
MSRP \$99.95 QTY 1	
<b>Diffusion of Useful Noise</b>	✓ ●
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Dream Experience</b>	✓
MSRP \$99.95 QTY 1	
<b>Dream Zone Creative Essentials</b>	✓ ● ●
MSRP \$29.95 QTY 1	
<b>Drone Archeology</b>	✓
MSRP \$99.95 QTY 1	
<b>Electric Dreamz Creative Essentials</b>	✓
MSRP \$29.95 audio/WAV/AIFF	
<b>Etymology</b>	✓
MSRP \$99.95, Aiff \$199.95	
<b>F.A.S.T. Animation</b>	✓ Ak
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Festa Latina Vol. 1 Drums &amp; Percussion</b>	✓
MSRP \$99.95 QTY 2	
<b>Fields of Motion</b>	✓
MSRP audio \$99.95/ Akai \$199.95	
<b>Film Collection</b>	✓
MSRP \$69.95 QTY 1	
<b>Flash Trackz Drum 'n' Bass</b>	✓
MSRP \$99.95 audio QTY 1	

<b>Foley Sound Effects</b>	✓
MSRP \$495 QTY 10	
<b>FX Sound Collection</b>	✓
MSRP \$69.95 QTY 2	
<b>Global SFX Creative Essentials</b>	✓
MSRP \$29.95 QTY 1	
<b>Globe Trance Mission 1</b>	✓
MSRP \$99.95 QTY 1	
<b>Globe Trance Mission 2</b>	✓
MSRP \$99.95 QTY 1	
<b>Hypnotica</b>	✓ G
MSRP \$99.95 QTY 1	
<b>Junk Percussion</b>	✓
MSRP \$99.95 QTY 15	
<b>Komputer Inside</b>	✓
MSRP \$99.95 QTY 1	
<b>Lo Fi &amp; Illbient</b>	✓
MSRP \$99.95 QTY 1	
<b>Malice In Wonderland</b>	✓
MSRP \$99.95 QTY 1	
<b>Pascal Gabriel's Colorful World of Sound &amp; Silence</b>	✓
MSRP \$99.95	
<b>Poke in the Ear</b>	✓ Ak SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Robots &amp; Computers</b>	✓ Ak R SC
MSRP \$99.95 audio CD, \$199.95 CD-ROM QTY 1	
<b>Science Fiction</b>	✓
MSRP \$49.95 QTY 1	
<b>Skinned</b>	✓
MSRP \$99.95	
<b>Sound Spectral</b>	✓ Ak G
MSRP \$99.95 audio/ \$199.95 CD-ROM	
<b>Techno Prisoners Creative Essentials</b>	✓ ● ●
MSRP \$29.95	
<b>Textural Ambience</b>	SC
MSRP \$199.95 QTY 1	
<b>Trance Formation</b>	✓ ● ●
MSRP \$29.95	
<b>Trance 'n' Ambient Elements</b>	●
MSRP \$39.95 QTY 1	
<b>Uberschall Sound Effects</b>	✓
MSRP \$99.95 QTY 1	
<b>X-FX</b>	✓ Ak
MSRP \$99.95 audio, \$199.95 CD-ROM	

## F7 SOUND AND VISION

<b>Concept:FX1</b>	● ●
MSRP \$49.95 QTY 1	
<b>Concept:FX2</b>	● ●
MSRP \$69.95	

## FUTURITY

<b>Metropolis Science Fiction Toolkit</b>	✓
MSRP \$99 QTY 1	

## GREYTSOUNDS

<b>Sonic Textures Sound Source</b>	✓
MSRP \$99.95 QTY 1	
<b>The Founder's Series Sound Effects</b>	Ak Em
MSRP \$199.95 QTY 1	

## ILIO

<b>Spectrasonics Distorted Reality 1</b>	✓ Ak Em K R SC
MSRP \$99 CD; \$199 CD-ROM QTY 1	
<b>Spectrasonics Distorted Reality 2</b>	✓ Ak Em K R SC
MSRP \$99 audio CD, \$199 CD-ROM QTY 1	
<b>TranceFusion</b>	✓ Ak Em R
MSRP \$99 CD; \$199 CD-ROM & audio QTY 1	

## KAERU CAFE

<b>Light Orange/Needles</b>	✓
MSRP \$49 QTY 1	

## MADMINN AUDIO

<b>Mad Freakin DJ</b>	✓ ● ●
MSRP \$99 QTY 1	

## MASTERBITS

<b>Euroshere Add-on Package</b>	✓ ●
MSRP \$299 QTY 5	
<b>Euroshere Base Package</b>	✓ ●
MSRP \$499 QTY 10	
<b>Eurosphere Vols. 1-15</b>	✓ ●
MSRP \$69 per disc QTY 15 in series	
<b>Eurosphere Complete Package</b>	✓
MSRP \$699 QTY 15	
<b>EurosphereMega Sound Effects</b>	✓
MSRP \$69 QTY 3	
<b>FX Zone</b>	✓
MSRP \$59 QTY 1	
<b>MIDtation Zone</b>	✓
MSRP \$69 QTY 1	
<b>Multimedia T.R.A.X.: Vol. 2, Project X</b>	✓
MSRP \$39	
<b>Noise &amp; Nature, Sound Solution Vol. 9</b>	✓ ●
MSRP \$39 QTY 1	
<b>Sex T.R.A.X.</b>	✓ ● ●
MSRP \$39 QTY 1	
<b>Soundclips Vol. I</b>	●
MSRP \$49.95 QTY 10	
<b>Soundclips Vol. II</b>	●
MSRP \$49.95 QTY 10	
<b>The Ailbi CD</b>	✓
MSRP \$17.95 QTY 1	

## NORTHSTAR

<b>EFX 1 &amp; 2 Hollywood Edge</b>	Em
MSRP \$295 each QTY 2	
<b>Hanna-Barbera FX</b>	Em SC
MSRP \$495 QTY 2	
<b>The Wizard</b>	Em
MSRP \$195 QTY 1	
<b>The Wizard II</b>	Em SC
MSRP \$195 QTY 1	
<b>VX 1-4, Valentino FX</b>	Em
MSRP \$149 each QTY 4	
<b>Warner Bros. FX Set</b>	SC
MSRP \$495 each QTY 2	

## Q UP ARTS

<b>Ambient Realms by Kit Watkins</b>	✓ R
MSRP \$99 audio CD; \$199 CD-ROM	
<b>David Torn Pandora's Tool Box, Vol. 1</b>	✓ Ac Ak R
MSRP \$99 audio CD; \$199 CD-ROM	
<b>David Torn Tonal Textures, Vol. 1</b>	✓ Ak
MSRP \$99 audio CD; \$199 CD-ROM	
<b>Dream Experience</b>	✓ Ak G
MSRP \$99 audio CD; \$199 CD-ROM	
<b>Trails And Reflections</b>	✓
MSRP \$49	

## RENAISSANCE SOUND

<b>Renaissance Sfx Dolby Surround Library</b>	✓
MSRP \$1,195 QTY 11	

## SONIC DESKTOP

<b>SmartSound Audio Palette CD-ROM Series</b>	● ●
MSRP \$69-\$129 QTY 16	

## SONIC SCIENCE

<b>Sonic Boon Dynamic Range</b>	✓
MSRP \$395 QTY 2	
<b>Sonic Boon Foley Footsteps</b>	✓
MSRP \$75 QTY 1	
<b>Sonic Boon Paradise</b>	✓
MSRP \$75 QTY 5	
<b>Sonic Boon The Works</b>	✓
MSRP \$495 QTY 10	
<b>Sonic Source Music for Multimedia</b>	● ●
MSRP \$125 QTY 2	
<b>Sonic Source Music Library</b>	✓
MSRP \$795 QTY 10	

## SONOMIC

<b>Sonomic 1.0 Online Sounds</b>	● ●
MSRP Varying membership and one-time prices	

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; MI MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.



### SOUNDSACTIONS

Wave Pool CD-ROM  
MSRP \$49 QTY 1

### TIME+SPACE

Cuckooland: Asylum

MSRP \$99.95 QTY 1

Fields Of Motion

MSRP \$99.95 CD, \$199.95 Akai CD-ROM QTY 1

Malice In Wonderland

MSRP \$99.95 CD, \$199.95 Akai

# Synth Patches & Sample Floppy Disks

### ALESIS

#### Classical QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### EuroDance QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### Hip Hop Grooves & Instruments

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### Latin QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### Sanctuary QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### Stereo Grand Piano QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q58, Q5R

#### Stereo Jazz Piano QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R

#### Vintage Keyboards QCard

MSRP \$249 SYNTHS SUPPORTED Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

#### Vintage Synths & Beatboxes QCard

MSRP \$249 SYNTHS SUPPORTED 8MB; Alesis QuadraSynth, QuadraSynth Plus Piano, S4, S4 Plus, Q56, Q56.1, Q57, Q57.1, Q58, Q58.1, Q5R, DM Pro, DGB

### CESIUM SOUND

#### Sound Libraries

MSRP Varies SYNTHS SUPPORTED Roland JD-990, Korg O1/W, Yamaha SY-85, Korg Wavestation, Ensoniq ESQ-1, Ensoniq SQ-80, E-mu Proteus/1, E-mu Proteus/2, Yamaha TX81Z, Roland D-50, Ensoniq VFX/VFXSD/SD-1, Ensoniq EPS, EPS16+, ASR-10

Sample CD formats: ✓ audio CD; ● AIFF; ● WAV; Ac Acid; Ak Akai; Em E-mu; Eq Ensoniq; G GigaSample; K Kurzweil; Mi MIDI; Mx Mixman; P Peavey; R Roland; SC SampleCell; SF SoundFont; U Bitheadz Unity DS-1; Y Yamaha.

#### Sound Libraries for MIDI Synths

MSRP \$30 - \$120 SYNTHS SUPPORTED Ensoniq VFX, VFXSD, SD-1, ESQ-1, and SQ-80; E-mu Proteus/1 and Proteus/2; Korg Wavestation and O1/W; Roland D-50, D-550, and JD-990; Yamaha SY-85 and TX81Z

### DRUM MACHINE MUSEUM

#### Drum Machine EPROM sets

MSRP \$50 to \$200 SYNTHS SUPPORTED TR-606/808/909/707/727, CR-78, DR-55, SR-88, LM-1, LM-2, DMX, DX, and Dr. Pads. Kits can be designed for any combination of drum sounds

### GREYTSOUNDS

#### 12 bit Floppy Disk Library

MSRP \$10/ per floppy SYNTHS SUPPORTED Akai S900/S950; Ensoniq EPS; Roland S-50/S-550/S-330/W-30. 100 titles including bass, drums and percussion, brass, strings, woodwinds, pianos, vintage keyboards, synthesizers, guitars, vocals, sound effects, and Fairlights

#### 16-bit Floppy Disk Library

MSRP \$10 per disk SYNTHS SUPPORTED Samples for Akai S1000-3200; Ensoniq ASR-10/ASR-88; Kurzweil K2000/K2VX/K2500. 100 titles including bass, drums and percussion, brass, strings, woodwinds, pianos, vintage keyboards, synthesizers, guitars, vocals, sound effects, and Fairlights

#### Alesis HR/SR-16 R&B Industrial Rhythms

MSRP \$24.95; \$14.95 via email SYNTHS SUPPORTED 1 floppy disk

#### Casio CZ Series Synth Patches

MSRP \$29.95 each; \$19.95 via email SYNTHS SUPPORTED 1 floppy disk; Casio CZ 101/1000/3000/5000

#### Casio VZ series/PG380 Synth Patches

MSRP \$39.95; \$29.95 via email SYNTHS SUPPORTED 1 floppy disk; Casio VZ-1, VZ-10M, VZ-8M and PG-380 guitar synthesizer

#### E-mu Emax 5-Pack Disk Library

MSRP \$49.95 SYNTHS SUPPORTED 5 floppy disks

#### E-mu Proteus 1/XR Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; E-mu Proteus/1 and Proteus/XR

#### E-mu Proteus MPS Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Emu Proteus MPS

#### Ensoniq EPS 5-pack Floppy Disk Sets

MSRP \$39.95 per 5-pack; \$379.95 for all 15 5-packs SYNTHS SUPPORTED 5 disks per 5-pack

#### Ensoniq EPS-16 5-pack Floppy Disk Sets

MSRP \$49.95 per 5-pack; \$299.95 for all 9 packs SYNTHS SUPPORTED 5 floppy disks

#### Ensoniq SQ1/SQ2/SQ3/KS32 Patches

MSRP \$39.95 each SYNTHS SUPPORTED 1 floppy disk; Ensoniq SQ1, SQ2, SQ3, KS32

#### Ensoniq VFX/VFXSD/SD-1 Patches

MSRP \$39.95 each SYNTHS SUPPORTED 1 floppy disk; Ensoniq VFX, VFXSD, SD-1

#### Kawai K1 Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Kawai K1, K1R, K1M and K1II

#### Kawai K4 Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Kawai K4, K4R

#### Kawai XD-5 Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Kawai XD-5

#### Korg A1 Synth Patches

MSRP \$29.95 SYNTHS SUPPORTED 1 floppy disk; Korg A1 effects processor

#### Korg A2/A3 Synth Patches

MSRP \$29.95 SYNTHS SUPPORTED 1 floppy disk; Korg A2 and A3 effects processors

#### Korg D5S-1 Floppy Disk Library

MSRP \$10 per disk; \$89.95 for 12-disk set

#### Korg M1/M1R Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Korg M1, M1R, M1Rex

#### Korg M1Rex Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Korg M1Rex

#### Korg M3R Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Korg M3R

#### Korg O1/W Synth Patches

MSRP \$39.95 each SYNTHS SUPPORTED 1 floppy disk; Korg O1/W, O1/W FD, O1/W Pro, O1/W ProX

#### Korg O3R/W Synth Patches

MSRP \$34.95 each SYNTHS SUPPORTED 1 floppy disk; Korg O3R/W

#### Korg S3 Patches/Rhythm Patterns

MSRP \$29.95 SYNTHS SUPPORTED 1 floppy disk; Korg S3

#### Korg T-Series Floppy Disk Library

MSRP \$10 per disk, \$39.95 per 5-pack SYNTHS SUPPORTED 1 or 5; Korg T1, T2EX, T3EX

#### Korg T-Series Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED Korg T1, T2, T3

#### Korg Wavestation A/D Synth Patches

MSRP \$39.95 each SYNTHS SUPPORTED Korg Wavestation A/D

#### Korg Wavestation Synth Patches

MSRP \$39.95 each SYNTHS SUPPORTED 1 floppy disk; Korg Wavestation, Wavestation A/D

#### Korg X2/X3

MSRP \$34.95 each SYNTHS SUPPORTED 1 floppy disk; Korg X2, X3

#### Kurzweil K2000 Synth Patches

MSRP \$39.95 each SYNTHS SUPPORTED 1 floppy disk; Kurzweil K2000, K2000VP, K2VX, K2500

#### Peavey DPM/DPMV3 Synth Patches

MSRP \$29.95 SYNTHS SUPPORTED 1 floppy disk; Peavey DPM, DPMV3

#### Roland D-20/D-10/D-5/D-110 Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; D-110, D-20, D-10, D-5

#### Roland D-50/D-550 Synth Patches

MSRP \$29.95 each SYNTHS SUPPORTED 1 floppy disk; Roland D-50, D-550

### Roland D-70 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk; Roland D-70

### Roland JD-800/JD-990 Synth Patches

MSRP \$39.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Roland JD-800, JD-990

### Roland JV-80/880/1080 Synth Patches

MSRP \$39.95 each **SYNTHS SUPPORTED** 1 floppy disk; Roland JV-80,  
JV-880, JV-1080

### Roland MT-32 Synth Patches

MSRP \$19.95 each **SYNTHS SUPPORTED** 1 floppy disk; Roland MT-32

### Roland SC-55/Sound Canvas Synth Patches

MSRP \$29.95 **SYNTHS SUPPORTED** 1 floppy disk; Roland SC-55  
Sound Canvas

### Roland U-20 Synth Patches

MSRP \$29.95 **SYNTHS SUPPORTED** 1 floppy disk; Roland U-20

### Yamaha DX11 Synth Patches

MSRP \$19.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha DX11

### Yamaha DX21/27/100 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha  
DX21, DX27, DX100

### Yamaha DX7 Synth Patches

MSRP \$29.95 **SYNTHS SUPPORTED** 1 floppy disk; Yamaha DX7

### Yamaha DX7IIFD Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha DX7II, DX7IIFD

### Yamaha SY22 Synth Patches

MSRP \$49.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha SY22, SY35

### Yamaha SY55/TG55 Synth Patches

MSRP \$49.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha SY55, TG55

### Yamaha SY77/TG77 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha SY77, TG77

### Yamaha SY85 PCM Sample Disks & Patches

MSRP \$14.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha SY85

### Yamaha SY85/TG500 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha SY85, TG500

### Yamaha SY99 Optimized SY77 banks

MSRP \$49.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha SY99

### Yamaha SY99 PCM Disk 5-Packs

MSRP \$69.95 per 5-pack **SYNTHS SUPPORTED** 5 floppy disks;  
Yamaha SY99

### Yamaha SY99 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha SY99

### Yamaha TG33 Synth Patches

MSRP \$49.95 each **SYNTHS SUPPORTED** 1 floppy disk; Yamaha TG33

### Yamaha TX16W Sample Disk Library

MSRP \$9.95 each; \$499 for all 89 disks **SYNTHS SUPPORTED** TX16W

### Yamaha TX802 Synth Patches

MSRP \$29.95 each **SYNTHS SUPPORTED** Yamaha TX802

### Yamaha TX81Z Synth Patches

MSRP \$19.95 each **SYNTHS SUPPORTED** 1 floppy disk;  
Yamaha TX81Z

### Yamaha V50 Synth Patches

MSRP \$29.95 **SYNTHS SUPPORTED** 1 floppy disk; Yamaha V50

## KAWAI

### ASL-1 Session Tool Kit

MSRP \$49.95 **SYNTHS SUPPORTED** 1 floppy; Kawai K5000 Series

### ASL-2 Bass, Solo, and Lead

MSRP \$49.95 **SYNTHS SUPPORTED** 1 floppy; Kawai K5000 Series

### ASL-3 Classic Sounds

MSRP \$49.95 **SYNTHS SUPPORTED** 1 floppy; Kawai K5000 Series

### ASL-4 Pads and Comping

MSRP \$49.95 **SYNTHS SUPPORTED** 1 floppy; Kawai K5000 Series

## KID NEPRO

### Korg Triton Collection

MSRP \$25 **SYNTHS SUPPORTED** PCG files for Korg Triton keyboards  
and Triton rack

## MASTERBITS

### Inspiration Cards: JD-800/990, Vol.1-3

MSRP \$99 each / 2 for -20% / 3 for -30%  
**SYNTHS SUPPORTED** one card each; Roland JD-800/990

### Inspiration Cards: Korg WS Vol. 1-5

MSRP \$99 each / 3 for -20% / 5 for -30%  
**SYNTHS SUPPORTED** one card each; Korg Wavestation

## MIDI MARK PROD.

### Floppy disks for Akai

MSRP \$4-10 each **SYNTHS SUPPORTED** S-1000, S-2000, S-2800,  
S-3000, So1, and S-900

### Floppy disks for Roland Samplers

MSRP \$4-10 per disk **SYNTHS SUPPORTED** S-50, S550, S330, W-30,  
DJ-70, also loads into S-760

### MPC Floppy and Zip disks

MSRP Floppies, \$10-15 each; Zip disks, \$349-250 each  
**SYNTHS SUPPORTED** MPC-60, MPC-60ii, MPC-2000,  
MPC-3000, MPC-2000

## NORTHSTAR

### Northstar E-mu SP1200 Library

MSRP \$20 each, or 5 for \$53 **SYNTHS SUPPORTED** SP-1200/SP12

### Northstar Emax I Library

MSRP \$20 ea., 5 for \$53, or 20 for \$183 **SYNTHS SUPPORTED** Emax I/II

### Northstar Emulator II Library

MSRP \$20 each, 10 disks for \$73 **SYNTHS SUPPORTED** EII

## PATCHMAN MUSIC

### 81-Disk Elite Series

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SYNTHS SUPPORTED E-mu ESI-32

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SYNTHS SUPPORTED Roland JD-990

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## Korg 05R Patches by Pro-Rec

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## SY85 Sample Disks

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## SY85 & TG500 Patches

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SYNTHS SUPPORTED Yamaha SY85

## SY99 Patches

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SYNTHS SUPPORTED Yamaha SY99

## SY99 Sample Disks

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### TG100 Patches by Pro-Rec

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SYNTHS SUPPORTED Yamaha TG100

### TS10/12 Individual Synth Sample Disks

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SYNTHS SUPPORTED 1; Ensoniq ASR-10, TS 10/12

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### X-5 Patches

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### X-Series Patches

MSRP \$39.90 each; \$129 for all 7 SYNTHS SUPPORTED Korg X-series

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SYNTHS SUPPORTED 1; Yamaha A3000

### Yamaha A3000 Individual Piano

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SYNTHS SUPPORTED Yamaha A3000

### Yamaha A3000 Individual Synth

MSRP \$18 per disk; \$99.90 for 10; \$199 for 25  
SYNTHS SUPPORTED Yamaha A3000

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### SR-JV80-10 Bass & Drums

MSRP \$295 SYNTHS SUPPORTED XV-5080/3080/88, XP-80/60/50/30, JV-2080/1080/1010/1000/880/90/80, JD-990

### SR-JV80-11 Techno

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### SR-JV80-12 Hip-hop

MSRP \$295 SYNTHS SUPPORTED XV-5080/3080/88, XP-80/60/50/30, JV-2080/1080/1010/1000/880/90/80, JD-990

### SR-JV80-13 Vocal

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### SR-JV80-14 Asia

MSRP \$295 SYNTHS SUPPORTED XV-5080/3080/88, XP-80/60/50/30, JV-2080/1080/1010/1000/880/90/80, JD-990

### SR-JV80-15 Special EFX

MSRP \$295 SYNTHS SUPPORTED XV-5080/3080/88, XP-80/60/50/30, JV-2080/1080/1010/1000/880/90/80, JD-990

### SR-JV80-16 Orchestral II

MSRP \$295 SYNTHS SUPPORTED XV-5080/3080/88, XP-80/60/50/30, JV-2080/1080/1010/1000/880/90/80, JD-990

### SR-JV80-17 Country Collection

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### SR-JV80-18 Latin Collection

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### SRX-02 Concert Piano

MSRP \$395 SYNTHS SUPPORTED XV-5080, XV-3080, XV-88

### VE-GSPro Voice Expander

MSRP \$495 SYNTHS SUPPORTED A-90, A-70, MC-80

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### Akai S612/S700/X7000 Sample Library

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SYNTHS SUPPORTED Akai S612/S700/X7000

### AKAI S900/S950 Sample Library

MSRP \$9.95 to \$14.95 per disk  
SYNTHS SUPPORTED AKAI S900/S950

### D-50, D-550 Patch Library

MSRP \$35 per Volume, 10 Volumes for \$150  
SYNTHS SUPPORTED 10 Volumes; Roland D-50, D-550

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MSRP \$90 (114-bank Voice Package)  
SYNTHS SUPPORTED Yamaha DX7, TX7, DX5, DX7II, TX216, TX816

### DX7IIFD, DX7s, TX802 Patch Library

MSRP \$30 per volume  
SYNTHS SUPPORTED 5 volumes; DX7IIFD, DX7II, DX7s, TX802

### DX9 Patch Library

MSRP \$45 (19-bank package)  
SYNTHS SUPPORTED 19 banks; Yamaha DX9

### Emax, Emax II Sample Disk Library

MSRP \$7 to \$9.95 per bank

### Korg 01W/01WFD Patch Library

MSRP \$39.95 per bank SYNTHS SUPPORTED Korg 01/W, 01/WFD

### Korg M1/T-Series Patch Library

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### S-900/S-950 Sample Disk Library

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MSRP \$199 SYNTHS SUPPORTED 1 floppy; Kurzweil K2000

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LIVE SOUND SHOWCASE—**THE WHO SELL OUT**—PAGES 8  
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# PRO SOUND

volume 22  
no. 12

**The 960L Road Trip Continues**  
Lexicon continued its 960L Digital Effects System VIP



tour with private, hands-on demonstrations at The Hit Factory in New York and at the Record Plant in Los Angeles. —page 18

**Crawford Moves**  
Crawford Communications has completed its relocation, which repositions its facilities to better suit the market as well as their physical relationship to each other. —page 60

**In a Heartbeat**  
Jim Sides, the executive VP, sales & marketing, Nexa USA



outlines the company's strategy for suc-

## Clair Bros. Buys Showco

by Clive Young

LITITZ, PA—Years of competition between the two largest sound reinforcement companies in the U.S. came to an end on November 17, when Clair Brothers Audio Enterprises (Lititz, PA) officially closed its purchase of Showco (Dallas) from Vari-Lite International for \$12.7 million.

Following the initial announcement of intent on October 30, Showco's inventory was removed from its longtime Regal Row offices and divided between Clair's head-

quarters and that company's Nashville branch, MD/Clair. A total of 10 key Showco personnel will move to Clair's Lititz facility.

Financing for the purchase was provided by Fulton Bank (Lancaster, PA). It's not the first large expenditure for Clair in recent times—three years ago, the company completed building its \$4.3 million, 90,000-square-foot headquarters, which houses about half of its employees worldwide. (continued on page 28)

## Studios Move Towards Surround, High-Resolution

by Martin Goodman

Studios are realizing the need to gear up for multichannel monitoring and are looking into incorporating various high-resolution recording formats into the capabilities that they offer their clients. With record labels releasing titles in DVD-V, and finally, DVD-A formats, recording,

mixing and mastering engineers, and thus, studio owners, have to be cognizant of the various delivery (encoding) formats (such as DSD, SACD, DTS and Dolby AC-3) while making decisions regarding recording formats.

Sony Music Studios, located on 54th (continued on page 30)



**GOIN' DEEP:** Deeper Studios designer Francis Manzo and Jonathan Peters work at the Digidesign Pro Control Manhattan-based studio. For more about Deeper, see on pages 44-45.

## Games Not Child Audio Pros Explore New

by Steve Harvey

LOS ANGELES—With the holiday season upon us, it is only a matter of days before children of all ages will be immersed in the latest make-believe worlds generated within their PC, PlayStation 2, Dreamcast or Nintendo machine. But while video game graphics may often be hyper-realistic, the same cannot be said of audio.

Interactive entertainment developers faced with a number of challenges

where audio being the p...  
dle of synch...  
play to aud...  
two most p...  
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tech@psn hands-onreview

Sony's DRE-S777 sampling reverb is



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Dr. Frederick Bashour  
Pro Audio Review  
September 2000



**DMP2** - 2 channel high-performance mic preamp direct box.



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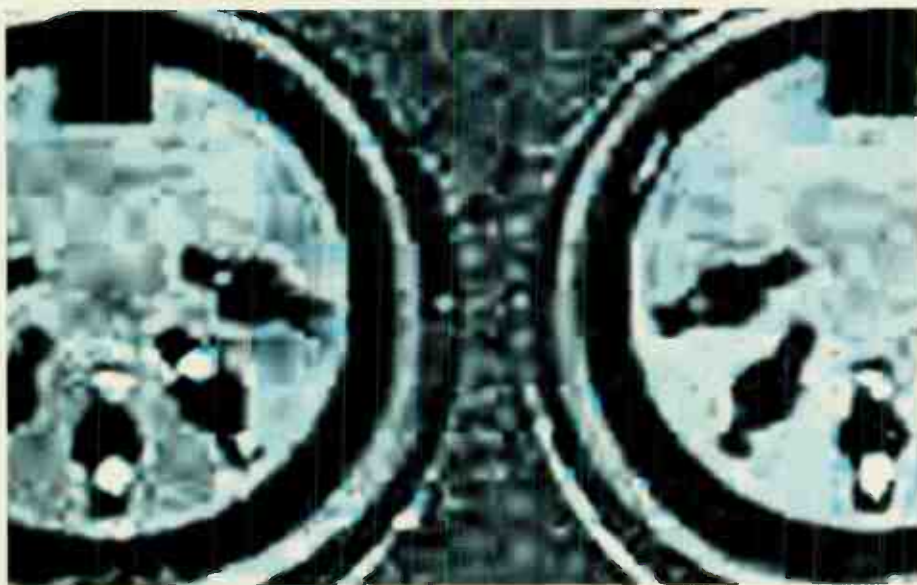


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# MIDI HARDWARE



Taking charge of your MIDI rig can seem like a daunting task. There's all those cables — which plugs into where? Do I need to hook all of them up? And once I get them all plugged in, how am I going to control the whole thing? Things can get even more complex if you want to use hardware faders and knobs to control MIDI gear, or if you want to drive your system with an instrument other than a piano-style keyboard.

But fear not, manufacturers offer MIDI control and processing hardware that can solve almost any need. Whether you need a dedicated hardware sequencer to record your songs or to take to a gig, a full-featured MIDI control keyboard for driving your sound modules, a fader box for tweaking the parameters in software synths or digital audio programs, a hardware retrofit to bring vintage gear into the world of MIDI, a MIDI guitar, or a MIDI interface to serve as the communication hub for a computer-based MIDI rig, there's a piece of gear that can do the job.

## BUYER'S TIPS: MIDI INTERFACES

MIDI interfaces can range in complexity from simple boxes with a couple of MIDI jacks to knob-laden rack boxes packed with connections and options. But regardless of the form they take, MIDI interfaces have one main purpose in life: To allow transfer of MIDI data in and out of a computer. To this end, they're pretty simple

devices (at least operationally); plug them in and they work. As you move up the interface food chain, things get slightly more complex with multiple ins and outs, routing capabilities and sync support (for more on MIDI interfaces that offer extended synchronization features, see also "Studio Essentials" on page 147), but for the most part things are largely straightforward.

Look at the number of connectors and ins and outs the interface has. Keep in mind that you can always daisy-chain MIDI modules from one another, so the fact that an interface only has one in and out may not be a deal-breaking limitation. But if you have a large number of devices, extra MIDI ports on the interface can come in handy — and if you're using editor/librarian software that needs to discretely communicate with synths and samplers (see "Computer Software and Hardware" on page 122) then it pays to have each MIDI device dedicated to its own interface port.

On the Mac, your choices are straightforward: Interfaces plug in to the computer's serial (printer or modem) or USB ports. On the PC, you have a few extra options. The interface can be an internal expansion card (which occupies a slot — also see "Synth & Sampler Soundcards" on page 22) or an external box connected to a serial, parallel or USB port. With external interfaces on either computer platform, look for a "thru" switch that

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will allow you to connect other serial or parallel devices to the computer without disconnecting the interface.

— Mitch Gallagher

## Alternate MIDI Controllers

See also Percussion Controllers on page 58, and Electronic Drums, Kits, and Triggers on page 60.

### AKAI

#### EWI 3020, EWI 3020M

**MSRP \$1,399.95** DESCRIPTION Wind controller with sound module. Saxophone/clarinnet-style fingering system using touch sensors. Octave shift rollers enable play over an 8-octave range.

#### EWI 3030, EWI 3030M

**MSRP \$1,785** DESCRIPTION Wind controller with sound module. Saxophone/clarinnet-style fingering system using touch sensors. Octave shift rollers enable play over an 8-octave range.

### ART

#### X-15 Ultrafoot

**MSRP \$347** DESCRIPTION Floor foot controller. Two assignable realtime expression pedals with room for an additional one; simple plug-and-play operation; MIDI in, out, thru. Can convert any external log-taper volume pedal to additional controller input.

### BIG BRIAR

#### Ethervox MIDI Theremin

**MSRP \$3,499** DESCRIPTION MIDI theremin. Antennas for controlling pitch and volume (or 2 other MIDI continuous controls). Includes analog monophonic sound generator. Detachable legs and base, included.

### ILIO ENTERTAINMENTS

#### Digitar

**MSRP \$449** DESCRIPTION Guitar-like MIDI controller. Six analog optical transducers respond to strumming on strings. Receives input from external MIDI keyboard or sequencer. Separate power supply also contains MIDI input and output.

### INTERACTIVE ENTERTAINMENT

#### Synth A Beam II

**MSRP \$1,000** DESCRIPTION Light to MIDI controller. Triggers MIDI by interrupting or reflecting visible beams of light. Internal sensitivity adjustments for beam brightness, plus analog outputs for triggering lighting or special effects via relay.

### MIDI SOLUTIONS

#### Breathalyzer

**MSRP \$199** DESCRIPTION Wind controller. Accepts the Yamaha BC3 as input and generates MIDI data corresponding to the amount of breath pressure applied to the device.

## Keyboard and Pedal Controllers

MODEL	MSRP	TYPE   # KEYS   # PROG. ZONES   WEIGHT
<b>Doepfer PK-88</b>	\$850	master controller   88 keys   —   45 lbs.
<b>Edirol Roland PC-160</b>	\$225	keyboard controller for computers   32 keys   —   —
<b>Edirol Roland PC-180</b>	\$295	keyboard controller for computers   49 keys   —   —
<b>Evolution MK-125 Dance Station</b>	\$149	keyboard controller for computers   25 keys   —   5 lbs.
<b>Evolution MK-149</b>	\$149	keyboard controller for computers   49 keys   —   9 lbs.
<b>Evolution MK-161</b>	\$219	keyboard controller for use with computers   61 keys   —   19 lbs.
<b>Fatar CMK-149</b>	\$219.95	keyboard controller for use with computers   49 keys   —   5.5 lbs.
<b>Fatar Studiologic CMK-37</b>	\$149.95	keyboard controller for use with computers   36 keys   —   4.18 lbs.
<b>Fatar StudioLogic CMK-49</b>	\$209.95	keyboard controller for use with computers   49 keys   —   4.4 lbs.
<b>Fatar StudioLogic CMS-161</b>	\$479.95	keyboard controller for use with computers   61 keys   —   14 lbs.
<b>Fatar StudioLogic MP-113 Pedalboard</b>	\$450	MIDI pedal controller   13 pedals   1 zones   14.3 lbs.
<b>Fatar StudioLogic MP-117 Pedalboard</b>	\$575	MIDI pedal controller   17 pedals   —   16.5 lbs.
<b>Fatar StudioLogic SL-1100</b>	\$1,495.95	master keyboard controller   88 keys   4 zones   44 lbs.
<b>Fatar StudioLogic SL-161</b>	\$499.95	master keyboard controller   61 keys   2 zones   11 lbs.
<b>Fatar StudioLogic SL-2001</b>	\$1,995.95	master keyboard controller   88 keys   8 zones   44 lbs.
<b>Fatar StudioLogic SL-61</b>	\$399.95	master keyboard controller   61 keys   2 zones   6.6 lbs.
<b>Fatar StudioLogic SL-760</b>	\$799.59	master keyboard controller   76 keys   3 zones   28.6 lbs.
<b>Fatar StudioLogic SL-880</b>	\$1,295.95	master keyboard controller   88 keys   4 zones   44 lbs.
<b>Fatar StudioLogic SL-990</b>	\$1,095.95	master keyboard controller   88 keys   —   44 lbs.
<b>Korg SG Pro X</b>	\$2,600	master controller w/sounds   88 keys   10 zones   53 lbs.
<b>Kurzweil PC2</b>	\$2,650	master controller w/sounds   76 keys   4 zones   35 lbs.
<b>Kurzweil PC2X</b>	\$3,150	master controller w/sounds   88 keys   4 zones   50 lbs.
<b>Oberheim MC 2000EX</b>	\$1,799	master controller w/sounds   88 keys   4 zones   61 lbs.
<b>Oberheim MC 3000</b>	\$2,299	master controller   88 keys   16 zones   75 lbs.
<b>Peavey DPM CBX</b>	\$1,999.99	master controller   88 keys   8 zones   62 lbs., 7 oz.
<b>Roland A-33 MIDI Keyboard Controller</b>	\$695	master controller   76 keys   2 zones   17 lbs., 14 oz.
<b>Roland PK-25 Pedal Board</b>	\$2,995	MIDI pedal controller   25 pedals   —   63 lbs., 1 oz.
<b>Roland PK-5 Dynamic MIDI Pedal</b>	\$495	MIDI pedal controller   13 pedals   1 zones   17 lbs., 10 oz.
<b>Roland PK-7 20-key Pedalboard</b>	\$1,495	MIDI pedal controller   20 pedals   1 zones   34 lbs., 10 oz.
<b>Yamaha CBX-K1</b>	\$199.95	keyboard controller for use with computers   37 keys   —   2.9 lbs.
<b>Yamaha CBX-K1XG</b>	\$499.95	keyboard controller w/sounds for use with computers   37 keys   —   3.3bs.
<b>Yamaha CBX-K2</b>	\$349.95	keyboard controller for use with computers   49 keys   —   6.6 lbs.



Fatar StudioLogic SL990

### MUSIC INDUSTRIES

#### Axon AX-100 by Blue Chip

**MSRP** AX-100, \$1,195.95; AX-100SB (w/card), \$1,395.95 **DESCRIPTION** Guitar controller. Works with any guitar equipped with Axon proprietary pickups for 6-string steel, 6-string nylon, and 4-string and 6-string basses. Also GK/RMC/RL Baggs and piezo-compatible.

### ROCKTRON SYSTEMS

#### All Access

**MSRP** \$1,079 **DESCRIPTION** MIDI foot controller. 15 control buttons, all of which may be used for program change, control change, or a combination of both. Bank up and down buttons. Secondary function button for editing and programming. Two inputs for expression pedals to be used as MIDI continuous controllers.

#### MIDI Mate

**MSRP** \$399 **DESCRIPTION** MIDI foot controller. 10 control buttons, a bank access button, and a secondary function button for editing and programming. Sends up to six preset changes on six different channels and five control changes while controlling one realtime parameter via a volume pedal.

### ROLAND

#### GR-33 Guitar Synthesizer

**MSRP** \$695 **DESCRIPTION** Guitar controller and sound module. Fast tracking. 384 sounds from JV-1080 sound engine. Built-in expression and control pedal. 40 multieffects plus reverb, delay, chorus, arpeggiator, and Harmonist.

### SHADOW ELECTRONICS

#### SH-075 MIDI Converter

**MSRP** \$799.95 **DESCRIPTION** Guitar controller. Direct guitar to MIDI converter (mounts on guitar). Switchable pitchbend range, Mono and Poly modes (with or without pitchbend), MIDI transpose (plus or minus 3 octaves). Built-in guitar tuner.

### STARR LABS

#### UATH-108 MicroZone Keyboard

**MSRP** Contact manufacturer **DESCRIPTION** 810 velocity-sensitive programmable microtonal keypads. Transmits velocity, channel aftertouch, and polyphonic aftertouch. Programmable wheels, sliders, buttons, ribbon, joystick, CV pedals, and breath. Included software generates tuning maps for Kurzweil K2500 and other synths in arrangements of up to 192 tones per octave. Removable keypad caps provide user-definable visual patterns. Programmable zones assignable to 32 onboard presets. Polyphonic key aftertouch. 4 programmable sliders and 4-way joystick. Road case

#### Z-Harp

**MSRP** \$3,500 **DESCRIPTION** MIDI retrofit for folk harps. Notes 0-127, continuous controllers 1-127, start/stop/continue, pitchbend, program change, volume, modulation, pan, expression, sys-ex.

#### Ztar MiniZ

**MSRP** Contact manufacturer **DESCRIPTION** Guitar controller. Designed for tapping technique. 24-fret fingerboard. Optional breath controller for driving a Yamaha VL 1.

#### Ztar Z1

**MSRP** \$1,395-2,395 **DESCRIPTION** Guitar controller. 6-string by 24-fret velocity- and pressure-sensitive fingerboard with a soft-touch key for each fret and note position. Optional key or string-triggers, 12 optional drum/expression pads, joystick, expression pedals, optional neck-strip sensors and breath controller.

### WALKABOUT

#### Mobile MIDI Keyboard Carriers

**MSRP** \$395 to \$1,095 **DESCRIPTION** Mobile MIDI carrier systems. Alternative carrier system for MIDI keyboard controllers. Requires MIDI wireless. Battery-powered. Tier-bracket option allows user to carry up to two MIDI controllers.

### YAMAHA

#### G50

**MSRP** \$749.95 **DESCRIPTION** Guitar-to-MIDI converter. 128 memory locations. 6 channels of note/pitch/velocity, plus 2 assignable controllers. Includes 13-pin cable.

#### WX5 Wind Controller

**MSRP** \$749.85; Limited Edition, \$799.95 **DESCRIPTION** Wind controller. 16 keys including assignable high keys, octave change keys. 7-octave control range. Pitchbend wheel. Setup switch. Hold



## MIDI Sequencers

MODEL	MSRP	TYPE   # TRACKS   # EVENTS
Doepfer MAQ 16/3	\$699	analog-style sequencer   3 tracks   —
Doepfer Schaltwerk	\$1,395	analog-style sequencer   8 tracks   —
FutureRetro Mobius	\$325	analog-style sequencer   256 tracks   3,580 patterns per song
Kawai ACR-20	\$1,398	sequencer and sound module   16 tracks   50,000 events per song
Kawai DRP-10	\$1,099	sequencer and sound module   16 tracks   50,000 events per song
Kawai Q-80EXE	\$499	sequencer   32 tracks   100,000 events per song
Quasimidi Polymorph	\$1,999	analog-style sequencer   —   —
Quasimidi QM-309	\$1,295	drum machine with sequencer   —   —
Roland MC-303 Groovebox	\$895	drum machine with sequencer   8 tracks   14,000 events per song
Roland MC-505 Groovebox	\$1,595	drum machine with sequencer   8 tracks   95,000 events per song
Roland MC-50mkII MicroComposer	\$795	sequencer   8 tracks X 16 ch/track   40,000 events per song
Roland MC-80/80EX MicroComposer	\$1,295; opt. sound exp. board, \$495	sequencer and sound module   128 tracks   120,000 events per song
Technosaurus Cyclodon	\$329	analog-style sequencer   1 tracks   —
Yamaha MDF3	\$449.95	data filer and sequencer   16 tracks   150,000 events per song
Yamaha QY70	\$599.95	sequencer   24 tracks   128,000 events per song
Yamaha QY700	\$1,495	sequencer   48 tracks   440,000 events per song
Yamaha RM1x	\$899.95	sequencer and sound module   16 tracks   110,000 events per song

switch for keyhold, sustain, and portamento. Program change switch. Includes sax-type mouthpiece, mouthpiece cap, recorder-type mouthpiece.

## ZETA

## Synthony

**MSRP \$2,995** **DESCRIPTION** Bowed string controller. Violin/viola and/or cello MIDI controller with internal MIDI synthesizer. Footswitch control included. Sustain Limit, Hold Type, Preset Save, Preset Delete, accessed with footswitch.

## MIDI Retrofits

## BIG BRIAR

## MOOG Lintronics MIDI Converter for Minimoog

**MSRP Kit, \$295; installed, \$495** **DESCRIPTION** MIDI retrofit for the Minimoog by Bob Moog.

## ENCORE

## JP8MK

**MSRP \$275** **DESCRIPTION** Roland Jupiter 8 MIDI retrofit and memory expansion.

## OB8MK

**MSRP \$175** **DESCRIPTION** Oberheim OB8 MIDI retrofit.

## OBXMK

**MSRP \$250** **DESCRIPTION** Oberheim OBX MIDI retrofit and memory expansion.

## SMK

**MSRP \$250** **DESCRIPTION** Moog Source MIDI retrofit.

## JKJ

## CV-4

**MSRP \$199; Hz/V option, \$25** **DESCRIPTION** MIDI to CV converter for monophonic analog synths. External unit or internal board. Pitch, Gate/S-trigger, and filter outputs. Also, AUX output for duophonic CV or additional controller.

## CV-5

**MSRP \$249; Hz/V option, \$25** **DESCRIPTION** MIDI to CV converter for monophonic analog synths. External unit or internal board. Pitch, Gate/S-trigger, and filter outputs. Pan and volume control of any synth via MIDI. Also, three assignable outputs for second synth channel, sequencer controls, duophonic CV, or additional controllers. High-quality portamento, pitch bend, and LFOs. Many controller routings. DIN sync out.

## PME

## Daughter Board Docking Station

**MSRP \$159** **DESCRIPTION** DBDS box turns GM, XG wavetable daughterboard normally used with soundcard into stand-alone External MIDI sound modules. Easy interface: MIDI in, MIDI thru, audio line outputs.

## SYNHOUSE

## MIDIJack

**MSRP \$99** **DESCRIPTION** Analog interface for most analog monophonic synths. Provides 99 MIDI channel selection, MIDI panic button, MIDI Off mode, CV/gate control, MIDI On mode, 4-note buffer, single note triggering, multiple note triggering, MIDI transpose select mode, analog CV calibration mode. Receives MIDI Note On, Note Off, and sustain (CC# 64).

## MIDI Interfaces Under \$100

MODEL	MSRP	TYPE   MIDI I/O   SYNC TYPE
Digital Music MX-285	\$89	MIDI patch bay,   2 in X 8 out   —
MIDIMan Midisport 1x1	\$69.95	USB MIDI interface for Mac and PC   1 in X 1 out   —
MOTU FastLane-USB	\$59	USB MIDI interface for Mac and PC   2 in X 2 out   —
MOTU PC-MIDI Flyer	\$79	MIDI interface for PC   2 in X 2 out   —
Opcode MIDI Translator II	\$59.95	MIDI interface for Mac   1 in X 3 out   —
Opcode Music Quest PC MIDI Card II	\$99.95	MIDI interface for PC   1 in X 1 out   —
Steinberg USB-2-MIDI Interface	\$99	USB MIDI interface for Mac and PC   2 in X 2 out   —



Steinberg Midex8



Mark of the Unicorn (MOTU) MIDI Timepiece AV

## MIDI Interfaces and Processors

MODEL	MSRP	TYPE   MIDI I/O   SYNC TYPE
Digital Music MX-28M	\$149	MIDI patchbay and merger   2 in X 8 out   —
Digital Music MX-8	\$399	MIDI patch bay   6 in X 8 out   —
Doepfer MCV4	\$120	MIDI/CV interface   1 in X 4 CV out   —
Edirol Roland Super MPU 64	\$249	MIDI interface for PC   4 in X 4 out   MTC
Edirol Roland Super MPU-II	\$295	MIDI interface for PC   2 in X 2 out   MTC
Emagic AMT8	\$499	USB interface and patch bay for PC, Mac   8 in X 8 out   MMC, MTC
Emagic MT4 MIDI Transmitter Four	\$199	USB MIDI interface for Mac and PC   2 in X 4 out   MTC
Emagic Uinitor8 MkII	\$799	USB interface for Mac, PC   8 in X 8 out   MMC, SMPTE, MTC, VTC
Encore Expressionist	\$599	MIDI/CV interface   8 channels   —
Frontier Design Sierra	\$299	MIDI interface for PC   8 in X 8 out   MTC, SMPTE
JLCooper MLA-1	\$359.95	MIDI patch bay, MIDI line amplifier   4 in X 4 out   —
JLCooper MLA-10	\$499.95	MIDI patch bay, MIDI line amplifier   4 in X 4 out   —
JLCooper MMC 9 Pin	\$499.95	MIDI interface for PC   —   SMPTE, MTC, MMC-to-Sony 9-pin
M Audio BiPort 2x4	\$179.95	MIDI interface for Mac and PC   2 in X 4 out   MTC, SMPTE
MIDI Solutions Breath Controller	\$199	Breath control interface   1 in X 1 out   —
MIDI Solutions F8	\$329	MIDI footswitch controller   1 in X 1 out   MMC, MTC
MIDI Solutions Footswitch Controller	\$119	MIDI foot controller   1 in X 1 out   MMC, MTC
MIDI Solutions M8	\$279	MIDI merger   8 in X 1 out   MMC, MTC
MIDI Solutions Mapper	\$119	Realtime MIDI mapper   1 in X 1 out   MMC, MTC
MIDI Solutions Merger	\$79	MIDI merger   2 in X 1 out   MMC, MTC
MIDI Solutions Pedal Controller	\$19	MIDI foot controller   1 in X 1 out   —
MIDI Solutions Quadra Merge	\$129	MIDI merger   4 in X 1 out   MMC, MTC
MIDI Solutions Quadra Thru	\$59	Active MIDI thru box   1 in X 1 out   MMC, MTC
MIDI Solutions R8	\$429	MIDI-controlled relay array   8 in X 1 out   MMC, MTC
MIDI Solutions Relay	\$119	MIDI/CV interface, MIDI-controlled relay switch   1 in X 1 out   —
MIDI Solutions Router	\$119	MIDI message router   1 in X 2 out   MMC, MTC





MIDIMan MIDISport1x1

## MIDI Interfaces and Processors (cont'd)

MODEL	MSRP	TYPE   MIDI I/O   SYNC TYPE
MIDI Solutions T8	\$199	Active MIDI thru box   1 in   1 out   MTC, MMC
MIDI Solutions Thru	\$49	Active MIDI thru box   1 in X 1 out   MMC, MTC
MIDI Solutions Velocity Converter	\$119	MIDI velocity processor   1 in X 1 out   MMC, MTC
MIDMan BiPort 2x4	\$179.95	MIDI interface for Mac and PC   2 in X 4 out   MTC, SMPTE
MIDMan Midisport 2x2	\$129.95	USB MIDI interface for PC and Mac   2 in X 2 out   —
MIDMan Midisport 4x4	\$199.95	USB MIDI interface for Mac and PC   4 in X 4 out   —
MIDMan Midisport 8x8	\$499.95	USB/serial MIDI interface for PC, Mac   8 in X 8 out   MTC, SMPTE
MOTU micro express	\$295	USB interface for Mac, PC   4 in X 6 out   MTC, SMPTE, MMC
MOTU MIDI Express XT	\$395	USB interface for Mac and PC   8 in X 9 out   MTC, SMPTE, MMC
MOTU MIDI Timepiece AV	\$595	MIDI interface for PC, Mac   8 in X 8 out   word clock, ADAT sync, Digidesign Super Clock, MMC, MTC, SMPTE, LTC
MOTU Pocket Express	\$165	MIDI interface for Mac and PC   2 in X 4 out   SMPTE, MTC
Opcodes MIDIport 32	\$149.95	USB MIDI interface for Mac and PC   2 in X 2 out   —
Opcodes MIDIport 96	\$349.95	USB MIDI interface for Mac and PC   6 in X 6 out   —
Opcodes Music Quest 2 Port/SE	\$199.95	MIDI interface for PC   2 in X 2 out   MTC, SMPTE
Opcodes Music Quest MQX-32 M	\$249.95	MIDI interface for PC   2 in X 2 out   SMPTE
Opcodes Studio 128X	\$449	USB MIDI interface for PC and Mac   8 in X 9 out   MTC, SMPTE
Opcodes Studio SLX	\$1,195	MIDI interface for Mac   15 in X 15 out   MMC, MTC, SMPTE
Opcodes Studio 64X	\$349.95	MIDI interface for Mac and PC   4 in X 6 out   MTC, SMPTE, MMC
Opcodes Studio 64XTC	\$549.95	MIDI interface for Mac and PC   4 in X 6 out   Digidesign Super Clock, MMC, MTC, SMPTE, word clock, ADAT sync
Opcodes Translator PC	\$149.95	MIDI interface for PC   2 in X 2 out   —
Opcodes Translator Pro	\$109.95	MIDI interface for Mac   2 in X 6 out   —
Russian Dragon RD-R3	\$299	timing accuracy meter   —   —
Steinberg Midex 8	\$449	USB MIDI interface for Mac and PC   8 in X 8 out   —
Wavefront Technologies MIDI-Wave	\$675	Theremin MIDI/CV interface   1 in X 1 out   —



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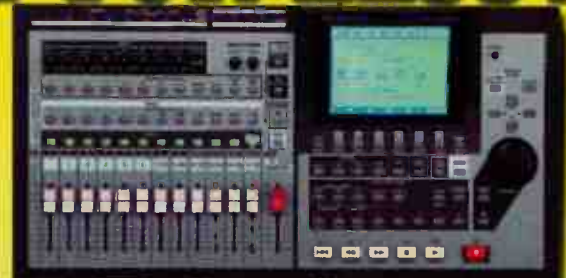
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# GROOVE & RHYTHM



The word of modern pop music relies more on rhythm than ever before — as evidenced by the current popularity of dance styles, and the cross-pollination of dance-influenced rhythms into everything from rock to rap to country music.

“Getting your groove on” means different things to different musicians and engineers, and — depending on what you’re doing and trying to accomplish — the tools used to add rhythm and percussion can vary just as widely. In some cases, what’s needed is a drum machine, which is generally oriented toward those who want a “drummer in a box.” A drum machine includes percussion sounds (often a lot of percussion sounds) as well as the ability to program drum patterns and fills using those sounds and to string those patterns and fills together to create complete rhythm tracks for songs. Drum machines can be heard in virtually all styles of music, from country to rap to jazz to the latest heavy metal styles — see below for more on drum machines.

Groove boxes, on the other hand, tend to be found more in the world of dance and electronic music. These devices can often fulfill some of the functions of a drum machine, but their main thrust is working with looped audio material to create rhythmic tracks. In addition, groove boxes may provide support for sampling and for recording and editing basic audio tracks — some groove boxes are so full-featured that

they can almost be considered self-contained groove studios.

But not all rhythm tracks are coming from machines these days; percussion controllers played by “real” players are as popular as ever. You’ll find manufacturers producing everything from controllers that emulate ethnic hand drums and marimbas, as well as unique percussion-based alternate controllers and complete drumset controllers. If you’re a drummer or percussionist who uses

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one of these types of controllers — or if you’re a keyboardist or programmer who regularly uses percussion sounds — you’ll definitely want to check out the dedicated rhythm and percussion sound modules listed here.

## BUYER’S TIPS: DRUM MACHINES

If you’re not working with a sequencer, a drum machine may be a very important purchase. It’s tough to record acoustic drums in most home and even some project studios. Even if you can physically manage the task, getting a good sound will still be difficult. A drum machine provides an easy solution, at least for creating demos and composing. If you feel the need to add live drums, you can always do so at a later point.

Look for a model with a good selection of sounds you like — if the sounds don’t do it for you, all the bells and whistles in the world aren’t going to help. Having a ton of

## Groove Samplers

Also see Synth Workstations on page 13, Software Synths, Samplers, and Plug-Ins on page 16, Hardware Samplers on page 20

MODEL	MSRP	SAMPLE COMPATIBILITY   POLYPHONY   FILTERS
Akai MPC2000XL	\$1,549	Akai, E-mu, Roland   32 voices   resonant, lowpass
E-mu / Ensoniq ASR-X	\$1,595	Roland, Ensoniq, Akai   32 voices   bandpass, resonant, lowpass, highpass
Electrix Repeater	\$219.95	realtime loop recording, overdubbing, time-stretching and pitch-bifiting, sync loops to audio or MIDI
Gemini DS-1224	\$219.95	—   —   —
Gemini DS-2024	\$249.95	—   —   —
Korg Electribe ES-1	\$599	—   12 voices   resonant
Roland SP-202	\$595	—   4 voices   lowpass
Roland SP-808	SP-808 \$1,695; SP-808PFO, \$2,195; SP-808-OP1 exp., \$445	—   4 stereo voices   resonant, bandpass, notch, highpass, EQ, lowpass, resonant, multimode
Roland SP-808EX	\$1,695	—   4 stereo voices   notch, lowpass, resonant, bandpass, EQ, highpass
Yamaha A3000 v.2	\$1,995	Yamaha, Roland, E-mu, Akai, AIFF, WAV   64 voices   bandpass, EQ, lowpass, notch, resonant, highpass
Yamaha SU200	\$499.95	—   6 voices   lowpass
Yamaha SU700 Loop Factory	\$1,295	Akai, Yamaha A3000 (wave only), AIFF   64 voices   EQ, lowpass, resonant

## Percussion Sound Modules

See also Synth Modules on page 14

MODEL	MSRP	TYPE   SOUNDS   SYNTH TYPE
Alesis DMS	\$449	rack or standmount percussion sound module   550 sounds   sample playback
Alesis DM Pro	\$899	rack or standmount percussion sound module   1,536 sounds   sample playback
Roland TD-10	\$1,895	table-top percussion sound module   600 sounds   DSP modeling
Roland TD-5	\$645	rack or standmount percussion sound module   210 sounds   sample playback
Roland TD-7T	\$875	rack or standmount percussion sound module   499 sounds   sample playback

## Electronic Drums and Drum Triggers

MODEL	MSRP	DESCRIPTION   PADS   SOUND SOURCE
Clavia Ddrum 4 System One	\$3,595	drum pad set with sound module   10 pads   sample playback
K&K Sound Big Trig 5-pack	\$129	ultra-high sensitivity drum triggers with quickmount heads   -   -
K&K Sound Hot Cymbal	\$39	cymbal pickup/transducer   -   -
K&K Sound Kick Guard	\$118	eliminates double trigger errors and delay   -   -
K&K Sound Kick Star	\$44	kick drum trigger   -   -
K&K Sound Rim Spot Drum Hoop Trigger	\$44	ultra-sensitive drum rim trigger   -   -
K&K Sound Trig Master	\$359	analog 10-channel rack-mount trigger impulse filter for triggering acoustic drums   -   -
K&K Sound Trig Star	\$33	universal head-mount drum trigger   -   -
K&K Sound Trigger Guard Standard	\$66	1/2" piezo trigger   -   -
K&K Sound Trigger Guard Super	\$69	3/4" piezo trigger   -   -
Pintech CK-8 Cocktail Kit	\$678	drum pad set   6 pads   -
Pintech CS/1 ConcertCast Professional Kit	\$1,178	drum pad set   9 pads   -
Pintech TS/1 Sensorac	\$678	drum pad set   8 pads   -
Roland Stage Set	\$2,595	drum pad set with sound module   10 pads   TD-71 sound module
Roland Trap Set	\$1,495	drum pad set with sound module   6 pads   TD-5 sound module
Roland V-Pro Set	\$4,495	drum pad set with sound module   11 pads   DSP-based sound engine
Yamaha DDS0	\$299.95	drum pad set with sound module   -   PCM
Yamaha DD9	\$139.95	drum pad set with sound module   -   PCM
Yamaha DS12	\$2,715	drum pad set with sound module   12 pads   PCM
Yamaha DTXPRESS	\$1,295	drum pad set with sound module   4 pads, 2 cymbals, 1 kick, 1 hi-hat   sample playback



# MIXERS



**T**he mixer is the nerve center of the recording studio. Whether you've got one keyboard, a completely MIDI-synth based rig, a computer-based hard disk recorder, or a hybrid tape/computer/MIDI rig, the mixer is where you combine and route signals and feed your effects boxes, mixdown recorders, and studio monitors.

As you're choosing your mixer, take a look at the number of input channels you'll need. Do you need all mono ins, or are you mainly mixing stereo keyboard outputs? How many microphones do you want to record at once? You'll need that many mic preamps. (Remember that just because a mixer doesn't have XLR connectors doesn't mean it's lacking mic preamps. Balanced and unbalanced 1/4" connectors sometimes also serve as mic inputs.) Do you need tape returns, or are all your tracks combined inside a computer-based system, requiring only a stereo output? Estimate the total number of channels you'll need, then add a few extra for good measure; it's the rare studio that doesn't grow. If you plan for

expansion now, you won't have to buy a bigger mixer next year.

Once you've sussed out your input needs, consider how many outputs you'll need to feed at once. Just because you have an eight-track recorder doesn't mean you need an eight-bus console (although extra busses can serve other functions besides just feeding a multitrack). Don't forget to look at the number of aux sends and returns you'll need for connecting your reverbs and effects processors.

How much EQ do you really need? If all your inputs are coming from keyboards and samplers, your EQ needs may be fairly modest; high and low shelving may cover it. If you're trying to compensate for poor mics, instruments, voices, or room acoustics, more powerful EQ may be called for; an EQ section on each channel with one or even two sweepable mids should do the job.

As you're shopping, look for a mixer that fulfills your connectivity requirements, has flexible routing and EQ (if necessary), and above all that is clean. Practically every sig-

## Mixers

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## The Digital Mixer Advantage

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## Studio Mixer Basics

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nal produced in your studio will pass through that mixer at least once, and probably several times during the course of a project. Because of this, we'd sacrifice extra bells and whistles for a cleaner signal path every time. How can you tell how clean the board is? Check out the specs to start with, but the best test is to use your ears: Does the mixer hiss when the faders are pushed up but there's no gear connected to its inputs? (Every component has some self-noise, but you should have to listen carefully to hear it, especially if only a few faders are raised.) Do the highs sound veiled, or is the midrange edgy? Does the bass seem tight, or is it mushy? Try to listen to signals you're familiar with using speakers you know well.

In the old days budget mixers were, shall we say, less than stellar performers. But the times have changed. Modestly priced mixers can now perform very well, with transparent sound, flexible routing and EQ, plenty of ins and outs, and low noise. You won't, in general, get the "sonic signature" that you would with a high-end "name" console that costs as much as your annual income, but the signals will get through in great shape, and you can always add sound-shaping outboard gear later if you find yourself wanting extra character in your audio.

## Powered Mixers

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX   POWER
Crate Pro Audio PA4	\$349.99	powered mixer	4 in   3-band   onboard FX   60/90W @ 2 ohms
Crate Pro Audio PA4FX	\$399.99	powered mixer	4 in   same as PA4 with digital FX
Crate Pro Audio PA8FX	\$569.99	powered mixer	8 in   same as PA4 with digital FX
Crate Pro Audio PCM8DLX	\$1,099.99	powered mixer	8 in   3-band   onboard FX   2 x 300W @ 2 ohms
Electro-Voice PSX2000	\$2,500	powered mixer, rackmount	10 in/ 3 aux send   7-band   —   2 x 570W @ 4 ohms

## Powered Mixers (cont'd)

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX   POWER
<b>FBT/MIPAD Pickup Mixer 14A</b>	\$1,499.95	powered mixer	14 in/ 2 buss out   3-band   -   250W @ 4 ohms
<b>FBT/MIPAD Pickup Mixer 14AX</b>	\$1,249.95	powered mixer	14 in/ 2 buss out   3-band   -   250W + 250W @ 4 ohms
<b>FBT/MIPAD Pickup Mixer 18A</b>	\$2,299.95	powered mixer	18 in/ 2 buss out   3-band   -   400W @ 4 ohms
<b>FBT/MIPAD Pickup Mixer 18AX</b>	\$1,999.95	powered mixer	18 in/ 2 buss out   3-band   -   400W @ 4 ohms
<b>FBT/MIPAD Pickup Mixer 8A</b>	\$999.95	powered mixer	8 in/ 2 buss out   3-band   -   100W + 100W @ 4ohms
<b>FBT/MIPAD Pickup Mixer 8AX</b>	\$799.95	powered mixer	8 in/ 2 buss out   3-band   -   100W @ 4 ohms
<b>Fender LTB Mixer System</b>	\$599.99	powered mixer	4 in/ 1 dir. out   1-band each input, 3-band master   onboard FX   80W @ 4 ohms
<b>Fender LX 1504</b>	\$429.99	powered mixer	4 in/ 1 dir. out/ 1 aux send   2-band   onboard FX   150 @ 4 ohms
<b>Fender LX 1506</b>	\$499.99	powered mixer	6 in/ 1 dir. out/ 1 aux send   2-band   onboard FX   150W @ 4 ohms
<b>Fender PX2212D</b>	\$1,799.99	powered mixer	12 in/ 4 aux send   -   onboard FX   -
<b>Fender SR 6 520 P</b>	\$629.99	powered mixer	6 in/ 1 dir. out/ 2 aux send   3-band inputs, 9-band graphic outputs   onboard FX   520W @ 2 ohms
<b>Fender SR 8 520 PD</b>	\$1,099.99	powered mixer	8 in/ 1 dir. out/ 2 aux send   3-band inputs, 9-band graphic outputs   onboard FX   520W @ 2 ohms
<b>Fender SRM 6 302</b>	\$729.99	powered mixer	6 in/ 2 dir. out   3-band tone inputs, 9-band graphic output   onboard FX   150W @ 4 ohms
<b>Fender SRM 8 302</b>	\$849.99	powered mixer	8 in/ 2 dir. out   3-band tone inputs, 9-band graphic output   onboard FX   150W @ 4 ohms
<b>Redwood Music STK-VM10SD</b>	\$1,129.95	powered mixer	8 in/ 2 aux send   3-band channel, shelving, dual 9-band master graphic, assignable   2 X 350W @ 4 ohms
<b>Redwood Music STK-VM16SD</b>	\$1,649.95	powered mixer	10 in/ 3 aux send   3-band midswEEP, 9-band stereo graphic EQ assignable   onboard FX   2 X 250W @ 4 ohms
<b>Redwood Music STK-VM4E</b>	\$399.95	powered mixer	4 in/ 1 dir. out/ 1 aux send   2-band channels, 3-band master   -   90W @ 4 ohms
<b>Redwood Music STK-VM6E</b>	\$419.95	powered mixer,	6 in/ 1 buss out/ 1 aux send   2-band   -   100W @ 4 ohms
<b>Redwood Music STK-VM6SDE</b>	\$999.95	powered mixer	6 in/ 2 aux send   3-band channel, shelving, dual 9-band master graphic, assignable   -   2 X 250W @ 4 ohms
<b>Redwood Music STK-VM8E</b>	\$649.95	powered mixer	8 in/ 1 buss out/ 2 aux send   3-band channel shelving, 9-band master graphic   -   250W @ 4 ohms
<b>Redwood Music STK-VRM10SD</b>	\$1,199.95	powered mixer, 5U rackmount	8 in/ 2 aux send   3-band channel, shelving; dual 9-band master graphic EQ assignable   -   2 X 350W @ 4 ohms
<b>SHS Audio RX-410</b>	\$449	powered mixer	4 in   2-band parametric   onboard FX   110W @ 4 ohms
<b>SHS Audio RX-6150</b>	\$575	powered mixer	6 in/ 2 aux send   -   onboard FX   100W @ 4 ohms
<b>Spirit by Soundcraft Powerstation 1200</b>	\$1,999.95	powered mixer	16 in/ 2 aux send   -   3-band sweepable mid   onboard FX   600W @ 4 ohms
<b>StuDiomaster Horizon 1208</b>	\$1,895	powered mixer, rackmount	8 in/ 1 buss out/ 4 aux send   3-band w/mid sweep onboard FX   600W x 600W @ 4 ohms
<b>StuDiomaster Horizon 1216</b>	\$2,295	powered mixer	16 in/ 1 buss out/ 4 aux send   3-band w/mid sweep   onboard FX   600W x 600W @ 4 ohms
<b>StuDiomaster Vision 708</b>	\$1,595	powered mixer	8 in/ 1 buss out/ 3 aux send   3-band w/mid sweep   onboard FX   350W x 350W @ 4 ohms
<b>StuDiomaster Vision 712</b>	\$1,795	powered mixer	12 in/ 1 buss out/ 3 aux send   3-band w/mid sweep   onboard FX   350W x 350W @ 4 ohms
<b>Tsunami SE-408N Stereo Boxtop Mixer</b>	\$695	powered mixer	10 in/ 2 buss out   7-band graphic   onboard FX   50W @ 4 ohms
<b>Tsunami TPM-1208S</b>	\$1,595	powered mixer	12 in/ 4 buss out/ 2 aux send   mic 3-band sweep midline, 3-band output, 9-band GEQ   onboard FX   400W @ 4 ohms



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## Fostex

## Powered Mixers (cont'd)

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX   POWER
Tsunami TPM-12125	\$1,797	powered mixer	12 in/ 4 buss out/ 2 aux send   9-band graphic   onboard FX   600W @ 4 ohms
Tsunami TPM-12205	\$1,995	powered mixer	12 in/ 4 buss out/ 2 aux send   9-band graphic   onboard FX   1,000W @ 4 ohms
Yamaha EMX2000	\$999.95	powered mixer	12 in/ 4 buss out   3-band, parametric on input chs, 7-band, graphic on outputs   onboard FX   200W @ 4 ohms
Yamaha EMX620	\$499	powered mixer	6 in/ 1/4 dir. out   2-band, parametric on input chs, 7-band, graphic on outputs   onboard FX   200W @ 4 ohms
Yamaha EMX660	\$649.95	powered mixer	6 in/ 4 buss out   3-band, parametric on input chs and 7-band, graphic on outputs   onboard FX   300W x 2 @ 4 ohms
Yamaha EMXB605T	\$899.95	powered mixer	10 in   —   —
Yamaha EMXB605T	\$899.95	powered mixer	8 in/ 4 buss out   3-band, parametric on input chs and 7-band, graphic on outputs   onboard FX   200W x 2 @ 4 ohms

## The Digital Mixer Advantage

by CRAIG ANDERTON

I think it's fair to say that manufacturers have, by and large, been disappointed with the level of interest in digital mixers. Frankly, I wasn't interested either until I used one for several weeks in the studio while writing a review, and found that it absolutely smoked the analog console I had been using. I became a convert, and now, I could never go back to analog.

Part of the problem has been manufacturers' inability to elucidate a compelling reason to switch to digital. It seems almost all companies are guilty of stressing that their digital console is "as easy to use as an analog console." If you already have an analog console, that's not exactly an earth-shattering sales pitch. And most specs simply relate to the number of busses, inputs, stages of EQ, etc. These specs aren't radically different from analog consoles; in fact, judged by these specs alone, digital consoles aren't really cost-effective because they typically cost more than analog models with equivalent capabilities.

Nor are most musicians, engineers, or music stores looking beyond the hype to see what digital mixers are all about. In the course of talking with people about the topic, I run across the same general reasons for the lack of interest in digital mixing. So, as a public service to *Music Technology Buyer's Guide* readers and digital console manufacturers, let's look at the main objec-

## Digital Mixers

MODEL	MSRP	I/O CONFIGURATION   EQ   FX
Allen & Heath DR128	\$2,995	12 in   DSP-dependent EQ   DSP effects
Fostex VM 04	\$299	4 in   2-band shelving   onboard FX
Fostex VM 200	\$1,499	20 in/ 8 direct buss ADAT digital out, 8 flexible buss out/ 8 dir. out/ 4 aux send   4-band parametric   onboard FX
Mackie Digital 8*Bus	\$9,999	8 buss out/ 24 dir. out/ 12 aux send   4-band parametric   onboard FX
Panasonic WR-DA7	\$5,495	32 in/ 8 buss out/ up to 8 dir. out/ 6 aux send   4-band parametric   onboard dynamics
Roland VM-3100Pro	\$1,295	20 in/ 8 + 2 buss out   3 or 2-band with EQ libraries, 2 shelving and 1 fully parametric   onboard dynamics, onboard FX
Roland VM-7000 Series Digital Mixers	32-channel processor, \$1,995;	94 in/ up to 24 flex buss out/ 48 dir. out/ 16 aux send   highpass plus 4-band   onboard FX
Sony DMX-R100	\$20,000	48 in   DSP-dependent EQ   onboard FX
Soundcraft Digital 324 Live	\$4,799.95	16 in   3-band parametric   onboard FX
Spirit by Soundcraft Digital 328	\$4,999.95	32 in/ 16 dir. out/ 4 aux send   3-band parametric   onboard FX and dynamics
Studer North America D950	\$300,000+	256 in   —   —
TASCAM TM-D1000	\$1,299	16 in   3 out   3-band parametric   onboard FX
Yamaha 01V	\$1,999	24 in/ 4 buss out/ 4 aux send   3-band parametric   onboard FX
Yamaha 02R V.2	\$8,999	40 in/ 10 buss out/ 32 dir. out/ 8 aux send   4-band overlapping parametric per channel   onboard FX
Yamaha 03D	\$1,999	16 in/ 4 buss out/ 4 aux send   4-band parametric   —

tions to digital mixers, and whether they're valid concerns or not.

"I don't like the sound of digital mixers." At one time, that was a valid comment. But times have changed in digital audio-land. Better converter design, improved bit resolution (and even higher bit resolution for internal processing), oversampling, better EQ algorithms, control smoothing, and many other factors have made all digital audio devices (not just mixers) more transparent and accurate. Compare contemporary digital tape recorders, hard disk



Soundcraft K2



## Mixers \$2,000 and Over

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX
Allen & Heath GL2000	\$2,995	analog console	32 in/ 4 buss out/ 6 aux send   —   —
Allen & Heath GL3300	\$7,995	analog console	40 in/ 8 buss out/ 8 aux send   4-band   —
API Legacy Series	\$100,000-\$500,000	analog console	—   —   —
Behringer Eurodesk MX9000	\$2,299	analog console	48 (A+B section), 24 per section in/ 16 buss out/ 24 dir. out/ 6 aux send   A-channels: 4 high, low, 2 semiparametric mid; B-channel, mix: 2-band   —
Crane Song Spider	\$6,000	analog mixer, 4U rackmount	8 in/ stereo buss out   —   onboard dynamics
Crookwood Master Bricks	\$5,000-\$12,000	analog console	2-256 in   —   —
DDA CS12M	Contact manufacturer	analog console	16 in/ 12 buss out   4-band   —
DDA CS3	\$3,990	analog console	4 buss out/ 6 aux send   3-band   —
DDA CS8	\$6,360 and up	analog console	16 in/ 8 buss out/ 16 dir. out/ 8 aux send   4-band   —
Lectrosonics AM16	\$3,750	mic/line mixer	16 in/ 12 buss out   —   —
Millenia Media Mixing Suite	\$15,000	analog mixer, 4U rackmount	80 in/ 4 buss out/ 80 dir. out/ 4 aux send   3-band parametric   optional FX
Neotek Elan	Varies with channels and options	analog console	56 in/ 24 buss out   4-band   onboard FX
Neotek Elite	Varies with channels and options	analog console	24 x 6 in/ 24 buss out   4-band parametric   onboard FX
Neotek Encore	Varies with channels and options	analog console	128 in   4-band parametric   —

machines, sound cards, CD players, and DATs to offerings from the early '90s; the difference is profound. Those same advances have been incorporated into today's digital mixers.

"I tried earlier ones and they sucked." The answer to this is partly the same as the previous paragraph, but in many cases the complaint relates to user interface, not just sound. And admittedly, early devices could be confusing to use. But again, times are changing. Manufacturers are heeding the

call for better interfaces, better support, and better documentation — because if they don't, customers will seek out manufacturers who do. This doesn't negate the fact that the interface is certainly different from an analog console, and because there are more functions, is bound to be more complex. But there's a flip side to that complexity, because you don't have to learn everything all at once. Initially use just the faders and apply some EQ, like an analog console. Over time, you can get into whatever

"power user" functions the mixer offers.

In many ways, you have to realign your thinking somewhat: today's digital mixers are more like musical instruments than simple traffic routers, as you can improve your technique, and discover new sounds, as you delve further into what these babies can do. Although that's more demanding than just twisting knobs and pushing switches, in my opinion the rewards are well worth it.

"I like the sound of analog mixers." This is certainly reasonable; you use gear whose sound you like. But it's important to remember that like analog gear, not all digital gear sounds the same. It's important to audition mixers with program material you know really well so you can make an informed decision about which sounds best to you. Personally, I prefer the sound of a good digital console over analog, because I can always "accessorize" a neutral-sounding mixer to get the warmth I want (tube preamps are a good start). It's much harder to take a mixer that already has a sound, and try to make it neutral.



TASCAM US-428

continued on page 70

# Mixers

## Mixers \$2,000 and Over (cont'd)

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX
Neotek Essence	Varies with channels and options	analog console	32 in   4-band   —
Oram BEQ24	\$47,082	analog console	32 in/ 24 buss out/ 32 dir. out/ 30 aux send   hi and lo shelf, 2 sweep mids, hi cut, sweep lo cut   noise gate
Oram BEQ24 (48-Channel)	\$70,682	analog console	48 in/ 24 buss out/ 48 dir. out/ 30 aux send   hi and lo shelf, 2 sweep mids, hi cut, sweep lo cut   noise gate
Oram BEQ8 (24-Channel)	\$18,165	analog console	24 in/ 8 buss out/ 24 dir. out/ 5 aux send   hi and lo shelf, 2 sweep mids, hi cut, sweep lo cut   noise gate
Oram BEQ8 (32-Channel)	\$23,358	analog console	32 in/ 8 buss out/ 32 dir. out/ 5 aux send   hi and lo shelf, 2 sweep mids, hi cut, sweep lo cut   noise gate
Redwood Music VX3242N	\$2,299.95	mic/line console	28 in/ 4 buss out/ 16 dir. out/ 6 aux send   3-band midsweep with low cut filter   —
SHS Audio CMX-2464	\$2,489	analog console	24 in/ 4 buss out/ 24 dir. out/ 6 aux send   2 + 1 sweepable   —
Sony SRP-V110	\$2,095	analog console	34 in/ 8 RCA buss out/ 8 RCA dir. out   3-band   —
Soundcraft Ghost	\$5,334 (24 ch) to \$7,491 (32 ch)	analog console	32 in/ 8 buss out/ 32 dir. out/ 10 aux send   4-band; 2 parametric, 2 shelving   —
Soundcraft K2	\$10,091 - \$16,282	analog console	24, 32, 40, or 48 in/ 8 buss out/ 8 aux send   4-band sweep   —
Speck XTRAMIXxi	\$2,990	line mixer, 4U rackmount	76 in/ 8 buss out/ 8 aux send   —   —
Spirit by Soundcraft Live 4 squared	\$5,339.95	analog mixer	32 in/ 4 buss out/ 32 dir. out/ 6 aux send   4-band sweepable mids   —
Spirit by Soundcraft LX7	\$2099.95	analog console	24 in/ 4 buss out/ 24 dir. out/ 6 aux send   4-band, 2 sweepable mid   —
Spirit by Soundcraft Spirit 8/40	\$6999.95	analog console	40 in/ 8 buss out/ 40 dir. out/ 6 aux send   4-band, 2 sweepable mid   —
Studiomaster Mixdown Classic MD8C-16	\$2,495	analog console	16 in/ 8 buss out/ 16 dir. out/ 6 aux send   3-band w/mid and bass sweep   —
Studiomaster Mixdown Classic MD8C-24	\$2,995	analog console	24 in/ 8 buss out/ 24 dir. out/ 6 aux send   3-band w/mid and bass sweep   —
Studiomaster Mixdown Classic MD8C-32	\$3,595	analog console	32 in/ 8 buss out/ 32 dir. out/ 6 aux send   3-band w/mid and bass sweep   —
Yamaha GA32/12	\$2,999	analog mixer	32 in/ 12 buss out/ 12 aux send   3-band parametric   —
Yamaha GA32/12	\$3,199	analog console	32 in/ 10 buss out   4-band parametric   —
Yamaha M2500-56	\$12,995	analog console	56 in/ 8 buss out/ 14 aux send   4-band parametric   —
Yamaha M3000-40	\$12,995	analog console	40 in/ 16 buss out/ 40 dir. out   4-band parametric   —
Yamaha MC32/12	\$3,199	analog console	32 in/ 10 buss out   4-band parametric   —
Yamaha MV12/6	see dealer	analog mixer	12 in/ 4 buss out/ 2 aux send.   3-band, parametric on input ch. and 7-band, graphic on outputs   onboard FX
Yamaha MV800	see dealer	analog mixer, 2U rackmount	8 in   2-band, parametric   onboard dynamics
Yamaha PM3500-48	\$55,295	analog console	48 in/ 8 buss out/ 48 dir. out/ 8 aux send.   4-band parametric   —
Yamaha PM4000-48	\$74,999	analog console	48 in/ 8 buss out/ 48 dir. out/ 10 aux send   4-band parametric   —



## Mixers Under \$2,000

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX
Alesis Studio 12R	\$449	3U rackmount	12 in/ 2 buss out/ 2 aux send   high shelving 12kHz, low shelving 80Hz   -
Alesis Studio 24	\$799	analog console	24 in/ 2 buss out/ 8 dir. out/ 4 aux send   3-band sweepable mid-range EQ (1-8), 3-band fixed midrange (stereo channels), 75Hz high-pass filter (ch. 1-8)   -
Alesis Studio 32	\$1,149	analog console	32 in/ 4 buss out/ 16 dir. out/ 6 aux send   3-band, parametric mid-range   -
Ashly Audio LX-308	\$499	line mixer, 1U rackmount	8 in/ 1 dir. out   -   -
Ashly Audio MX-206	\$599	mic/line mixer, 1U rackmount	6 in   -   -
Ashly Audio MX-508	\$1,399	analog mixer, 3U rackmount	8 in/ 2 buss out/ 2 aux send   3-band   -
Behringer Eurodesk MX2442A	\$949	analog mixer	24 in/ 4 buss out/ 6 aux send   3-band   -
Behringer Eurodesk MX3282A	\$1,399	analog mixer	32 in/ 8 buss out/ 8 aux send   3-band   -
Behringer Eurorack MX1604A	\$229	analog mixer	12 in/ 2 + 2 buss out/ 2 aux send   3-band   -
Behringer Eurorack MX1804X	\$449	analog mixer	14 in/ 2 + 2 buss out/ 2 aux send   3-band   onboard FX
Behringer Eurorack MX2004A	\$349	analog mixer	16 in/ 2 + 2 buss out/ 2 aux send   3-band   -
Behringer Eurorack MX2642A	\$469	analog mixer	16 in/ 4 buss out/ 8 dir. out/ 6 aux send   3-band   -
Behringer Eurorack MX3242X	\$1,199	analog mixer	16 in/ 4 buss out/ 16 dir. out/ 6 aux send   4-band   onboard FX
Behringer Eurorack MX802A	\$149	analog mixer	8 in/ 2 buss out/ 2 aux send   3-band   -
Behringer Euroracks MX602A	\$99	analog mixer	6 in/ 2 buss out/ 1 aux send   3-band   -
Behringer Pro Mixer DX100	\$119	DJ mixer	2 dual-input stereo in   3-bands   -
Behringer Pro Mixer DX1000	\$599	DJ mixer	5 dual-input stereo + 2 mic channels / 1 buss out/ 1 aux send   3-band, low kill   -
Behringer Pro Mixer DX500	\$249	DJ mixer	3 dual-input stereo in/ 1 buss out/ 1 stereo aux send   3-band, high kill, low kill,   -
Crate Pro Audio CSM1402	\$579.99	mic/line mixer	10 in/ 2 buss out/ 2 aux send   3-band   -
Crate Pro Audio CSM24	\$949.99	analog mixer	24 in/ 2 buss out/ 4 aux send   3-band   -
Crate Pro Audio CSM24	\$949.99	analog console	24 in   3-band   -
Crate Pro Audio CSM802	\$339.99	mic/line mixer, 2U rackmount	6 in/ 2 aux send   2-band   -
Edirol Roland MX-5	\$225	mic/line mixer	5 stereo in/ 2 dir. out   -   -
FBT/MIPAD Pickup Mixer 14E	\$829.95	analog mixer	14 in/ 2 buss out   3-band   -
FBT/MIPAD Pickup Mixer 14X	\$629.95	analog mixer	14 in/ 2 buss out   3-band   -
FBT/MIPAD Pickup Mixer 18E	\$1,349.95	analog mixer	18 in/ 2 buss out   3-band   onboard FX
FBT/MIPAD Pickup Mixer 18X	\$1,049.95	analog mixer	18 in/ 2 buss out   3-band   -
FBT/MIPAD Pickup Mixer 8E	\$649.95	analog mixer	8 in   3-band   -
FBT/MIPAD Pickup Mixer 8X	\$449.95	analog mixer	8 in/ 2 buss out/   3-band   -
Fostex MN04	\$99	mic/line mixer	4 in   -   -
Furman Sound MM-3	\$199; balanced, \$250	analog mixer	4 in   bass, treble   -
Furman Sound SM-3	\$199; SM-3B balanced \$250	analog mixer, 1/2 rackmount	1 in/ 4 dir. out/ 1 aux send   -   -
Furman Sound SRM-80 Signal Router/Monitor	\$499	mixdown/dubbing mixer	
Gemini BPM-1000	\$549.95	DJ mixer	4 in   26dB cut for low, mid, high   -
Gemini BPM-250	\$389.95	DJ mixer	3 in   26dB cut for low, mid, high   -
Gemini KL-10 Executioner Ten	\$299.95	DJ mixer	2 in   Rotary and switch kills for low, mid, high   -
Gemini KL-19 Executioner Nineteen	\$339.95	DJ mixer, 5U rackmount	2 in   rotary and switch kills for low, mid, high   -
Gemini PS-626 Pro2	\$249.95	analog mixer, free-standing	3 in   26dB cut for bass, mid, high   -

## Mixers Under \$2,000 (cont'd)

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX
<b>Gemini PS-646 Pro2</b>	\$329.95	DJ mixer	4 in   26dB cut for bass, mid, high   —
<b>Gemini PS-676 Pro2</b>	\$339.95	DJ mixer	3 in   26dB cut for bass, mid, high   FX
<b>Gemini PS-700PRO</b>	\$399.95	DJ mixer	4 in   cut for low, mid, high   —
<b>Gemini PS-800 PRO</b>	\$439.95	DJ mixer, 5U rackmount	4 in   cut for low, mid, high   FX   —
<b>Gemini PS-900PRO</b>	\$549.95	DJ mixer, 5U rackmount	4 in   cut for low, mid, high   FX
<b>Mackie 1202 vlx Pro</b>	\$459	analog mixer	12 in/ 2 buss   3-band EQ   —
<b>Mackie 1402 vlx Pro</b>	\$629	analog mixer	14 in/2 buss   3-band EQ   —
<b>Mackie 1642 vlx Pro</b>	\$999	analog mixer	16 in/4 buss/8 out   3-band EQ   —
<b>Mackie LM 3204</b>	\$999	rack mount line mixer	32 in/4 buss   3-band EQ   —
<b>Intelix 8002 MCB</b>	\$649	mic/line mixer, 1U rackmount	8 in/ 2 buss out/ 1 aux send   —   —
<b>Kawai MX16</b>	\$795	analog console	16 in/ 3 aux send   2-band   noise reduction
<b>Kawai MX8BR</b>	\$425	analog mixer, 2U rackmount	8 in/ 2 aux send   —   —
<b>Lectrosonics AM8</b>	\$1,350	mic/line mixer, rackmount,	8 in/ 1 buss out   —   —
<b>Miles Technology MTX-62</b>	\$649	mic/line mixer, 1U rackmount	6 in/ 2 out   2-band   —
<b>Peavey 3D Mix Pro</b>	\$399.99	DJ mixer, 4U rackmount	2 in   —   —
<b>Rane MM8z</b>	\$999	analog mixer, 4U rackmount	9 in/ 1 aux send   3-band shelving   —
<b>Rane MP22z</b>	\$999	analog mixer	9 in/ 2 aux send   3-band shelving   —
<b>Rane MP24z</b>	\$1,299	analog mixer	9 in/ 2 aux send   4-band shelving   —
<b>Red Sound Infader</b>	\$599	DJ mixer	4 in/ 1 aux send   3-band, high kill, low kill, mid kill   3-way xfade
<b>Redwood Music STK-802</b>	\$279.95	mic/line mixer, rackmount or console	6 in/ 2 aux send   3-band on mic channels, 2-band on stereo channels   —
<b>Redwood Music STK-VX1202</b>	\$559.95	mic/line mixer, rackmount or console	8 in/ 3 aux send   3-band midsweep, 3-band shelving on stereo channels   —
<b>Redwood Music STK-VX1602</b>	\$699.95	mic/line mixer	12 in/ 3 aux send   3-band midsweep   —
<b>Redwood Music STK-VX2442</b>	\$1,549.95	mic/line console	20 in/ 4 buss out/ 8 dir. out/ 4 aux send   3-band midsweep with low cut filter   —
<b>Redwood Music STK-VX802FX</b>	\$399.95	mic/line mixer, rackmount or console	6 in/ 2 aux send.   3-band on mic channels, 2-band on stereo channels   onboard FX
<b>Roland DJ-1000</b>	\$895	DJ mixer	2 in   3-band   onboard FX
<b>Roland DJ-2000</b>	\$1,495	DJ mixer	2 in/ 2 aux send   3-band   onboard FX
<b>Roland RX-62</b>	\$295	analog mixer	6 in/ 1 aux send   —   —
<b>Roland RX-82</b>	\$395	analog mixer	8 in/ 2 aux send   2-band shelving   —
<b>Roland VM-3100</b>	\$995	analog console	12 in/ 8 buss out   3-band: 2 shelving with variable freq, 1 parametric   —
<b>Rolls/Bellari/RFX MX902</b>	\$250	mic/line mixer	9 in/ 2 aux send   —   —
<b>Rolls/Bellari/RFX RM203</b>	\$280	line mixer, 1U rackmount	10 in/ 1 aux send   —   —
<b>Rolls/Bellari/RFX RM65</b>	\$320	mic/line mixer, 1U rackmount	6 in/ 2 aux send   2 bands
<b>Rolls/Bellari/RFX RM81 MIX MAX</b>	\$290	mic/line mixer, 1U rackmount	8 ins   tone control   —
<b>Samson Mixpad 12</b>	\$299.99	mic/line console	12 in/ 2 aux send   2-band   —
<b>Samson Mixpad 4</b>	\$189.99	mic/line console	9 in/ 1 aux send   3-band   —
<b>Samson Mixpad 9</b>	\$219.99	mic/line console	9 in/ 2 aux send   2-band   —
<b>Samson MPL1204</b>	\$499.99	mic/line mixer, 4U rackmount	12 in   3-band   —
<b>Samson MPL1502</b>	\$329.99	mic/line console	15 in   —   —
<b>Samson PL1602</b>	\$259.99	mic/line mixer, 2U rackmount	16 in/ 2 aux send   2-band   onboard FX
<b>Samson PL2404</b>	\$499.99	line mixer, 4U rackmount	24 in/ 4 buss out/ 2 aux send   —   —
<b>SHS Audio CMX-1242</b>	\$1,690	console	12 in/ 2 buss out/ 12 dir. out/ 4 aux send   2 band + 1 sweepable   —



## Mixers Under \$2,000 (cont'd)

MODEL	MSRP	CONFIGURATION	I/O CONFIGURATION   EQ   FX
SHS Audio CMX-1664	\$1,990	console	16 in/ 4 buss out/ 16 dir. out/ 6 aux send   2 + 1 sweepable   -
Spirit by Soundcraft Folio FX16	\$1,299.95	analog mixer, 10U rackmount	16 in/ 4 buss out/ 16 dir. out/ 3 aux send   3-band sweepable mid   onboard FX
Spirit by Soundcraft Folio FX8	\$699.95	analog mixer, rackmount	8 in/ 2 buss out/ 8 dir. out/ 2 aux send   3-band sweepable mid   onboard FX
Spirit by Soundcraft Folio Notepad	\$299.95	analog mixer	4 in/ 1 aux send   2-band fixed   -
Spirit by Soundcraft Folio SX	\$849.95	analog mixer	12 in/ 4 buss out/ 12 dir. out/ 3 aux send   3-band sweepable mid   -
Steinberg Niche ACM Audio Control Module	\$499	analog mixer, 1U rackmount	8 in/ 8 dir. out   -   -
StuDiomaster 42-DC	\$84.95	mic/line mixer, 1U rackmount	4 in   -   -
StuDiomaster 42DC-XLR	\$129.95	mic/line mixer, 1U rackmount	4 in   -   -
StuDiomaster C2000-142	\$549.95	analog mixer	12 in/ 2 aux send   3-band w/mid sweep   -
StuDiomaster C2000-182	\$669.95	analog mixer	16 in/ 2 aux send   3-band w/mid sweep   -
StuDiomaster Club 102 - DSP	\$629.95	analog mixer	8 in/ 2 aux send   3-band w/mid sweep   onboard FX
StuDiomaster Club 2000 Series	\$439.95	analog mixer	8 in/ 2 aux send   3-band w/mid sweep   -
StuDiomaster Pro 2-163R	\$849.95	analog mixer	12 in/ 5 aux send   3-band w/mid sweep   -
StuDiomaster Pro 2-203	\$1,049.95	analog console	16 in/ 5 aux send   3-band w/mid sweep   -
StuDiomaster RC - 12	\$359.95	analog mixer, 6U rackmount	8 in/ 2 aux send   3-band on mono channels, 2-band on stereo   -
StuDiomaster Trilogy TR-166R	\$1,195	analog mixer	12 in/ 4 buss out/ 10 dir. out/ 6 aux send.   3-band w/mid sweep   -
StuDiomaster Trilogy TR-206	\$1,395	analog console	16 in/ 4 buss out/ 14 dir. out/ 6 aux send   3-band w/mid sweep   -
StuDiomaster Trilogy TR-326	\$1,795	analog console	24 in/ 4 buss out/ 20 dir. out/ 6 aux send   3-band w/mid sweep   -
Oram MWSC Octamix Combining Amplifier	\$1,295	line mixer, 1U rackmount	8 in: combines 8 sources to 2 separate left-right busses for mono, stereo, or quad   -
Tsunami MX-102	\$425	mic/line mixer	10 in/ 2 aux send   3-band EQ   -
Yamaha MX12/4	\$599.95	analog mixer	12 in/ 4 buss out/ 2 aux send   3-band on input channels, parametric, 7-band, graphic on stereo outputs   -

## Control Surfaces

MODEL	MSRP	SYSTEM COMPATIBILITY
Digidesign ProControl Fader Pack	\$6,495	requires ProControl Master, add up to 3 ProControl Fader Packs for a total of 32 faders controlling Pro Tools
Digidesign ProControl Master Unit	\$11,995	Pro Tools
JLCooper CS-10 2	\$599.97	digital recording systems
JLCooper MCS Panner	\$499.95	digital recording systems
JLCooper MCS-3000 Media Command Station	\$1,999.95	digital recording systems, optional Sony RS-422 interface
JLCooper MCS-3000x Expander	\$1,999.95	digital recording systems
JLCooper MCS-3400 Media Command Station	\$2,499.95	digital recording systems, optional Sony RS-422 interface
JLCooper MCS2 MIDI	\$299.95	digital recording systems using 9-pin RS422, ADB, and RS-232 sync formats
Mackie HUI	\$3,499	Pro Tools 4.1 system III
Mackie UltraMix	\$2,797	Controls any mixer with balanced or unbalanced insert points
TASCAM US-428	\$599	PC and Mac USB audio/MIDI interface and control surface for software DAWs

# Mixers

"I want to be able to see all the controls at one time." For many live applications, this is a totally valid reason not to go digital. Digital mixers, because they use relatively costly motorized faders, restrict the number of physical channels to anywhere from (typically) eight to 24, which isn't enough if you're used to running live mixers with several dozen inputs.

But in the project studio, it's a different story. Many mixers have some sort of "layering"-based design, where you deal with particular groups of faders (e.g., 1-8, 9-16, 17-24, etc.) at a time. Thanks to automation, you can automate the "set-and-forget" channels, then stick them on a layer and let them hang around in the background. Meanwhile, if you want to actually play some faders, you can assign those to the active, physically present layer.

One big advantage of this scenario is that you don't end up being distracted by a zillion controls you're not using (admit it, how many times have you adjusted a control one channel over from the one you really wanted to adjust?). Also, this approach allows for a more compact footprint, leaving more space for your monitors, MIDI controllers, signal processors, etc.



**FBT/MIPAD Pickup Mixer 18 E**

"I use Cubase/Performer/Logic/Vision/ACID, etc., and having a virtual mixer means I don't need one in hardware." Technically speaking, this is true: these types of programs do indeed allow you to do all your mixing on a virtual, on-screen console. But just because you can do it doesn't mean this is the most efficient way to do a mix.

There are two main problems, the first being mixing with a mouse. Mixing one channel at a time is way tedious — an analog would be trying to record a rhythm guitar part by recording one string at a time on each of six tracks. It's possible, but who



**Tsunami Technologies MX-102**

wants to work that way? Feeding a sound card's multichannel digital output (typically an ADAT lightpipe or TDIF connection) into a mixer's digital input lets you use real hardware faders, often with automation (which can typically sync to the MIDI or MTC signal generated by the sequencer). A side benefit of using external faders is eliminating latency; with slower computers, there may be an audible delay in level changes when you use an external hardware box to control the onscreen faders. Even though these changes play back without delay, it can be disconcerting to experience delay while recording.

The second problem with the software-only approach is processor loading. Once you start laying on the tracks and plug-ins, the computer often slows to a crawl. Furthermore, plug-ins have to tread a fine line between sound quality and processor loading. By feeding a digital mixer, you can use the mixer's onboard EQ, dynamics, reverb, etc., thus freeing up the computer's CPU for maximum track count.

Combining a digital mixer as a "front end" with MIDI + digital audio programs gives the best of all worlds: quality audio, a human interface with real faders, minimal processor loading, and the ability to use the software for what it does best — recording, editing, cutting, pasting, and copying.

"I can't afford a digital mixer." While the price tag may initially seem higher than analog models, in many cases you're getting onboard effects, an automation package, a

set of D/A and A/D converters you can interface with other digital gear (DATs, sound cards, samplers, CD-Rs, digital tape machines, etc.), programmability, and a slew of other features. Add these all up, and even the more costly digital mixers can end up looking pretty cost-effective.

For me, the decision to buy a digital mixer was predicated on the assumption that it would save me enough time compared to analog mixing that it would pay for itself within a year. So far, that assumption is right on track. Just being able to recall presets and automation has made a huge difference in working more efficiently.

As I said at the beginning, once you've actually experienced what it's like to work with a digital mixer, you'll have a hard time going back to analog. Yes, analog still has its place; my trusty Mackie LM3204 continues to do a great job as a line mixer for my synths and drum machines. But digital mixing has its place too, and its usefulness will continue to grow in the years ahead.



**Gemini KL-19 Executioner**



# Studio Mixers: Just the Basics

by CRAIG ANDERTON

A mixer is the hardware "audio traffic director" for a multitrack recording system that combines signals (each with its own level control), routes them to appropriate destinations, and provides the mixed (usually stereo) output signal. Mixers may appear intimidating, but they consist of many identical modules; learn one, and you know how 90% of the mixer works.

To illustrate basic mixing principles, consider an eight-input, two-output mixer. Audio signals feed into the mixer inputs, proceed through preamp trims that set each signal's level, then the combined signals feed a common output stereo bus, which goes to your monitoring system and mastering recorder. Think of the input signal path as a vertical, downward flow into the mixer, and the bus (output signal path) as a horizontal flow from left to right out of the mixer (Figure 1; we'll discuss the aux busses later). At the input/bus junction, a fader sets the level. Because the output is usually stereo, there will be a panpot for each channel. Rotating this control places the signal anywhere in the stereo field (left, right, or center).

Typical mixers have anywhere from eight to dozens of inputs.

## GETTING ON THE BUS

Only the simplest mixers have two output busses. Most have several busses (eight-bus mixers are common) and let you set up different mixes on these different busses. The extra busses could be used for surround-sound compatible recordings, adding processing such as echo, or creating a separate, mono mix for compatibility with TV. Mixers are characterized by the number of inputs and outputs. For example, a "24-in, eight-out" (or 24:8) mixer has 24 input channels and eight output busses.

There may even be additional subgroup busses that provide a master volume control for several individual channels. For example, suppose you're mixing a brass section with each instrument assigned to its own channel, and the various channels are perfectly balanced. If you try to increase or decrease the overall level by moving each fader indi-

vidually, you'll probably upset the balance. If these channels feed a subgroup bus, its master control can alter the entire group's level simultaneously.

Each mixer has its own way of sending signals to busses. Options include bus select switches, where a row of pushbuttons sends the input to the selected bus(es), or send controls, which are similar to the main level controls but feed an auxiliary bus instead of the main stereo output bus.

## INPUT MODULES

Each mixer channel has its own input module for processing or routing a signal before sending it to the output bus. Typical features include:

- Preamp to amplify low-level signals, such as microphones
- Clipping indicator that lights if the signal exceeds the mixer's available dynamic range
- Send control(s) that route the audio to auxiliary busses
- Low-cut filter (removes very low frequencies to minimize room rumble, mic "pops," etc.)
- High-cut filter to reduce sibilance and hiss
- Panpot to control the stereo image placement
- Fader to control overall level
- Insert jacks for inserting signal processors on individual channels.

- Preview (or solo) pushbutton, which when activated, mutes all other input modules — handy for making subtle changes in one track that would normally be overwhelmed by the other tracks
- Mute switch, which automatically cuts out (or mutes) its associated channel

One of the most important sections is the equalizer (EQ for short); think of it as a fancy, flexible tone control. A basic EQ might offer boost and cut for treble and bass. A more sophisticated version could have separate controls for frequency, boost/cut, and bandwidth. This would allow dialing in a specific frequency, and boosting or cutting over a narrow range (e.g., to remove hum) or a wider range, to add overall "presence" or "bottom." This type of equalizer is called a parametric equalizer. If the bandwidth is not adjustable, then it's a quasi-parametric type. High-end consoles might have four stages of parametric EQ for each channel. Mid-price models might have one or two parametric stages, with high and low, fixed-frequency boost/cut controls.

While mixing, various sounds sometimes occupy the same part of the audio spectrum and "mask" each other. EQ can separate instruments by shifting the emphasis from one part of the frequency spectrum to another. For example, if background ambience interferes with narration, reduc-

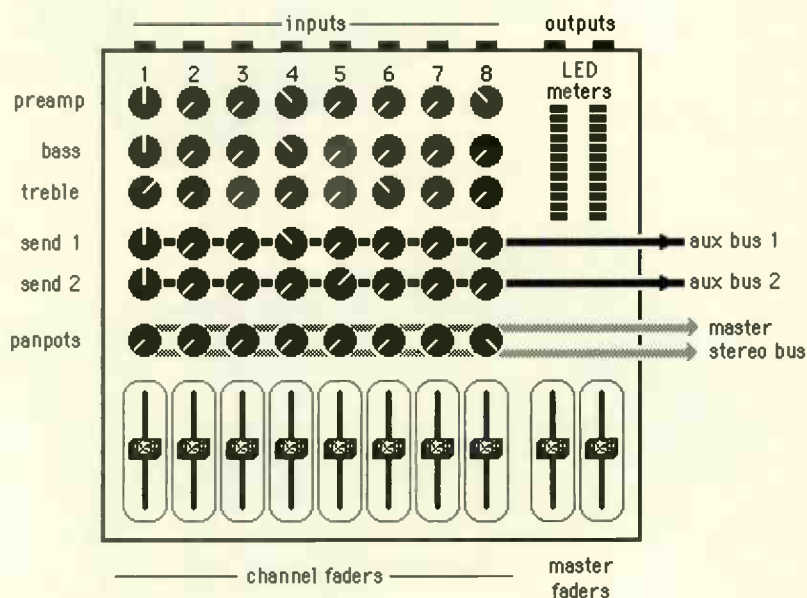


Figure 1



Stanton SK-2F



Redwood Music VX3242N



Studiomastrer RC-12

ing the response of the ambience at speech frequencies creates more audio "space" for the narration.

## MASTER OUTPUT CONTROLS

These provide an overall level adjustment for the master stereo bus (many busses also have master controls). In other words, these controls vary the level of all audio feeding a bus at once.

## SPLIT VERSUS INLINE MIXERS

Mixers tend to come in two flavors, split and inline. Inline mixers feed input signals and multitrack signal returns into the same channels, typically switching between them. Split consoles physically divide the console into two parts, one side or section for tracking, and one for mixing. Split consoles are often physically bigger, but rarely require re-patching, thus speeding up the recording and mixing process.

## METERING

Multi-step LED VU meters generally use different colors to differentiate between ranges of levels (green for normal, yellow for close to overload, and red for overload). The meters may be able to monitor a variety of sources, such as inputs, aux bus outputs, master outputs, etc. Some inputs also have "activity" LEDs. These light up if there's a signal present (which can save a lot of head-scratching if you have a level control turned down accidentally and aren't sure that signals are reaching the mixer).

## DIGITAL CONTROL AND AUTOMATION

Some analog mixers use computer-based, digital control to store preset control settings (e.g., a particular combination of control settings for the verse, chorus, solo, etc.) as well as remember dynamically varying mixing "moves," such as sliding a fader up and down. Digital control can be built into the mixer, or available as an add-on. However, it's more likely that newer mixers will be all-digital, where once an analog signal hits the input jack, it is converted into digital data and processed entirely in the digital domain. Digital mixers almost always offer digital inputs as well, such as S/PDIF, AES/EBU, ADAT optical, or TASCAM TDIF (for more information on digital interfaces, see the article "How to Buy an Audio Interface" on page 122).

Digital control has made mixers easier to use, as a built-in processor can memorize all the control changes you make, and play them back the same way each time. For



# Mixers

example, if the lead singer should be more prominent, just play the mix again while changing the lead singer's track level, and have the computer store only those edits while leaving the other elements of the mix intact.

Computer-based hard disk recording systems often have "virtual" mixers built in, where all controls appear on a computer monitor. These are nonetheless often modeled after traditional mixers, with graphic representations of faders, knobs, meters, etc.

## WHAT TO LOOK FOR IN A MIXER

You'll find that inputs get used up quickly; it's not a bad idea to decide how many inputs you need, then double that. Ditto auxiliary busses, especially if you do remix work that involves lots of analog signal processors.

A bigger decision these days is whether to go analog or digital. A digital console can be extremely cost-effective; some models include dynamics processing and sophisticated EQ for each channel, which if purchased individually would come to more than the price of the console itself. The tradeoff is less obvious operation: an analog mixer has a control for every function, whereas a digital mixer might arrange a limited number of faders into "layers." For example, 16 channel faders might mix channels 1-16 when set to layer A, and channels 17-32 when set to layer B. Digital mixers tend not to be used as much for live performance because of the "hidden" functions and more complex interface.

Digital mixers often require accessory cards to handle different types of inputs, so factor this into your buying decision. For example, there's no way the manufacturer knows whether you use a TDIF or ADAT-based multitrack, so rather than make you pay for features you don't need, you plug in an optional card for either ADAT or TDIF inputs.

Finally, different mixers have subtly different "sonic signatures." This doesn't mean that one will sound better or worse than another, just different. If possible, A-B mixers in which you're interested. One model's sound may click with you better than another's.



Redwood Music STK-VX2442



Rane TTM-S4i

# Hardware Recorders

## Personal Digital Studios (cont'd)

MODEL	MSRP	FORMAT   # TRACKS   MIXER INPUTS   EQ   AUX SENDS
Xytar DMS3232CDRHD	\$11,999	hard disk   32 tracks   32 ins   7-band parametric   32 sends
Xytar DMS832CDR	\$7,499	hard disk   32 tracks   8 ins   7-band parametric   8 sends
Xytar DMS832CDRHD	\$8,999	hard disk   32 tracks   8 ins   7-band parametric   8 sends
Xytar IDMS232CDR	\$2,499	hard disk   32 tracks   2 ins   7-band parametric   2 sends
Xytar SP1632AIO	\$18,999	hard disk   32 tracks   16 ins   7-band parametric   16 sends
Xytar SP2432AIO	\$22,999	hard disk   32 tracks   24 ins   7-band   24 sends
Yamaha AW4416HD	\$3,599	hard disk   16 tracks   8 in   4-band parametric   —
Yamaha MD4S	\$899.99	MiniDisc   8 tracks   4 ins   3-band shelving   —
Yamaha MD8	\$1,399	MiniDisc   8 tracks   8 ins   3-band shelving   2 sends

## Tape-based Digital Multitracks

MODEL	MSRP	format   # Tracks   samplerate/bit depth
Alesis ADAT-LX20	\$1,899	S-VHS tape   8 tracks   48 kHz/20-bit
Alesis ADAT-XT20	\$2,599	S-VHS tape   8 tracks   48 kHz/20-bit
Alesis M20	\$4,999	S-VHS tape   8 + 1 tracks   48 kHz/24-bit
TASCAM DA-98HR	\$6,999	8mm tape   8 tracks   96, 44.1, 48kHz/24-bit



Alesis M20



Alesis ADAT XT20

record tracks will be plenty. If you're miking up a drum kit with several mics, you'll probably need more simultaneous record tracks.

Consider how many mixer channels you'll need. Will you be bringing MIDI tracks into the unit along with the tape tracks, or will everything go to tape and then be mixed down? If the latter, you'll need as many mixer channels as you have tape tracks (although a few extras never hurts). If the former, you'll want as many inputs as you can get.

Next consider which bells and whistles you'll need. Do you need to be able to edit tracks? How about onboard effects (saves buying an external unit)? How much EQ do you need? MIDI gear tends not to need much equalizing; acoustic instruments and vocals may need more and benefit from a sweepable midrange design.

### BUYER'S TIPS: STEREO MIXDOWN RECORDERS

Once you've created your masterpiece, you'll want to mix it down to a medium you can take around to play for others, as well as create archives of your work and put together mixes for possible release. Most studios mix down to a stereo recorder of some sort, whether cassette, DAT (digital audio tape), MiniDisc, or, increasingly, compact disc. (Keep in mind that computer-based CD-R burners have dropped way down in price in the past few years. We haven't included a chart for them here, but if you're using a computer-based audio system, definitely give them a look.)





YAMAHA AW4416



Korg D16



iZ RADAR



YAMAHA CD1000

If your main concern is being able to take your mixes around and play them for other people, mixing down to a good cassette deck is still a viable way to go; very few people outside of studios have DAT machines! While you can use any garden-variety home stereo cassette deck for mix-down, you'll find that a "pro" unit will often be more durable, and may have flatter and wider frequency response. Pro cassette decks are also often rackmountable, a convenient feature for many studios.

MiniDisc offers the benefits of clean digital recording, combined with random access song locating — great for live performance situations where you're playing along with backing tracks. The downsides: Despite the hype, the format has never really taken off. Playback will probably be limited to your studio, and MiniDisc isn't a commonly accepted master format at CD duplication houses.

DAT is widely used in pro studios for its sound quality, portability, and stability. DATs are also accepted by most CD manufacturing houses, should you want to press your music and release it. Like MiniDisc, the downside is that virtually the only place you'll be able to play your tracks will be in studios. In addition to the models listed in our chart, you may want to look around for consumer DAT decks, which can often be had for even lower prices.

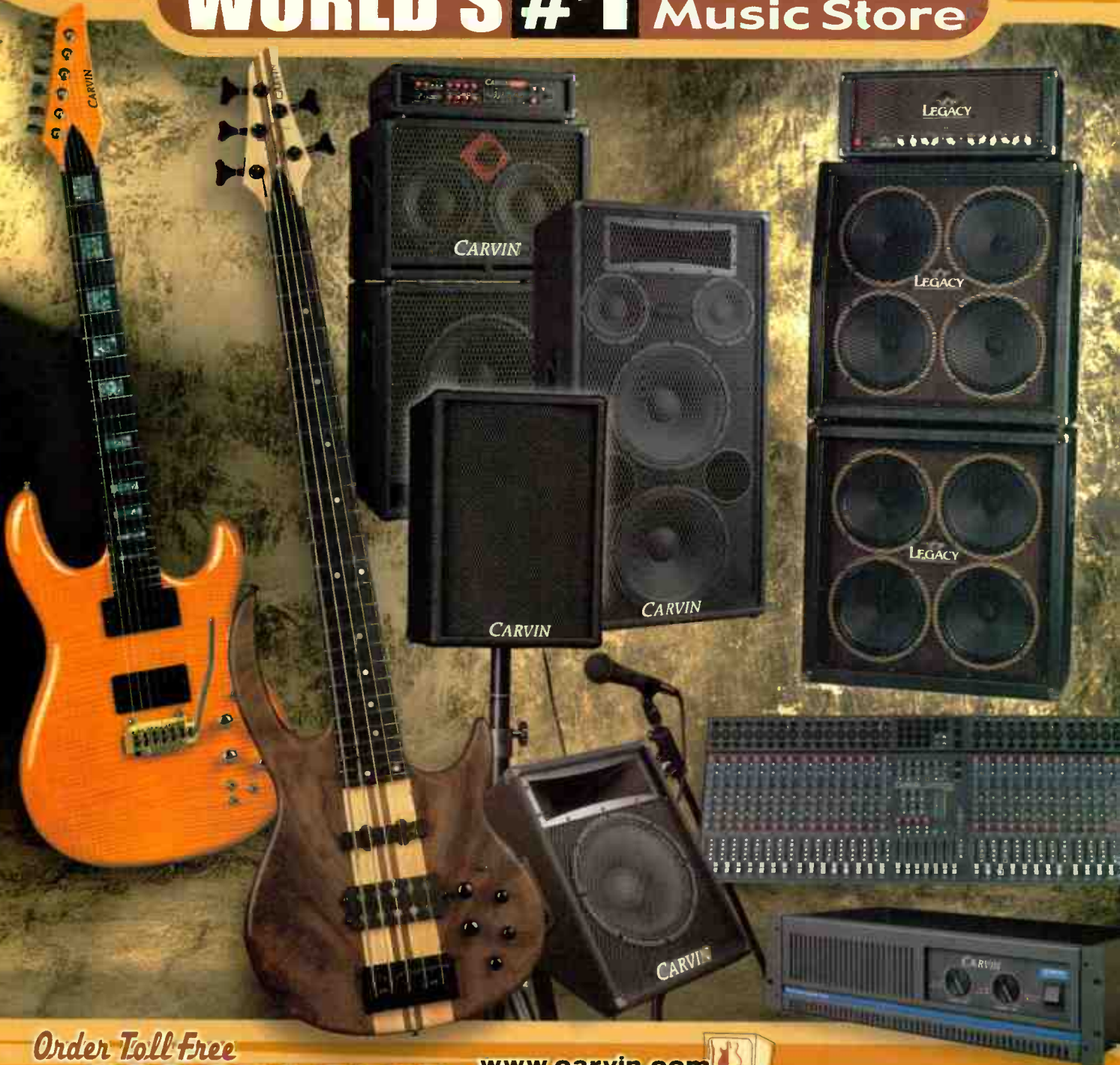
These days, many musicians, engineers, and studios find the best solution is to mix to CD for best sound quality and widest compatibility, although most still have an inexpensive cassette deck around for making dubs you can listen to in your car, give to friends, or send to your mother. Today's CD recorders are as easy to operate as a cassette deck. Plug in your source, drop a disc in the machine, press "record," and you're off. But some new CD recorders can go much further than this, offering support for editing, digital processing and EQ, and support for high-resolution audio formats.



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# MONITORS AND AMPLIFIERS



If you're going to record audio and music, you're going to have to have monitors in your studio. Yes, you can do quite a bit of work using headphones, but most engineers and musicians find that relying solely on headphones is less than ideal.

As with all categories of gear, the types

and numbers of available monitors have expanded greatly. You can choose either passive monitors, which require a separate amplifier (or amplifiers), or powered monitors that contain built-in power amplification. You can also choose to augment your "regular" monitors with a subwoofer — a

## Passive Monitors

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
Alesis Point Seven	\$299	5" carbon fiber and 1" silk dome   85Hz-22kHz +/-3dB   50W
Alesis Monitor One	\$399	6.5" polypropylene woofer, 1" silk dome tweeter   45Hz-18kHz +/-3dB   120W
Alesis Monitor Two	\$699	10" polypropylene, 5" polypropylene, and 1" silk dome   40Hz-18kHz +/-3dB   200W
Ambiance Acoustics California Cube	\$1,295/system	4.5" full-range   38Hz-16.5kHz, -5dB   120W
Ambiance Acoustics Super Cube	\$1,595/system	4.5" full-range   38Hz-16.5kHz, -5dB   200W
Ambiance Acoustics Hyper Cube	\$1,995/system	4.5" full-range   38Hz-16.5kHz, -5dB   250W
ATC Studio Monitors SCM10 Pro	\$1,650	5", 1"   65Hz-20kHz   —
ATC Studio Monitors SCM20 Pro	\$2,500	6", 1"   60Hz-20kHz   —
B & W Nautilus 801	\$11,000/pair	15" kevlar/paper fiber, 6" kevlar, 1" metal dome   37Hz-20kHz, +/-2dB   50-1,000W
B & W Nautilus 802	\$8,000/pair	2 x 8" kevlar/paper fiber, 6" kevlar, 1" metal dome   39Hz-20kHz, +/-2dB   50-500W
B & W Nautilus 803	\$5,000/pair	2 x 7" kevlar/pulp fiber, 6" kevlar, 1" metal dome   42Hz-20kHz, +/-2dB   50-250W
B & W Nautilus 804	\$2,500/pair	2 x 6.5", 6" kevlar, 1" metal dome   45Hz-20kHz, +/-2dB   50-200W
B & W Nautilus 805	\$2,000/pair	6.5" kevlar bass/mid, 1" metal dome   56Hz-20kHz, +/-2dB   50-120W

### Monitors

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type of speaker dedicated to extending the low-frequency (bass) response of a monitoring system. If you're mixing for surround sound applications, or thinking of getting into surround sound, a good subwoofer that matches well with your chosen full-range monitors is essential.

If your needs are more modest, space is at a premium, or you're doing mainly Web audio work, a set of computer speakers may be just what you need. Lots of models are available; look for a set that provides the sound you want at a size that works for you.

### BUYER'S TIPS: MONITORS

Active (self-powered) monitors are all the rage these days and for good reason. Combining the power amplifier, crossover, and speakers into one package is efficient, and the manufacturer can carefully match the response of each component to those of the others.

Does this mean that passive monitors (without built-in power) are a thing of the past? No way; passive monitors are as popular as ever. Many people like choosing their own size and type of power amplifier, and it's generally less expensive to upgrade just your speakers or just your amplifier than it is to replace an active monitoring system.

Most budget studios rely on direct- or close-field monitors; the speakers are relatively small, and usually positioned just a few feet from the listener. Because of this close proximity to your ears, make sure that the monitors you're considering are listenable for long periods of time, and won't cause ear fatigue. Is the midrange harsh? Are the highs edgy or overly brilliant? There's nothing worse than sitting for hours listening to harsh-sounding speakers!

Don't rely too heavily on specs when choosing your speakers. The standards manufacturers use when measuring their

# Monitors and Amplifiers

specs vary wildly, so direct comparisons are often almost impossible. As an example, some frequency-response specs are cited at the -1dB point, some at -3dB, and some at the 10dB down point — there's no way you can make a comparison based on those kinds of variances!

So how do you compare? The only solution is to use your ears. Despite the fact that all manufacturers claim their speakers are "flat," every model listed here sounds different from the others. (Who knows what "flat" sounds like, anyway?) The important thing is that mixes created on your monitors transfer well to other systems. There are two things that affect this: How accurate the monitors are, and even more importantly, how well you know the sound of your monitors and the room you're mixing in. Regardless of whether you choose active or passive system, plan to spend a lot of time listening to them before you ever try to do a mix on them. We have a stack of favorite reference CDs that we always use to familiarize ourselves with monitoring systems and rooms.

If you're going for passive monitors, don't skimp on amplifier power. It's a common misconception that too much power is what damages speakers. In fact, the opposite is true: Under-powering speakers with a weak amp can result in tweeter-frying distortion that will blow your speakers every time. Don't worry about matching power amp wattage to speaker power ratings. Go for a generous amount of clean power, and avoid pushing your amplifier hard. For most studio applications, you'll also want to avoid power amplifiers with built-in cooling fans.

— Mitch Gallagher

## The Art of Monitoring

by CRAIG ANDERTON

All the effort you put into recording, overdubbing, and mixing is for naught if your monitoring system isn't honest about the sounds you hear. The issue isn't simply the speakers; the process of monitoring is

## Passive Monitors (cont'd)

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
<b>Bag End MM-8H</b>	\$1,160	8" cone, 1.75" aluminum compression   95Hz-20kHz (+/- 3dB)   150W
<b>Bag End MM-8</b>	\$1,260	8" cone, 1.75" aluminum compression   95Hz-20kHz (+/- 3dB)   150W
<b>Benson Audio Labs MiniZone</b>	\$199	5.5" long excursion polycone, 1" treated fabric dome   80Hz-20kHz -6dB   60W
<b>Benson Audio Labs StudioStat 8.2</b>	\$1,399	8" cast frame, 2" coil rubber surround composite cone, 5" x 5" electrostatic element   39Hz-21kHz -6dB   200W
<b>Digital Designs DD161d</b>	\$499	6.5" carbon poly, 25mm tweeter   45Hz-22kHz   100W
<b>Digital Designs Magma "c" Series</b>	\$279	6.5" carbon poly with 20 oz. magnet, 20mm tweeter   45Hz-22kHz   100W
<b>Dynaudio Acoustics BM5</b>	\$799	6 1/2" with integrated poly cone, 1" shielded soft dome   55Hz-29kHz +/-2.5 dB   100W
<b>Dynaudio Acoustics BM6</b>	\$1,069	6-1/2" with integrated poly cone, 1" soft dome unit   43Hz-20kHz +/-2.5 dB   100W
<b>Dynaudio Acoustics BM15</b>	\$1,599	9-1/2" with poly cone, 1" ferrofluid-cooled soft dome unit   43Hz-20kHz +/-2.5 dB   250W
<b>Dynaudio Acoustics M1</b>	\$3,199	2 x 6" shielded dynamic unit with integrated poly cone, 1" soft dome   —   300W
<b>Dynaudio Acoustics M1-5</b>	\$4,199	2 x 8" w/ poly cone, 1" soft dome   40Hz-20kHz +/-3 dB   200W
<b>Dynaudio Acoustics M2</b>	\$6,579	2 x 8" with poly cone, 1" soft dome   45Hz-20kHz +/-3dB   400W
<b>Dynaudio Acoustics M3</b>	\$12,129	2 x 12", 2 x 6", 1" soft dome   40Hz-20kHz +/-3dB   350W
<b>Electro-Voice S40</b>	\$634	5.25", 1"   85Hz-20kHz   160W
<b>Electro-Voice Sentry 100</b>	\$612	8", 1.5" dome   45Hz-18kHz   30W
<b>Electro-Voice Sentry 500</b>	\$1,074	12", 1.5" dome   40Hz-18kHz   100W
<b>Event Electronics 20/20 Direct Field Monitor</b>	\$199	8" polypropylene cone, 25mm silk dome   50Hz-20kHz, +/- 3dB   150W program, 200W peak
<b>FBT/MIPAD Esprit ES 3.0</b>	\$459.95	10", 1.25" compression tweeter   70Hz-19kHz   —
<b>FBT/MIPAD FBT MaxX 2</b>	\$399.95	10", 1" compression HF driver   50Hz-20kHz   —
<b>FBT/MIPAD FBT MaxX 2</b>	\$399.95	10", 1"   50Hz-20kHz   —
<b>FBT/MIPAD FBT MaxX 4</b>	\$499.95	12", 1"   50Hz-20kHz   —
<b>FBT/MIPAD FBT MaxX 4</b>	\$499	12", 1"   50Hz-20kHz   400W
<b>FBT/MIPAD Jolly 3</b>	\$199.95	5", 1" dome tweeter   80Hz-20kHz   —
<b>FBT/MIPAD LF 50</b>	\$699	15", 8", 1.25"   60Hz-18kHz   —
<b>FBT/MIPAD LM 60</b>	\$629	12", 1"   50Hz-19kHz   —
<b>Hot House PRM 165</b>	\$1,299/pair	6-1/2"   300Hz-15kHz   —
<b>JBL Professional 4206</b>	\$396	6", 1" dome shielded   65Hz-20kHz +/-2dB   75W
<b>JBL Professional 4208</b>	\$520	8", 1" dome shielded   60Hz-20kHz +/-2dB   75W
<b>JBL Professional 4408A Two-Way Monitor</b>	\$724	8", 1" titanium dome   50Hz-20kHz +/-2dB   100W
<b>JBL Professional 4410A Three-Way Monitor</b>	\$1,000	10", 5", 1" titanium dome   45Hz-20kHz   125W
<b>JBL Professional 4412A Three-Way Monitor</b>	\$1,500	12", 5", 1" titanium dome   45Hz-20kHz +/-2dB   150W
<b>JBL Professional LSR32 Linear Spatial Reference</b>	\$2,242	2", 5", 1"   60Hz-22kHz +/-1.5dB   200W
<b>M&amp;K Professional MPS-1510</b>	\$450	5.25", 1" soft dome   80Hz-20kHz +/- 2dB   —
<b>M&amp;K Professional MPS-1525</b>	\$1,250/ pair	5-1/2", 2 x 3-1/4", 1" soft dome   100Hz-20kHz +/-3dB   —
<b>M&amp;K Professional MPS-1610</b>	\$650	6.5", 1" soft dome   80Hz-20kHz +/- 2dB   —
<b>M&amp;K Professional MPS-1625</b>	\$1,550/pair	6.5", 4 x 3.5", 1"   80Hz-20kHz +/- 2dB   —



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# Monitors and Amplifiers

deceptively complex, as it involves your ears, the acoustics of the room in which you monitor, the amp and cables that drive your monitors, and the speakers themselves. All of these elements work together to determine the accuracy of what you hear.

If you've ever done a mix that sounded great on your system but fell apart when played elsewhere, you've experienced what can go wrong with the monitoring process. Here are some suggestions on getting the most out of your monitors.

## HEARING VARIABLES

Ears are the most important components of your monitoring system. Even healthy, young ears aren't perfect, thanks to a phenomenon quantified by the Fletcher-Munson curve. Simply stated, the ear has a midrange peak and does not respond as well to low and high frequencies, particularly at lower volumes. The response comes closest to flat response at relatively high levels. The "loudness" control on hi-fi amps attempts to compensate for this by boosting the highs and lows at lower levels, then flattening out the response as you turn up the volume.

Another limitation is that a variety of factors can damage your ears — not just loud music, but excessive alcohol intake, deep sea diving, and just plain aging. I've noticed that flying temporarily affects high-frequency response, so I wait at least 24 hours after getting off a plane before doing anything that involves critical listening. The few times I've broken that rule, mixes that seemed perfectly fine at the time played back too bright the next day.

It's crucial to take care of your hearing so at least your ears aren't the biggest detriment to monitoring accuracy. Always carry the kind of cylindrical foam ear plugs you can buy at sporting good stores so you're ready for concerts, using tools (the impulse noise of a hammer hitting a nail is major!), or being anywhere your ears are going to get more abuse than someone talking at a conversational level. (Note that you should not wear tight-fitting earplugs on planes. A sudden change in cabin pressure could cause serious damage to your eardrums.) Your art depends on your ears; care for them.

## Passive Monitors (cont'd)

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
<b>M&amp;K Professional MPS-2510</b>	\$899	2 x 5-1/2", 3 x 1" soft dome tweeters   77Hz-20kHz +/-2dB   —
<b>M&amp;K Professional MPS-2525</b>	\$1,199	2 x 5.25", 4 x 3.5", 3 x 1"   80Hz-20kHz +/- 2dB   —
<b>M&amp;K Professional MPS-2550</b>	\$1,299	2 x 6.5", 2 x 5.25", 3 x 1"   77-20kHz +/- 2dB   —
<b>M&amp;K Professional MPS-2575</b>	\$1,599	2 x 6.5", 2 x 5.25", 4 x 3.5", and 5 x 1" soft dome   77-20kHz, +/-2dB
<b>Martin Audio C115</b>	\$139	5"   80Hz-20kHz   —
<b>Martin Audio C516</b>	\$149	6.5"   80Hz-20kHz   —
<b>Martin Audio LE350A</b>	\$1,559	—   70Hz-18kHz, +/-3dB
<b>Martin Audio W.5</b>	\$729	—   70Hz-18kHz, +/-3dB   300-400W
<b>Martin Audio W1</b>	\$1,219	—   75Hz-18kHz, +/-3dB   —
<b>Martin Audio W2</b>	\$2,019	—   60Hz-18kHz, +/-3dB   400-550W
<b>Martin Audio W8</b>	\$4,679	12", 6.5", 1"   120Hz-18kHz   400W
<b>Martin Audio W8C</b>	\$3,999	12"   120Hz-18kHz, +/-3dB   —
<b>Martin Audio WM0.5</b>	\$740	—   70Hz-18kHz, +/-3dB   300-400W
<b>Paradigm LCR-450</b>	\$500	2 x 6-1/2", 1"   45Hz-22kHz +/-2dB   130W
<b>Paradigm Mini Monitor</b>	\$339	6-1/2", 1"   43Hz-20kHz +/-2dB   80W
<b>Paradigm Monitor 3</b>	\$399	8", 1" dome   36Hz-20kHz +/-2dB   100W
<b>Paradigm Studio/20</b>	\$650	6-1/2", 1"   40Hz-22kHz +/-2dB   100W
<b>PMC PMC TB1S</b>	\$920	170mm, 25mm   40Hz-25kHz   150W
<b>SHS Audio M-12</b>	\$278	12", 4" x 10" Powerline   65Hz-20kHz   150W
<b>SHS Audio MM-15</b>	\$358	15", 5" x 15" Powerline   55Hz-20kHz   200W
<b>SHS Audio SD-15</b>	\$239	15", 3" x 7" high frequency   60Hz-18kHz   150W
<b>Stage Accompany C 24</b>	\$2,445	12", ribbon compact driver   80Hz-30kHz   400W
<b>Stage Accompany C 27</b>	\$2,625	15", ribbon compact driver   55Hz-30kHz   400W
<b>Stage Accompany C 29</b>	\$3,357	2 x 15", ribbon compact driver   45Hz-30kHz   800W
<b>Stage Accompany E 24</b>	\$1,797	12", ribbon compact driver   60Hz-30kHz   400W
<b>Stage Accompany E 27</b>	\$2,007	15", ribbon compact driver   54Hz-30kHz   400W
<b>Stage Accompany L 24</b>	\$2,277	12", ribbon compact driver   80Hz-30kHz   400W
<b>Stage Accompany L 26</b>	\$2,817	2 x 12", ribbon compact driver   80Hz-30kHz   800W
<b>Stage Accompany L 27</b>	\$2,457	15", ribbon compact driver   70Hz-30kHz   400W
<b>Stage Accompany M 44</b>	\$2,385	12", 4" ribbon compact driver   45Hz - 30kHz   400W
<b>Stage Accompany Master M 57</b>	\$3,477	2 x 12", ribbon compact driver   35Hz-30kHz, +/-3dB   800W
<b>Stage Accompany XL-Bin</b>	\$2,805	2 x 15"   52Hz-135Hz   800W
<b>Tannoy Reveal</b>	\$399/Pr	6 1/2", 1" soft dome tweeter   65Hz - 20kHz   50W
<b>Tannoy System 600</b>	\$695/pair	6"   52Hz - 20kHz   80W
<b>Tannoy System 800</b>	\$995/pair	8"   47Hz - 20kHz   90W
<b>Westlake Audio BBSM</b>	\$4,896	Dual 10", 6.5", 1-1/4"   50Hz-18kHz   120W
<b>Westlake Audio BBSM-4</b>	\$2,250	Dual 4", 3/4"   65Hz-20kHz   50W
<b>Westlake Audio BBSM-5</b>	\$2,495	Dual 5", 1.25"   63Hz-20kHz   60W
<b>Westlake Audio BBSM-6</b>	\$3,150	Dual 6.5", 4", 1"   60Hz-20kHz   60W
<b>Westlake Audio BBSM-8</b>	\$3,997	Dual 8", 4", 1"   65Hz-18kHz   100W
<b>Westlake Audio BBSM-12</b>	\$6,998	Dual 12", 6-1/2", 1-1/4"   50Hz-18kHz   120W
<b>Westlake Audio BBSM-45</b>	\$14,745	Dual 15", 10", 1" compression tweeter   38Hz-18kHz   300W
<b>Westlake Audio HR-1</b>	\$27,238	Dual 15" & 10" mid-bass, 2", 1"   34Hz-18kHz   300W



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# Monitors and Amplifiers

## ROOM VARIABLES

As sound bounces around off walls, the reflections become part of the overall sound, creating cancellations and additions depending on whether the reflections are in-phase or out-of-phase compared to the source signal reaching your ears. These frequency response anomalies affect how you hear the music.

Also, placing a speaker against a wall seems to increase bass. This is because any sounds emanating from the rear of the speaker, or leaking from the front (bass frequencies are very non-directional), bounce off the wall. Because a bass note's wavelength is so long, the reflection will tend to reinforce the main wave (see **Figure 1**).

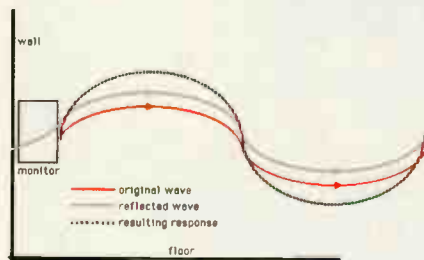


Figure 1

As the walls, floor, and ceiling all interact with speakers, it's important that speakers be placed symmetrically within a room. Otherwise, if (for example) one speaker is three feet from a wall and another 10 feet from a wall, any reflections will be wildly different and affect the response.

The subject of acoustically treating a room is beyond the scope of this article. Hiring a professional consultant to "tune" your room with bass traps and similar mechanical devices could be the best investment you ever make in your music. Some studios use graphic equalizers to "tune" rooms, but this is not necessarily a cure-all (see sidebar).

## NEARFIELD MONITORS

Traditional studios have large monitors mounted at a considerable distance (six to ten feet or so) from the mixer, with the front flush to the wall, and an acoustically treated control room to minimize response variations. The "sweet spot" — the place where room acoustics are most favorable — is designed to be where the mixing engineer sits at the console.

## Passive Monitors (cont'd)

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
Westlake Audio LC 265.1 Center Channel	\$1,347	Dual 6.5", 1"   48Hz - 18kHz   95W
Westlake Audio LC 6.75	\$1,199	6.5", .75"   60Hz - 18kHz   80W
Westlake Audio LC 8.1	\$1,499	8", 1"   55Hz-18kHz   85W
Westlake Audio LC 8.1 SW	\$4,250	Dual 10"   36Hz-20kHz   160W
Westlake Audio LC3W10	\$2,759	10", 5", 1"   42Hz-20kHz   80W
Westlake Audio LC3W12	\$3,399	12", 6 1/2", 1"   38Hz-20kHz   100W
Westlake Audio SM-1	\$58,953	Dual 18" & 12" mid-bass, 2", 1", 1/2" super tweeter   20Hz-20kHz   400W
Westlake Audio TM-3	\$22,948	Dual 15", 2.1", 1"   34Hz-18kHz   300W
Yamaha S1151V	\$415	15", 2"   55Hz-16kHz   500W
Yamaha S15e	\$309	15", 1"   60Hz-14kHz   250W
Yamaha SM151V	\$445	15", 2"   55Hz-16kHz   500W
Yamaha SW1181V	\$515	18"   30Hz-2kHz   500W
Yorkville Sound YSM-1	\$280	6.5", 1"   40Hz-20kHz   70W

## Powered Monitors

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
ATC Studio Monitors SCM20A Pro	\$4,595	9", 3", 1"   60Hz-20kHz   bass: 250W; top: 50W
ATC Studio Monitors SCM50A Pro	\$8,995	9", 3", 1"   38Hz-20kHz   bass, 200W; mid, 100W; top, 50W
ATC Studio Monitors SCM100A Pro	\$10,195	12", 3", 1"   32Hz-20kHz   bass amp, 200W; mid, 100W; top, 50W
ATC Studio Monitors SCM150A Pro	\$11,995	15", 3", 1"   32Hz-20kHz   bass, 200W; mid, 100W; top, 50W
Barbetta Diva G8 and G10	\$1,899	8" or 10" polymer cone, 1" titanium dome   39Hz-22kHz   140W
Barbetta Diva Omnifield G-9	\$1,099	8" rubber surround, 1" titanium dome   39Hz-22kHz   125W bi-amped, 100W woofer, 40W tweeter
Behringer Truth B2031	\$699	22cm polycarbonate, 25mm ferrofluid-cooled dome   50Hz-20kHz   75W high/150W low
Crate Pro Audio PFRSUB	\$649	dual 12"   —   250W
Dynaudio Acoustics BM6A	\$2,599	6-1/2" with poly cone, 1" soft dome unit   42Hz-21kHz +/-2.5 dB   100W low, 100W high
Dynaudio Acoustics BM15A	\$3,599	9 1/2" with poly cone, 1" ferrofluid-cooled soft dome   40Hz-21kHz +/-2.5 dB   200W low, 100W high
Electro-Voice Sentry 100EL	\$1,212	8", 1/5" dome   45Hz-18kHz   30W, 59W
Event Electronics 20/20bas Bi-amplified System	\$499	8", 25mm silk dome   35Hz-20kHz, ±3dB   130W low, 70W high
Event Electronics Project Studio 6	\$349	6-1/2", 25mm   45Hz to 20kHz +/-3dB   70W low, 30W high
Event Electronics Project Studio 5	\$299	5-1/4", 1"   53Hz-19kHz +/-3dB   70W low, 30W high
Event Electronics Project Studio 8	\$424	8", 25mm   35Hz-20kHz, +/-3dB   70W low, 30W high
Event Electronics Tria Triamplified Workstation Monitor System	\$999	8" floor-mounted cone, 5-1/4" cone, 1" soft dome   35Hz-20kHz, ±3dB   80W VLF, 80W low, 40W high
FBT/MIPAD Esprit 3.0A	\$750	10", 1.25" compression tweeter   70Hz-19kHz   200W
FBT/MIPAD FBT MaxX 2A	\$699.95	10", 1"   50Hz-20kHz   LF 200W; HF 50W
FBT/MIPAD FBT MaxX 4A	\$849.95	12", 1"   50Hz-20kHz   400W, 100W
FBT/MIPAD Jolly 3A	\$329	5", 1" dome   80Hz-20kHz   60W
FBT/MIPAD K 250A	\$829	15", 1" K-Series   60Hz-18kHz   250W
FBT/MIPAD LF 40AM Speaker with Monitor	\$1,099	12", 1" HF   60Hz-18kHz   200W



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125 Watts  
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# Monitors and Amplifiers

In smaller studios, nearfield monitors have become the standard way to monitor. With this technique, small speakers sit around three to six feet from the mixer's ears, with the head and speakers forming a triangle (see **Figure 2**). The speakers should point toward the ears and be at ear level; if slightly above ear level, they should point downward toward the ears.

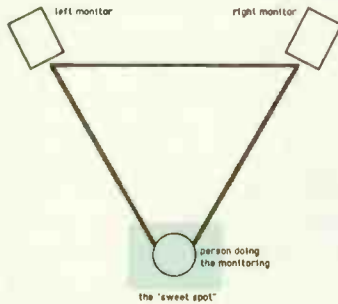


Figure 2

Nearfield monitors minimize the impact of room acoustics on the overall sound, as the speakers' direct sound is far louder than the reflections coming off the room surfaces. They also don't have to produce a lot of power because of their proximity to your ears, which relaxes the requirements for the amps feeding them.

However, placement in the room is still an issue. If placed too close to the walls, there will be bass build-up. Although you can compensate with EQ (or possibly controls on the speakers themselves), the build-up will be different at different frequencies. High frequencies are not as affected because they are more directional.

If the speakers are free-standing and placed away from the wall, back reflections from the speakers bouncing off the wall could affect the sound. You're pretty safe if the speakers are more than six feet away from the wall in a fairly large listening space (this places the first frequency null point below the normally audible range), but not everyone has that much room. My crude solution is to mount the speakers a bit away from the wall on the same table holding the mixer, and pad the walls behind the speakers with as much sound-deadening material as possible.

Nor are room reflections the only problem; with speakers placed on top of a console, near a computer monitor, or close to

## Powered Monitors (cont'd)

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
<b>Fostex 6301</b>	\$229	10cm   80Hz-13kHz   10W
<b>Fostex PS-3</b>	\$349	5-1/4", 3", 1"   70Hz-20kHz +/-3dB   15W to sub, 5W to each satellite
<b>Genelec 1029AP</b>	\$1,070	5", 3/4"   68Hz-20kHz   40W bass, 40W treble
<b>Genelec 1030AM-P</b>	\$2,198	6.5", 3/4"   52Hz - 20kHz   80W LF, 50W HF
<b>Genelec 1031AM</b>	\$4,000	8", 1"   48Hz-22kHz +/-2dB   120W bass, 120W tweeter
<b>Genelec 1031AM-P</b>	\$3,998	8", 1" metal dome   45Hz-21kHz   120W bass, 120W treble
<b>Genelec 1032AM</b>	\$5,000	10", 1" aluminum dome   42Hz-21kHz +/-2.5dB   80W bass, 120W tweeter
<b>Genelec 1037B</b>	\$9,498	12", 5", 1" aluminum dome   37Hz-21kHz +/-2.5dB   180W low, 120W mid, 120W high
<b>Genelec S30C</b>	\$5,800	8", 3.5", 60mm ribbon tweeter   43Hz-25kHz +/-2.5dB   120W low, 120W mid, 120W high
<b>Hot House ARM265</b>	\$6,499/pair	2 x 6-1/2"   32Hz-19kHz +/-1.75dB   2 x 250W
<b>JBL Professional LSR25P</b>	\$489	5.25", 1"   70Hz-20kHz   low, 100W; high, 50W
<b>JBL Professional LSR25P</b>	\$489	5.25"   70 Hz - 20 kHz, +1, -2 dB   LF, 100W; HF, 50W
<b>KRK Expose E7</b>	\$2199.99	7", 1" Kevlar   54Hz-20kHz   140W
<b>KRK Expose E8</b>	\$2,399.99	8", 1" Kevlar   100Hz-4kHz +/-1dB   140W
<b>KRK V4</b>	\$399.99	4", 1"   65Hz-20kHz +/-2dB   HF, 15W; LF, 30W
<b>KRK V6</b>	\$599.99	6", 1" Silk dome   58Hz-22kHz +/-2dB   HF, 30W; LF, 60W
<b>KRK V8</b>	\$899.99	8", 1" silk dome   47Hz-23 kHz +/-2 dB   130W low, 70W high
<b>M&amp;K Professional MPS-2S10P</b>	\$1,499	2 x 5.25", 3 x 1" soft dome   77-20kHz +/- 2dB   150W low, 150W high
<b>Mackie Designs HR824</b>	\$1,499	8.75", 1"   39Hz-22kHz +/-1.5dB   350W biamped, 250W woofer, 100W tweeter
<b>MacPherson Monolith MONO-RD</b>	\$4,895	-   -   -
<b>Martin Audio ICT300</b>	\$939	-   55Hz-18kHz, +/-3dB   400-550W
<b>Martin Audio ICT500</b>	\$1,599	-   45Hz-18kHz, +/-3dB   500-1,000W
<b>Martin Audio W3</b>	\$2,619	-   55Hz-18kHz, +/-3dB   400-550W
<b>Meyer Sound HD-1</b>	\$5,520	8", 1"   32Hz-22kHz   108W bi-amped
<b>NHT Pro A-10</b>	\$1,200	6.5", 1"   48Hz-21kHz   150W
<b>NHT Pro A-20</b>	\$2,000	6.5", 1"   42Hz-21kHz   250W
<b>NHT Pro M-00</b>	\$700	4.5", 1" soft dome   65Hz-21kHz +/-3dB   75W
<b>Paradigm Active-450/LR</b>	\$1,800	2 x 6-1/2", 1" tweeter   38Hz-22kHz +/-1dB   110W bass, 50W high
<b>Paradigm Active/20</b>	\$1,600	6-1/2", 1"   35Hz-22kHz +/-1dB   110W bass/mid, 50W high
<b>Roland DS-90</b>	\$595	6.5", 1"   -   90W
<b>Sevans Pro Audio ATC SCM20A</b>	\$5,100/ pair	150mm, 25MM   60Hz-20kHz   250W low/mid, 50W tweeter
<b>Sevans Pro Audio ATC T-16</b>	\$3,749	150mm, 25mm   60Hz-20kHz   250W
<b>Tannoy System 600A</b>	\$1,595/pair	6.5"   44Hz-20kHz   140W
<b>Tannoy System 800A</b>	\$2,295/pair	8"   44Hz-21kHz   180W
<b>Yamaha MSP10</b>	\$749	8", 1"   40Hz-40kHz   LF, 120W; HF, 60W
<b>Yamaha MSP5</b>	\$299	5", 1"   50Hz-40kHz   LF, 40W; HF, 27W
<b>Yamaha SW10</b>	\$849	10"   25Hz-150Hz   180W



## Subwoofers

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
Acoustic SBT 2.6	\$2,275	26"   25-120Hz   1.20W RMS
Altec Lansing ACS33 Subwoofer	\$49.95	4" long-throw and 3" full-range driver   70Hz-18kHz   —
Bag End Infra-18	\$1,590	18" direct radiating   8Hz-95Hz (+/- 3dB)   400W/400W, built-in ELF integrator
Event Electronics 20/20/15 Subwoofer System	\$1,199	15" down-firing, long-throw driver   28-120Hz   250W
Event Electronics Tria Triamplified Workstation Monitor System	\$999	8" floor-mounted cone, 5-1/4" cone, 1" soft dome   35Hz-20kHz, ±3dB   80W VLF, 80W low, 40W high
FBT/MIPAD EN 5.0A Subwoofer	\$999	12" double coil   45Hz-200Hz   300W
FBT/MIPAD FBT MaxX 9SA Subwoofer	\$1,249.95	15"   40Hz-125Hz   900W
FBT/MIPAD LS 100 Subwoofer	\$659	15"   40Hz-125Hz   —
Genelec 1091AP	\$699	8" cone   38Hz-85Hz +/-2.5dB   70W
Genelec 1092AP	\$2,149	2 x 8" cone   33Hz-85Hz +/-2.5dB   180W
Hot House ASB 110 Compact Studio Subwoofer	\$2,999	10"   16Hz-110kHz   450W RMS
Hot House ASB 112 Mid-Size Studio Subwoofer	\$3,499	12"   16Hz-110Hz   450W RMS
Hot House ASB 115 Pedestal Height Studio Subwoofer	\$3,999	15"   16-110Hz   450W RMS
Hot House ASB 212 Pedestal Height Studio Subwoofer	\$4,999	2 x 12"   16-110Hz   600W RMS
JBL Professional LSR12P Linear Spatial Reference Subwoofer	\$2,446	12"   25-110Hz   250W
M&K Professional LFE-3 Bass Management Controller	\$350	—   —   —
M&K Professional LFE-4	\$800	—   —   —
M&K Professional MPS-2810	\$1,499	2 x 8"   20Hz-120Hz +/- 2dB   200W
M&K Professional MPS-5150	\$1,499	2 x 12"   20Hz-50/125Hz variable   150W
M&K Professional MPS-5310	\$1,999	2 x 12"   20Hz-50/125Hz variable   350W
Tannoy PS110	\$499	10"   30Hz-150Hz   100 W
Tannoy PS115B	\$1,095	15"   33Hz - 130Hz   105W
Westlake Audio BB10-SWP	\$9,850	18"   26Hz-20kHz   200W

other large pieces of furniture or great reflections from those items can cause inaccuracies. To get around this problem, I use a relatively small main mixer, so the nearfields fit to the side of the mixer, and are slightly elevated. This makes as direct a path as possible from speaker to eardrum.

### ANATOMY OF A NEARFIELD MONITOR

Nearfield monitors are available in a variety of sizes and at numerous price points. Most are two-way designs, with (typically) a six-inch or eight-inch woofer and smaller tweeter. While a three-way design that adds

a separate midrange driver might seem like a good idea, adding another crossover and speaker can complicate matters. A well-designed two-way system is better than a so-so three-way system.

There are two main monitor types, active and passive. Passive monitors consist of only the speakers and crossovers, and require outboard amplifiers. Active monitors incorporate any amps needed to drive the speakers from a line-level signal.

With powered monitors, the power amp and speaker have hopefully been tweaked into a smooth, efficient team. Issues such as

speaker cable resistance become moot, and protection can be built into the amp to prevent blowouts. Powered monitors are often bi-amped (e.g., a separate amp for the woofer and tweeter), which minimizes intermodulation distortion and allows for tailoring the crossover points and frequency response for the speakers being used.

If you hook up passive monitors to your own amps, make sure they have adequate headroom. Any clipping generates gobs of high-frequency harmonics, and sustained clipping can burn out tweeters.

### SO WHICH IS BEST?

You'll see endless discussions on the Web as to which nearfields are best. In truth, the answer may rest more on which nearfield works best with your listening space and hearing response. How many times have you seen a review of a speaker where the person notes with amazement that some new speaker "revealed sounds not heard before with other speakers"? This is to be expected. The frequency response of even the best speakers is sufficiently uneven that some speakers will indeed emphasize different frequencies compared to other speakers, essentially creating a different mix.

Although it's a cliché that you should audition several speakers and choose the model you like best, you can't choose the perfect speaker, because such an animal doesn't exist. Instead, you choose the one that colors the sound in the way you prefer.

Choosing a speaker is an art. I've been fortunate enough to hear my music over some hugely expensive systems in mastering labs and high-end studios, so my criterion for choosing a speaker is simple: whatever makes my "test" CD sound the most like it did over the big-bucks speakers wins.

If you haven't had the same kind of listening experiences, book 30 minutes or so at some really good studio (you can probably get a price break since you're not asking to use a lot of the facilities) and bring along one of your favorite CDs. Listen to the CD and get to know what it should sound like, then compare any speakers you audition to that standard.

One caution: If you're comparing two sets of speakers and one set is even slightly louder than the other, you'll likely choose the

# Monitors and Amplifiers

louder one as sounding better. To make a valid comparison, match the speaker levels as closely as possible.

A final point worth mentioning is that speakers have magnets, which, if placed close to monitors, can distort the monitor's display. Magnetically shielded speakers solve this problem.

## LEARNING YOUR SPEAKER AND ROOM

Ultimately, because your own listening situation is imperfect, you need to "learn" your system's response. For example, suppose you mix something in your studio that sounds fine, but sounds bass-heavy in a high-end studio with accurate monitoring. That means your monitoring environment is shy on the bass, so you boosted the bass to compensate (this is a common problem in project studios with small rooms). With future mixes, you'll know to mix the bass lighter than normal.

Compare midrange and treble as well. If vocals jump out of your system but lay back in others, then your speakers might be "midrangey." Again, compensate by mixing midrange-heavy parts back a little bit.

You also have to decide on a standardized listening level. Most pros monitor at low levels when mixing, not just to save their ears, but also because if something sounds good at low volume, it will probably sound even better when you really crank it up. However, this also means that the bass and treble might be mixed up a bit more than they should be to compensate for the Fletcher-Munson curve. So, before signing off on a mix, check the sound at a variety of levels. If at loud levels it sounds just a hair too bright and boomy, and if at low levels it sounds just a bit bass- and treble-light, that's about right.

## WHAT ABOUT HEADPHONES?

Musicians on a budget or in less-than-ideal studio settings (such as apartments) often wonder about mixing over headphones, as \$100 will buy a great set of headphones, but not much in the way of speakers. Although mixing exclusively on headphones isn't recommended, keep a good set of headphones around as a reality check (not

## Computer Speakers

MODEL	MSRP	CONFIGURATION   FREQUENCY RESP.   POWER RATING
Altec Lansing ADA70	\$149	6.5" dual voice coil, 3" full-range driver, 1" dome tweeter   250Hz-20kHz   20W low, 14W high
Altec Lansing ACS44	\$79	4" long throw and 3" full-range driver   35Hz-19kHz   —
Altec Lansing ADA30S	\$199/pair	6" dual voice coil   20Hz-20kHz   20W
Altec Lansing ACS43	\$49.95	—   90Hz-20kHz   —
Altec Lansing ADA880	\$329/pair	8" voice coil, 4 x 3" full-range drivers, 2 x 1" tweeters   20Hz-20kHz   —
Edirol Roland MA-4	\$85	7cm   100Hz-18kHz   4W bass, 4W treble
Edirol Roland MA-8	\$149	10cm, 3cm   80Hz-18kHz   8W bass, 8W treble
Edirol Roland MA-9	\$149	10cm, 3cm   80Hz-8kHz   8W bass, 8W treble
Edirol Roland MA-12C	\$290	10cm   70Hz-17kHz   10W bass, 10W treble
Edirol Roland MA-150U USB	\$179	12cm, 3cm   75Hz-18kHz   15W bass, 15W treble
Rock Solid Sounds S 100	\$200	4", 1"   95Hz-20kHz +/-3dB   10-100W
Samson DMS80 Desktop Monitor System	\$239	5-1/4", dome tweeter   20Hz-20kHz   40W

## Headphone Distribution Amps

MODEL	MSRP	# CHANNELS   MIX CONTROL
Furman	\$419	6   individual mix
Furman	\$220	8   individual mix
Redwood Music	\$299.95	6   individual mix
Samson	\$139.99	5   individual mix
Symmetrix	\$529	6   direct input/output/level control for each individual amp

## Power Amplifiers

MODEL	MSRP	CONT. AV. POWER 8 OHM STEREO   DEPTH   WEIGHT   SPACES
Aguilar Amplification DB 728	\$2,495	400W   19"   55 lbs   4U
Alesis Corporation RA-100	\$349	100W   —   14.3 lbs.   2U
Ashly Audio FTX-1501	\$839	190W   16.5"   46 lbs.   2U
Ashly Audio FTX-2001	\$1,049	290W   16.5"   60 lbs.   2U
Ashly Audio MFA-8000	\$2,299	750W   16.5"   68 lbs.   3U
Ashly Audio SRA-120	\$469	45W   10"   20 lbs.   1U
ATC Studio Monitors SPA150	\$3,699	200W   15"   50 lbs.   4U
Barbetta MM500	\$1,395	200W   19"   27 lbs.   2U
Crate Pro Audio SPA1400	\$599.99	260W   16.75"   36 lbs.   2U
Crate Pro Audio SPA1400C	\$699.99	260W   16.75"   36 lbs.   2U
Crate Pro Audio SPA200	\$399.99	70W   7"   19lbs.   2U
Crate Pro Audio SPA400	\$499.99	125W   15"   27lbs   2U
Crest Audio CA 2	\$790	150W   18"   38 lbs.   2U
Crest Audio CA 4	\$1,050	250W   18"   41 lbs.   2U
Crest Audio CA 6	\$1,350	400W   18"   44 lbs.   2U
Crest Audio CA 9	\$1,790	600W   18"   47 lbs.   2U
Crest Audio CA 12	\$2,390	700W   18"   67 lbs.   3U
Crest Audio CA 18	\$3,390	1,000W   18"   77 lbs.   3U



## Power Amplifiers (cont'd)

MODEL	MSRP	CONT. AV. POWER @ OHM STEREO   DEPTH   WEIGHT   SPACES
Crest Audio V 1500	\$1,390	400W   13.25"   49 lbs.   3U
Crest Audio V 450	\$660	150W   12"   33 lbs.   3U
Crest Audio V 650	\$780	200W   12"   39 lbs.   3U
Crest Audio V 900	\$900	250W   12"   46 lbs.   3U
Crest Audio V 1100	\$1,160	300W   13.25"   47 lbs.   3U
Crest Audio Vs 450	\$590	150W   12"   33 lbs.   3U
Crest Audio Vs 650	\$690	200W   12"   33 lbs.   3U
Crest Audio Vs 900	\$790	250W   12"   36 lbs.   3U
Crest Audio Vs 1100	\$1,050	300W   13.25"   41 lbs.   3U
Crest Audio Vs 1500	\$1,250	400W   13.25"   42 lbs.   3U
Crown CE 1000	\$731	275W   13"   32.9 lbs.   3U
Crown CE 2000	\$1,043	400W   13"   32.9"   3U
Crown CE 4000	\$2,237	600W   16.25"   33 lbs.   3U
Crown CP660	\$864	60W   12.75"   25 lbs.   2U
Crown D-45	\$496	25W   9"   10 lbs.   1U
Crown D-75A	\$652	40W   9"   10 lbs.   1U
Crown K1	\$1,559	350W   16"   32 lbs.   2U
Crown K2	\$1,872	500W   16"   38 lbs.   2U
Crown MA-602	\$1,559	225W   16"   39.9 lbs.   2U
Crown MA-1202	\$1,820	310W   16"   44.1 lbs.   2U
Crown MA-2402	\$2,339	520W   16"   51.12 lbs.   2U
Crown MA-3600VZ	\$3,228	1,120W   16"   55.4 lbs.   2U
Crown MA-5002VZ	\$4,219	1,300W   16"   77.13 lbs.   3U
Crown Micro-Tech 600	\$1,094	225W   16"   36.4 lbs.   2U
Crown Micro-Tech 1200	\$1,407	310W   16"   41.1 lbs.   2U
Crown Micro-Tech 2400	\$1,824	520W   16"   46.14 lbs.   2U
Crown Studio Reference I	\$4,532	800W   16"   60.11 lbs.   4U
Crown Studio Reference II	\$3,124	360W   16"   56.2 lbs.   4U
Electro-Voice 7100	\$545	75W   12.8"   18.2 lbs.   1U
Electro-Voice Eliminator Power Amplifier	\$1,262	-   -   -   -
Electro-Voice P1200	\$1,490	350W   16.8"   37.5 lbs.   2U
Fender Musical Instruments M500	\$679.99	200W   -   -   2U
Furman Sound SP-20A	\$289	20W   8.25"   9 lbs.   -
Gemini P-601	\$379.95	85W   10.5"   18 lbs.   3U
Gemini P-801	\$439.95	125W   10.5"   21 lbs.   3U
Gemini XG-2001	\$439.95	160W   10.5"   22 lbs.   3U
Gemini XG-3001	\$499.95	200W   10.5"   22 lbs.   3U
Gemini XPB-750	\$599.95	175W   -   -   2U
Gemini XPM-600	\$599.95	200W   13.75"   15.8 lbs.   2U
Gemini XPB-1600	\$749.95	300W   -   -   2U
Gemini XPM-900	\$799.95	280W   13.75"   29 lbs.   2U
Gemini XPM-1200	\$899.95	360W   13.75"   31.2 lbs.   2U
Hoffmann Amplification 60	\$699	60W   10"   40 lbs.   3U
Hoffmann Amplification 120W	\$899	120W   12"   50 lbs.   3U
Hot House Four Hundred	\$1,699	125W   12"   28 lbs.   2U
Hot House Fifteen Hundred	\$3,499	350W   13"   45 lbs.   3U

the open-air type that sits on your ear, but the kind that totally surrounds your ear). Sometimes you can get a more accurate bass reading using headphones than you can with nearfields, and when "proofing" your tracks, phones will show up imperfections you might miss with speakers. Careful, though: it's easy to blast your ears with headphones and not know it.

### SATELLITE SYSTEMS

"Satellite" systems use tiny monitors that can't really produce adequate bass in conjunction with a subwoofer, a fairly large speaker that is crossed over at a very low frequency so that it reproduces only the bass region. This speaker usually mounts on the floor, against a wall; placement isn't overly critical because bass frequencies are relatively non-directional.

Although satellite-based systems can make your computer audio sound great or allow a less intrusive hi-fi setup with tight living space, I wouldn't mix a major label project over them. Perhaps you could learn these systems over time as well, but I personally have difficulty with the disembodied bass for critical mixes.

However, using subwoofers with monitors that have decent bass response is another matter. The response of nearfield monitors often starts to roll off around 50-100 Hz, which diminishes the strength of sub-bass sounds. Sounds in this region are a big part of a lot of dance music, and it's important to know what's going on down there. In this case, the subwoofer simply gives a more accurate indication of the bass region sound,

### STRENGTH IN NUMBERS

Before signing off on a mix, listen through a variety of systems — car stereo speakers, hi-fi bookshelf speakers, big-bucks studio speakers, boom boxes, headphones, etc. This gives an idea of how well the mix will translate over a variety of systems. If the mix works, great — mission accomplished. But if it sounds overly bright on five out of eight systems, pull back the brightness just a bit. The mastering process can compensate for some of this, but mastering works best with mixes that are already good.

Many "pro" studios will have big, expensive speakers, a pair of nearfields for reality testing, and some "junk"

# Monitors and Amplifiers

speakers sitting around to check what something will sound like over something like a cheap TV. Switching back and forth among the various systems can help “zero in” on the ultimate mix that translates well over any system.

The more you monitor, the more educated your ears will become. Also, the more dependent they will become on the speakers you use (some producers carry their favorite monitor speakers to sessions so they can compare the studio's speakers to speakers they already know well). But even if you can't afford the ultimate monitoring setup, with a bit of practice you can learn your system well enough to produce a good-sounding mix that translates well over a variety of systems — which is what the process is all about.

## ROOM TUNING WITH GRAPHIC EQUALIZATION

Equalizer-based room tuning involves placing a mic where you would normally mix, feeding pink noise or test tones through a system, and tuning an equalizer (which patches in as the last device before the power amp) for flat response. Several companies make products to expedite this process, such as RTAs (Real Time Analyzers) that include the noise generator, along with calibrated mic and readout. You then diddle the sliders on a 1/3-octave graphic EQ to compensate for anomalies that show up on the readout. Some devices combine the RTA and EQ for one-stop analysis and equalization.

While this sounds good in theory, there are two problems:

- If you deviate from the “sweet spot” where the microphone was placed, the frequency response will change.
- Heavily equalizing a poor acoustical space simply gives you a heavily equalized, poor acoustical space.

It's better to make the corrections acoustically, using devices (such as bass traps) to minimize standing waves, experimenting with speaker placement, and learning your speaker's frequency response. Also, make sure that phase problems and other gremlins aren't the real culprits.

Like noise reduction, which works best on signals that don't have a lot of noise, room tuning works best on rooms that don't have serious response anomalies.

## Power Amplifiers (cont'd)

MODEL	MSRP	CONT. AV. POWER 8 OHM STEREO   DEPTH   WEIGHT   SPACES
Hot House S400	\$2,099	100W   13.4"   34 lbs.   2U
Hot House M 500	\$2,099	150W   13.4"   34 lbs.   2U
Hot House M 500 HV	\$2,499	375W   13.4"   36 lbs.   2U
Hot House Six Hundred	\$2,499	175W   12"   35 lbs.   3U
Hot House One Thousand	\$2,999	350W   12"   38 lbs.   3U
Hot House Two Thousand	\$4,999	390W   19"   95 lbs.   5U
JBL Professional MPX 300	\$988	200W   16.1"   41 lbs.   3U
JBL Professional MPX 600	\$1,428	400W   16.1"   47 lbs.   3U
JBL Professional MPX 1200	\$2,418	800W   16.1"   65 lbs.   3U
Mackie Designs M1400	\$799	250W   16.25"   36 lbs.   2U
Manley Tube Amplifiers	from \$2250 to \$14,000	—   —   —   —
Miles Technology MPR-450	\$999	60W   12.7"   25 lbs.   2U
Peavey GPS 900	\$699.99	450W   —   —   —
Peavey GPS 1500	\$799.99	750W   —   —   —
Peavey GPS 2600	\$1,039.99	1,300W   —   —   —
Peavey GPS 3500	\$1,269.99	1,750W   —   —   —
Peavey PV 1200	\$599.99	—   —   —   3U
Peavey PV 2000	\$799.99	1,300W   —   —   4U
Peavey PV 260	\$299.99	130W   —   —   2U
QSC MX 700	\$715	150W   12"   25 lbs.   2U
QSC MX 1500a	\$1,265	350W   17.9"   42 lbs.   2U
QSC MX 2000a	\$1,665	450W   17.9"   54 lbs.   3U
QSC MX 3000a	\$2,465	800W   17.9"   69 lbs.   3U
QSC PLX 1202	\$858	200W   13.25"   21 lbs.   2U
QSC PLX 1602	\$1,198	300W   13.25"   21 lbs.   2U
QSC PLX 2402	\$1,498	425W   13.25"   21 lbs.   2U
QSC PLX 3002	\$1,798	550W   13.25"   21 lbs.   2U
QSC PLX 3402	\$2,098	700W   13.25"   21 lbs.   2U
QSC PowerLight 1.0	\$1,488	200W   17.6"   18 lbs.   2U
QSC PowerLight 1.0HV	\$1,578	300W   18"   18 lbs.   2U
QSC PowerLight 1.4	\$1,698	300W   17.9"   18 lbs.   2U
QSC PowerLight 1.4	\$1,698	300W   18"   18 lbs.   2U
QSC PowerLight 1.5X	\$1,728	Ch 1, 450W; Ch 2, 200W   18"   18 lbs.   2U
QSC PowerLight 1.8	\$2,028	400W   17.9"   18 lbs.   2U
QSC PowerLight 2.0HV	\$2,198	1,000W   17.9"   18 lbs.   2U
QSC PowerLight 2.4MB	\$2,068	1,000W   17.9"   18 lbs.   2U
QSC PowerLight 3.4	\$2,998	725W   17.9"   18 lbs.   3U
QSC PowerLight 4.0	\$3,398	900W   17.9"   30 lbs.   3U
QSC PowerLight 6.0PFC	\$5,948	1,500W   17.9"   30 lbs.   3U
QSC PowerLight 9.0PFC	\$6,998	1,800W   19.5"   59 lbs.   3U
QSC USA 1310	\$1,165	400W   7.0"   54 lbs.   4U
Redwood Music STK-V2	\$359.95	70W   8.5"   17.6 lbs   1U
Redwood Music STK-V6	\$499.95	200W   16"   33 lbs.   2U
Redwood Music STK-V8 Plus	\$789.95	250W   16"   48.5 lbs   3U
Redwood Music STK-V10	\$829.95	300W   16"   34 lbs.   2U
Redwood Music STK-V12 Plus	\$999.95	350W   16"   48 lbs.   3U
Redwood Music STK-V16 Plus 4	\$1,199.95	4 X 210W   16"   49.5 lbs.   3U



## Power Amplifiers (cont'd)

MODEL	MSRP	CONT. AV. POWER 8 OHM STEREO   DEPTH   WEIGHT   SPACES
Redwood Music STK-VS20	\$1,329.95	450W   16"   38.8 lbs.   3U
Redwood Music STK-VS34	\$1,795.95	800W   16"   44 lbs.   3U
Rocktron Systems Velocity 100	\$419	40W   9.25"   13 lbs.   1U
Rocktron Systems Velocity 120	\$599	50W   9.25"   —   1U
Rocktron Systems Velocity 250	\$899	90W   12"   30 lbs.   2U
Rocktron Systems Velocity Valve	\$1,799	97W   14"   40 lbs.   2U
Roland SRA-200E	\$795	100W+100W   14-3/8"   11 lbs   1U
Roland SRA-260	\$795	130W   7-7/16"   —   2U
Roland SRA-540	\$995	270W   17 7/16"   33 lb 2 oz   2U
Roland SRA-800	\$1,295	400W   17 5/8"   —   3U
Rolls/Bellari/RFX RA235	\$200	35W   5"   5.5 lbs   1U
Rolls/Bellari/RFX RA280	\$250	50W   7.5"   12 lbs   2U
Rolls/Bellari/RFX RA2110	\$338	70W   7.5"   12 lbs   2U
Samson Servo 120	\$199.99	120W   —   —   1U
Samson Servo 170	\$269.99	—   9.5"   13.7   2U
Samson Servo 260	\$349.99	130W   9.5"   17.6 lbs   2U
Samson Servo 550	\$469.99	225W   9.2"   32.4 lbs.   3U
Samson Servo 4060	\$449.99	120W   10.75"   25 lbs.   2U
Samson Servo 4120	\$599.99	240W   10.75"   29.5 lbs.   2U
SHS Audio DH-300	399	100W   10"   17 lbs.   2U
SHS Audio DH-480	\$695	150W   10"   25 lbs.   3U
SHS Audio DH-1600	\$999	450W   14"   54 lbs.   4U
Stage Accompany ES 10	\$1,707	290W   16.3"   39 lbs.   2U
Stage Accompany ES 20	\$2,277	500W   16.1"   47 lbs.   3U
Stage Accompany ES 40	\$3,147	1,000W   17.5"   77 lbs.   3U
Stage Accompany PPA 1200	\$4,797	350W   14.8"   75 lbs.   4U
Stewart Audio World 1.6	See dealer	300W   15"   16 lbs.   2U
Studiomaster 700D	\$749.95	210W   16"   38 lbs.   2U
Studiomaster 1200D	\$995	375W   16"   45 lbs   2U
Tsunami HQ-702S	\$695	220W   18.5"   21 lbs.   2U
Tsunami HQ-902S	\$895	280W   18.5"   25 lbs.   2U
Tsunami HQ-1302S	\$995	380W   18.5"   25 lbs.   2U
Tsunami HQ-2002S	\$1,195	600W   18.5"   27.5 lbs.   2U
Yamaha C160	\$599	160W   17-15/16"   26.5 lbs.   2U
Yamaha C320	\$849	340W   17-15/16"   33.1 lbs.   2U
Yamaha C450	\$999	460W   17-15/16"   35.3 lbs.   2U
Yamaha CP2000	TBA	450W   16-1/8"   6.4 lbs.   2U
Yamaha H3000	\$1,399	350W   17-15/16"   38 lbs.   2U
Yamaha H5000	\$1,699	550W   17-15/16"   51 lbs.   2U
Yamaha H7000	\$2,249	750W   17-15/16"   58 lbs.   2U
Yamaha P1600	\$599	160W   17-15/16"   26.5 lbs.   2U
Yamaha P3200	\$849	340W   17-15/16"   33.1 lbs.   2U
Yamaha P4500	\$999	460W   17-15/16"   35.3 lbs.   2U
Yamaha XH150	\$699	150W   12-9/16"   35.2 lbs.   3U
Yamaha XM6150	\$899	100W x 6   12-9/16"   8.2 lbs.   3U
Yamaha XM4220	\$899	140W x 4   12-9/16"   8.2 lbs.   3U

# This Mic Is Anything But Flat...



## The Neumann M 147 Tube

For years, vintage Neumann tube mics, such as the venerable U 47, have been high-priced, highly prized commodities. Why, when advances have created mics with near-perfect, virtually transparent reproduction, have producers and engineers travelled to the ends of the earth in search of these vintage relics? Because of the way they sound (especially the way the sound sits in the mix).

Enter the M 147 Tube.

Using the same capsule as the classic U 47 and its smaller cousin the U 47 FET, the M 147 Tube microphone brings a warmth, presence and detail to vocals that is simply unattainable from any other mic being produced today, regardless of how much it looks like a Neumann. The fact is, there is really only one way to get that classic sound you seek. Fortunately, it's priced well within your reach.

...That's Why The Pros Love It.



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## What The Professionals Are Saying About The Neumann M 147 Tube:

"So far, I'm thrilled to pieces with the Neumann M 147 Tube. I don't think there's any instrument that I wouldn't try them on. Whatever instrument I used them for, I was very impressed with the sound. I wish I had about five or six of them!"

- **Al Schmitt,**  
as quoted in *EQ*,  
March 1999

"I would recommend the M 147 highly for rock, rap, pop, jazz or blues vocals; drum room and/or kick drum miking; all tube and solid-state instrument amplifiers; nylon string guitar; and low-volume or indistinct sound sources that need some extra presence, and for any type of digital recording. In short, I like the M 147 a lot -- so much so that I bought one."

- **Myles Boisen,**  
Electronic Musician,  
August 1999

"The particular kind of presence it adds is really unique and desirable, and it's really not available from any other mic or easily obtainable with an equalizer. Typically, condenser mics that have a forward character are really just brittle and edgy, and the M 147 is completely different from that."

- **Monte McGuire,**  
Recording,  
July 1999

"I asked the singer on my session which mic she preferred and, when presented with a finite budget, her pick (and mine) was the M 147. Classic Neumann sound, tube electronics, the U 47 legacy, and a price that won't savage your bank account. Gotta love it!"

- **Rick Chinn,**  
Audio Media,  
February 1999

"The M 147 proves again that however close the imitators get, there is no substitute for the genuine article. This is the real McCoy and although it cannot be called cheap, its simple approach means that it is far more accessible than a valve Neumann would normally be expected to be. Another classic in the making."

- **Dave Foister,**  
Studio Sound,  
February 1999

"It's my opinion that the tone of the Neumann would not require much EQing during mixdown; a decided advantage. Its high end would sit nicely in a mix, and its round but controlled low end would not have to be cut to provide room for other instruments."

- **Mitch Gallagher,**  
Keyboard Magazine,  
June 1999



# MICROPHONES AND MIC PREAMPS



**G**etting audio signals into your mixer or recorder with the best possible sound quality is what it's all about; nothing will affect the ultimate sound of your recordings or productions more. Microphones and mic preamps and/or channel strips — mic preamps that also include other processing such as EQ, compression, gating, etc. — are the key components that will determine at least the initial sound quality you'll be capturing.

While there are numerous ways we could have broken up and categorized microphones (by type, by application, by diaphragm size, and so on), we've settled on breaking them out into divisions based on price points.

Because of the rise in popularity of channel strips, this year we've separated them from straight mic preamps. Either one can serve as a preamp for your microphone-level signals, but many engineers are finding the extra processing offered by channel strips to be extremely appealing. In many situations, channel strips also work well for tracking line-level signals such as keyboards, or for processing the output from tape- or hard disk-based recorders during mixdown.

## BUYER'S TIPS: MICROPHONES

If you're working with acoustic instruments or vocals, then at some point a microphone is going to figure into your studio purchase plans. Go for the best you can. Think of the

mic as the source of the audio; if you start with a great signal, it'll only get better as you polish and enhance it with the rest of your system. But if the signal starts out crappy due to a poor microphone, there's only going to be a limited amount you can do to improve the signal further down the line. You can never have too many mics; each has its own sound and applications. Our advice is to start off with a good general-purpose mic, one that will cover a lot of bases. As you're working on projects, note which applications that mic isn't sounding its best on, and start looking for other mics that might cover those requirements better.

There are several types of mics available,

## Microphones Under \$200

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
<b>AKG Acoustics D770</b>	\$119	dynamic, large diaphragm   cardioid   60Hz-20kHz
<b>AKG Acoustics D880</b>	\$142	dynamic, large diaphragm   supercardioid   60Hz-20kHz
<b>Audio-Technica ATM27HE</b>	\$165	dynamic, mid diaphragm   hypercardioid   60Hz-15kHz
<b>Audio-Technica Bark</b>	\$99.95	multi-mic set: dynamic, mid diaphragm   cardioid   90Hz-13kHz
<b>Audio-Technica Bite</b>	\$99.95	multi-mic set: dynamic, mid diaphragm   cardioid   90Hz-14kHz
<b>Audio-Technica MB4000C</b>	\$125	condenser, mid diaphragm   cardioid   100Hz-18kHz
<b>Audio-Technica PRO 35x</b>	\$165	condenser, small diaphragm   cardioid   50Hz-17kHz
<b>Audio-Technica PRO 37R</b>	\$175	condenser, small diaphragm   cardioid   30Hz-15kHz
<b>Audio-Technica PRO 7a</b>	\$120	condenser, small diaphragm   cardioid   300Hz-15kHz
<b>Audio2000'S ACM193</b>	\$95	condenser, small diaphragm   hyper-cardioid   50Hz-18kHz
<b>Audix ADX-90</b>	\$199	condenser, small diaphragm   cardioid   50Hz-18kHz
<b>Audix HT-1</b>	\$199	condenser, small diaphragm, headset   supercardioid   50Hz-18kHz

## Microphones

Microphones under \$200	.93
Microphones \$200-\$999	.95
Microphones \$1,000 & over	104

## Microphone Preamps

Channel Strips	106
Phantom Power Supplies	106

but the two most common types to consider are dynamic and condenser. Dynamic mics use a magnetic moving-coil arrangement similar to a speaker working in reverse. Because they're electro-mechanical devices, they tend to be less sensitive and more durable than other mic types. You'll often find dynamic mics in front of electric guitars amps, horns, drums, and other loud, punchy signals.

Condenser mics don't use a moving coil of wire; they're based around changes in capacitance (capacitors are also known as "condensers," hence the name). Because of this, they can be built lighter, making them more sensitive to detail and high frequencies. Condensers are often used on quieter, more delicate acoustic instruments and vocals. Note that condensers require a power source to operate; some have built-in batteries, but most require power from an external supply. That's what a mixer's or a preamp's phantom power is for.

Ideally, you'd have both dynamic and condenser mics in your collection. If you must choose only one, we'd opt for a condenser. It will work fine on drums and electric guitars (be a bit careful of volume levels), and will excel on more delicate sounds.

What about polar (pickup) patterns? Mics

are available in a variety of patterns, and some mics can even switch between different patterns. In the end, though, something like 90% of all recordings are made with cardioid mics. Especially in home studios, where room acoustics are often suspect, a directional mic — a cardioid — is a good choice. As your collection expands (and it will), consider adding an omni-patterned mic for its balanced, open sound and ability to capture room ambience along with the direct signal.

## BUYER'S TIPS: MIC PREAMPS

Many mixers already have built-in microphone preamps; why would anyone want to spend money on an external unit? For two reasons: First of all, the quality of the preamps that a manufacturer builds into a mixing console may be compromised by economic considerations. They may skimp on the preamps (especially if the board has a lot of them) in order to hit a price point. Second, and far more important, the mic preamp is major contributor to the tone and quality of the signal produced by the microphone. Mics generate extremely low voltages; it takes a very clean and accurate amplifier (a preamp is really just a type of amp) to raise that signal to a level a mixer or other device can deal with. In the process of amplifying the mic's output, the preamp may impart a certain, often sought-after, coloration to the signal. That's what makes old vintage preamps so cool; they have a "sound" to them. Tube preamps can take this concept to the extreme, often radically warming and fattening the mic's raw signal.

At the other end of the spectrum are preamps that impart no coloration; the so-called "straight-wire" approach. These units are revered for their accuracy, especially for classical recording. The preamps in most budget consoles fall more into this camp, imparting little coloration to the signal.

Which type of preamp you'll want depends on what you're trying to achieve. The ideal situation would be to have an assortment of preamps, each with a different sound, at your disposal. Since most of us don't have that option, if you decide you need a separate mic pre to augment your mixer, look at the kind of sound you're most often trying to get. If you go for fat, warm sounds, look at a tube or vintage-style

## Microphones Under \$200 (cont'd)

MOEEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
<b>Audix OM-2</b>	\$149	dynamic, small diaphragm   hypercardioid   50Hz-16kHz
<b>Audix OM3xb</b>	\$199	dynamic, small diaphragm   hypercardioid   50Hz-18kHz
<b>Behringer ECM8000</b>	\$79	condenser, small diaphragm   omni-directional   15Hz-20kHz
<b>Behringer Ultravoice XM8500</b>	\$39	dynamic, mid diaphragm   cardioid   50Hz-15kHz
<b>Behringer XM2000S</b>	\$39	dynamic, mid diaphragm   cardioid   40Hz-16kHz
<b>Benson Audio Labs BA25</b>	\$149.90	dynamic, mid diaphragm   cardioid   50Hz-15kHz
<b>Benson Audio Labs BA30</b>	\$169.90	dynamic, mid diaphragm   cardioid   50Hz-15kHz
<b>Beyerdynamic M O1</b>	\$109	dynamic, mid diaphragm   super-cardioid   50Hz-15kHz
<b>Beyerdynamic M422TG</b>	\$199	dynamic, mid diaphragm   cardioid   100Hz-12kHz
<b>Beyerdynamic TGX-5</b>	\$149	dynamic, small diaphragm   cardioid   40Hz-12kHz
<b>Crown CM-10/CM-10E</b>	\$169/\$99	condenser, small diaphragm   omni-directional   60Hz-15kHz
<b>Crown GLM-100/GLM-100E</b>	\$219/\$119	condenser, small diaphragm   omni-directional   20Hz-20kHz
<b>Crown PZM-185</b>	\$199	boundary, small diaphragm   hemispherical   50Hz-16kHz
<b>Crown Sound Grabber II</b>	\$109	boundary, small diaphragm   hemispherical   50Hz-16kHz
<b>Dianel Co The Harmonica Honker</b>	\$130	condenser, small diaphragm   semi-cardioid   30Hz-15kHz
<b>Edirol Roland DR-10</b>	\$95	dynamic, large diaphragm   unidirectional   60Hz-15kHz
<b>Edirol Roland DR-20</b>	\$150	dynamic, large diaphragm   unidirectional   60Hz-15kHz
<b>Electro-Voice N/D167</b>	\$132	dynamic, mid diaphragm   cardioid   50Hz-12kHz
<b>Electro-Voice N/D168</b>	\$182	dynamic, large diaphragm   cardioid   25Hz-15kHz
<b>Event Electronics Rode NT-3</b>	\$199	condenser, mid diaphragm   hypercardioid   20Hz-20kHz
<b>Fostex M221</b>	\$35	dynamic, large diaphragm   cardioid   100Hz-16kHz
<b>Fostex M321</b>	\$55	dynamic, large diaphragm   cardioid   90Hz-16kHz
<b>Fostex M521</b>	\$75	dynamic, large diaphragm   —   —
<b>K&amp;K FanTaStick Western Classic</b>	\$89	acoustic guitar piezo   —   —
<b>K&amp;K Hot Hi-Hat Microphone</b>	\$199	condenser, small diaphragm   soft cardioid   50Hz-20kHz
<b>K&amp;K Hybridfoil Violin Transducer</b>	\$105	violin transducer   —   —
<b>K&amp;K Pure Piano Transducer</b>	\$112	piezo   —   —
<b>K&amp;K Silverbullet Microphone</b>	\$139	—   soft cardioid   20Hz-19kHz
<b>K&amp;K Ultrapure Guitar Transducer System</b>	\$189	internal transducer   —   —
<b>K&amp;K Violinissimo Violin Transducer</b>	\$115	triple transducer   —   —
<b>Marshall Electronics 1000</b>	\$99.95	condenser, mid diaphragm   cardioid   30Hz-20kHz
<b>Music People Audio Spectrum</b>	\$39.95-\$79.99	dynamic, small diaphragm   cardioid   —
<b>Peavey Electronics PV</b>	\$79.99	dynamic, large diaphragm   cardioid   50Hz to 14kHz
<b>Peavey Electronics PV i</b>	\$59.99	dynamic, large diaphragm   cardioid   50Hz to 14kHz
<b>Peavey Electronics PVM 22</b>	\$149.99	dynamic, large diaphragm   cardioid   50Hz to 16kHz
<b>Peavey Electronics PVM 38I</b>	\$149.99	dynamic, large diaphragm   cardioid   50Hz to 16kHz
<b>Peavey Electronics PVM 45i</b>	\$179.99,	dynamic, large diaphragm   —   —
<b>Peavey Electronics PVM 80</b>	\$179.99	dynamic, large diaphragm   hypercardioid   50Hz-16kHz
<b>Roland DR-10</b>	\$95	dynamic, large diaphragm   hyper-cardioid   60Hz-15kHz



solid-state design (also a good choice if you already have clean preamps in your mixer). But keep in mind that warmth and "fat" often have a price; the preamps that produce those sounds may be noisier, and they'll certainly be less accurate than other designs. The rule is: You can always add warmth with other processing gear (say, a tube compressor or EQ) but you can never take it out of the signal once it's recorded.

## Microphone Basics

by CRAIG ANDERTON

The microphone has the crucial, and difficult, task of turning minute variations in air pressure into electrical signals. As such, it is the first link in the audio "chain," and as the cliché goes, a chain is only as strong as its weakest link. Selecting the proper microphone for a specific task, and properly placing it to optimally pick up a signal, is a cross between an art and a science; this article presents some microphone basics so that you can match the right type of microphone to the right application. Of course, there's not enough space here to give a truly exhaustive treatment, but if you're interested in more information, there are several books available on the subject.

### THE FOUR BASIC MIC TYPES

There are four basic microphone types commonly used for recording: dynamic, condenser, ribbon, and PZM (the latter is a trademark of Crown International, Inc.). Each one operates differently, yet works on the same basic principle — air waves hit a sensitive, movable surface that translates this air motion into electrical energy.

With a dynamic mic (**Figure 1**), a coil of tightly-wound wire, free to move back and forth on a permanent magnet, attaches to a movable diaphragm, which reacts to air pressure variations. The action of the coil moving through the permanent magnet's field induces a voltage into the coil, with the output voltage being analogous to the air pressure variations hitting the diaphragm.

## Microphones Under \$200 (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
Roland DR-20	\$150	dynamic, large diaphragm   hypercardioid   60Hz-15kHz
Samson Q2 Vocal/Instrument Microphone	\$149.99	dynamic, small diaphragm   cardioid   50Hz-15kHz
Samson Qmic hypercardioid	\$199.99	dynamic, small diaphragm   hypercardioid   20Hz-18.5kHz
Samson R11	\$199.99	dynamic, small diaphragm   hypercardioid   —
Samson S11	\$99.99	dynamic, small diaphragm   unidirectional cardioid   60Hz-18kHz
Samson S12	\$149.99	dynamic, small diaphragm   hypercardioid   60Hz-18kHz
Sennheiser E 835	\$139	dynamic, large diaphragm   cardioid   —
Sennheiser Evolution e835	\$159	dynamic   cardioid   40Hz-16kHz
SHS Audio OM-250	\$45	dynamic, large diaphragm   cardioid   90Hz-10kHz
SHS Audio OM-500	\$89	dynamic, large diaphragm   cardioid   50Hz-16.5kHz
SHS Audio OM-550B	\$89	dynamic, large diaphragm   cardioid   50Hz-15kHz
SHS Audio OM-750	\$89	dynamic, large diaphragm   cardioid   50Hz-15kHz
Shure SM57	\$146	dynamic, large diaphragm   cardioid   40Hz-15kHz
Shure SM58	\$188	dynamic, large diaphragm   cardioid   50Hz-15kHz
Studiomaster KM-81	\$59.95	dynamic, large diaphragm   cardioid   50Hz-15kHz
Telex Communications Cobalt	\$189	dynamic, large diaphragm   cardioid, unidirectional   30Hz-19kHz
Telex Communications TD-26	\$149	dynamic, large diaphragm   hypercardioid   30Hz-19kHz

## Microphones \$200 - \$999

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
AKG Acoustics C1000S	\$312	condenser, small diaphragm   cardioid hypercardioid w/PPC1000   50Hz-20kHz
AKG Acoustics C2000B	\$378	condenser, small diaphragm   cardioid   30Hz-20kHz
AKG Acoustics C3000B	\$520	condenser, large diaphragm   cardioid   20Hz-20kHz
AKG Acoustics C416	\$329	condenser, small diaphragm   hypercardioid   20Hz-20kHz
AKG Acoustics C418	\$329	condenser, small diaphragm   hypercardioid   50Hz-20kHz
AKG Acoustics C419	\$329	condenser, small diaphragm   hypercardioid   20Hz-17kHz
AKG Acoustics C420	\$358	condenser, small diaphragm   cardioid   20Hz-20kHz

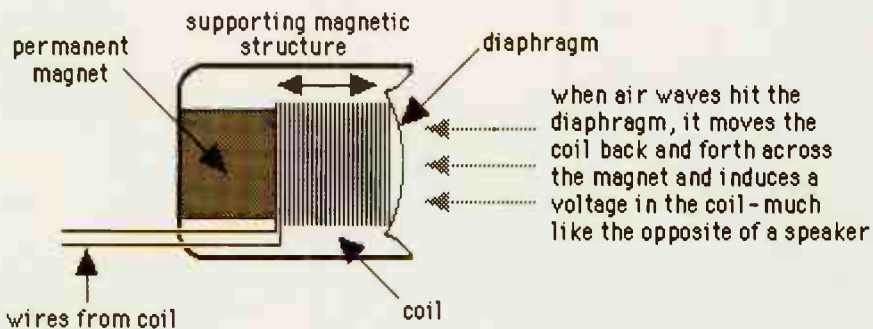


Figure 1

# BE A PLAYER

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## Microphones \$200 - \$999 (cont'd)

MODEL	MSRP	TYPE PATTERN FREQUENCY RESPONSE
AKG Acoustics C535EB	\$376	condenser, small diaphragm   cardioid   20Hz-20kHz
AKG Acoustics D112	\$338	dynamic, large diaphragm   cardioid   20Hz-17kHz
AKG Acoustics D3800	\$275	dynamic, large diaphragm   hypercardioid   40Hz-22kHz
AKG Acoustics WMS60/80	\$555/\$904	boundary, large diaphragm   -   -
Alesis AM51	\$549	condenser, large diaphragm   cardioid   -
Alesis AM52	\$699	condenser, large diaphragm   cardioid, omnidirectional figure-8   -
Alesis AM61	\$999	condenser, large diaphragm, tube circuitry   cardioid   -
Audio Engineering AEA R44 S	\$695	boundary, large diaphragm   bi-directional   -
Audio-Technica AT3325	\$339	condenser, small diaphragm   cardioid   30Hz-20kHz
Audio-Technica AT3327	\$259	condenser, small diaphragm   omnidirectional   -
Audio-Technica AT3328	\$259	condenser, small diaphragm   cardioid   30Hz-20kHz
Audio-Technica AT4033a/SM	\$495	condenser, mid diaphragm   cardioid   30Hz-20kHz
Audio-Technica AT4041	\$395	condenser, small diaphragm   cardioid   20Hz-20kHz
Audio-Technica AT4047/SV	\$695	condenser, large diaphragm   cardioid   20Hz-18kHz
Audio-Technica AT4050/CM5	\$995	condenser, large diaphragm   omni, cardioid, figure-8   20Hz-20kHz
Audio-Technica AT4054	\$499	condenser, large diaphragm   cardioid   60Hz-20kHz
Audio-Technica AT4055	\$499	condenser, large diaphragm   cardioid   20Hz-20kHz
Audio-Technica ATM41a	\$200	dynamic, mid diaphragm   cardioid   50Hz-16kHz
Audio-Technica ATM61HE	\$270	dynamic, mid diaphragm   hypercardioid   50Hz-18kHz
Audio-Technica ATM63HE	\$210	dynamic, mid diaphragm   hypercardioid   50Hz-18kHz
Audio-Technica ATM75	\$220	condenser, small diaphragm, headset   cardioid   60Hz-15kHz
Audio-Technica ATM87R	\$299	boundary, small diaphragm   unidirectional   30Hz-20kHz
Audio-Technica ATM89R	\$325	condenser, small diaphragm   hypercardioid   70Hz-20kHz
Audio-Technica KP-Drums	\$499.95	multi-mic set: dynamic, mid diaphragm   cardioid   -
Audio-Technica KP-Studio	\$299.95	multi-mic set: condenser, mid diaphragm   cardioid   100Hz-18kHz
Audio-Technica KP-Vocals	\$209.95	multi-mic set: dynamic, mid diaphragm   cardioid   100Hz-15kHz
Audix ADX-50	\$289	condenser, small diaphragm   cardioid   40Hz-18kHz
Audix ADX-51	\$329	condenser, small diaphragm   cardioid   40Hz-18kHz
Audix ADX-60	\$289	boundary, small diaphragm   semicardioid   50Hz-18kHz
Audix CX111	\$599	condenser, large diaphragm   cardioid   20Hz-20kHz
Audix CX101	\$499	condenser, large diaphragm   cardioid   20Hz-20kHz

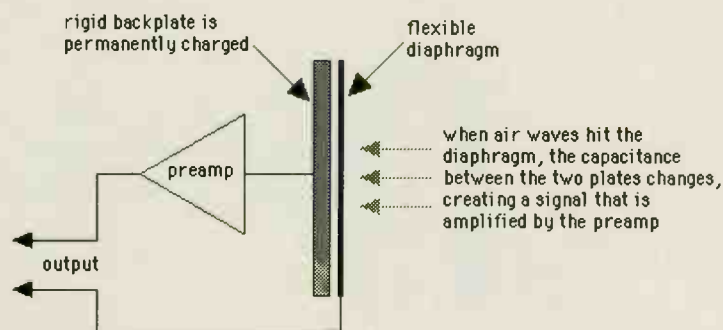


Figure 2

The condenser microphone (Figure 2) takes advantage of the fact that capacitance changes will create voltage changes if the capacitor is biased (permanently connected to a constant voltage). In this case, the backplate has a permanent charge and the flexible diaphragm acts as the other plate of the capacitor. As capacitance is roughly a function of the distance between two plates, diaphragm motion leads to capacitance changes, thus producing a voltage output.

Ribbon microphones (Figure 3 on page 98) use a thin metal ribbon that moves in response to air waves and cuts across the magnetic field generated by a permanent magnet. While somewhat more fragile than other mic types, ribbon mics paradoxically resist high-temperature and high-humidity environments that can cripple electret and dynamic mics. Ribbon types also have superior transient response, but a second paradox is that they exhibit "ringing" (where the diaphragm continues moving slightly after being subject to a sharp transient). This translates into a subtle, additional resonance, which is theoretically undesirable, but does give a subjectively "warmer" feel to acoustic instruments and voices. Modern ribbon microphones improve dramatically on older designs, giving better reliability and sound.

The PZM microphone mounts a condenser mic in a special package where the mic points down at a plate, with a small gap separating the two. The reason for this packaging is to overcome the common microphone placement problem of phase cancellation. For example, when you set up a mic on a podium, the same sound can hit the microphone at slightly different times—specifically, the direct sound hits before the reflected sound. This can lead to partial or total cancellation at certain frequencies, thus creating a thin sound. With a PZM mic mounted on the podium, the mic placement and use of a plate means that reflected waves occur at essentially the same time as the direct wave. In the studio, some engineers mount PZM mics to the underside of piano covers, to pick up string vibrations.

### DECISIONS, DECISIONS

So how do you choose the right microphone for the right application? Based on

the above, if I was recording a speech it seems like the PZM would be the way to go. But many situations are less clear-cut, and besides, microphones have improved to the point where a top-of-the-line anything sounds pretty good; proper tone shaping through equalization can also minimize differences between different types of microphones.

Although once upon a time different types of mics sounded quite different, recent advances have increased the versatility and usefulness of all types. Dynamic mics, for instance, used to have poor high-frequency response; lighter diaphragms have solved that problem. Condenser mics were inconvenient to use since they required a separate power supply and lots of preamplification, but new condenser materials have resulted in a modern version of the condenser mic (the electret microphone), which uses low-voltage power supplies and low-noise solid state preamps. Ribbon mics were once known for two major characteristics: excellent response and extreme fragility. Now, ribbon microphones can stand up better to the kind of hostile treatment that recording equipment frequently receives. Since differences between microphones are becoming subtler, it becomes necessary to fine-tune your ear when deciding which type to use.

Dynamic mics are typically quite rugged, require no power supply, and are the mic of choice if you're going to be giving it a lot of heavy-duty use (for example, a tour). One disadvantage of the dynamic is a lack of response at the extreme ends of the audio spectrum (although vocal dynamic mics often exhibit a slight "lift" in the upper midrange and lower treble regions); a dynamic microphone with superb high-frequency response is expensive. Dynamics also have limited transient response (the ability to respond quickly to a rapidly changing signal). This leads to a somewhat less crisp and precise sound. On the other hand, dynamic mics resist overload well, and are often used in the music business to handle kick drums, snares, guitar/bass amps, and "screamer" vocalists. Some vocalists sound great with dynamic mics; for

## Microphones \$200 - \$999 (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
<b>Audix OM-1</b>	\$359	dynamic, small diaphragm   hypercardioid   50Hz-18kHz
<b>Audix OM-5</b>	\$299	dynamic, small diaphragm   hypercardioid   48Hz-19kHz
<b>Audix OM-6</b>	\$329	boundary, small diaphragm   hypercardioid   40Hz-19kHz
<b>Audix OM-7</b>	\$329	dynamic, small diaphragm   hypercardioid   45Hz-19kHz
<b>Audix SCX1-c</b>	\$599	condenser, mid diaphragm   cardioid   40Hz-20kHz
<b>Audix VX-10</b>	\$599	condenser, mid diaphragm   cardioid   40Hz-20kHz
<b>Behringer B-2</b>	\$289	condenser, large diaphragm   omni or cardioid (switchable)   20Hz-20kHz
<b>Benson Audio Labs B2</b>	\$259.90	condenser, small diaphragm   cardioid   40Hz-20kHz
<b>Benson Audio Labs DM30</b>	\$399.90	dynamic, mid diaphragm   hypercardioid   40Hz-18kHz
<b>Benson Audio Labs HM10</b>	\$299.90	condenser, small diaphragm, headset   cardioid   80Hz-15kHz
<b>Benson Audio Labs ND80</b>	\$349.90	dynamic, mid diaphragm   hypercardioid   50Hz-18kHz
<b>Benson Audio Labs NO90</b>	\$349.90	dynamic, mid diaphragm   hypercardioid   50Hz-18kHz
<b>Benson Audio Labs PC20 Series Microphones</b>	\$999.90	condenser, small diaphragm   cardioid (hypercardioid omni-directional capsules available)   20 Hz to 20kHz (+2dB)
<b>Benson Audio Labs RC22</b>	\$299.90	condenser, small diaphragm   cardioid   40Hz-20kHz
<b>Beyerdynamic M 69 TG</b>	\$259	dynamic, mid diaphragm   hypercardioid   50Hz-16kHz
<b>Beyerdynamic M 88 TG</b>	\$399	dynamic, large diaphragm   hypercardioid   30Hz-30kHz
<b>Beyerdynamic M130</b>	\$699	boundary, large diaphragm   figure-8   -
<b>Beyerdynamic M160</b>	\$699	boundary, large diaphragm   hypercardioid   -
<b>Beyerdynamic M201TG</b>	\$289	dynamic, mid diaphragm   hypercardioid   40Hz-18kHz
<b>Beyerdynamic M420TG</b>	\$299	dynamic, mid diaphragm   hypercardioid   100Hz-15kHz
<b>Beyerdynamic MC834</b>	\$999	boundary, large diaphragm   cardioid   -
<b>Beyerdynamic MCE 93/94</b>	MCE93, \$599; MCE94, \$639	condenser, small diaphragm   cardioid   30Hz to 20kHz
<b>Beyerdynamic MCE82</b>	\$799	condenser, small diaphragm   cardioid   50Hz-20kHz
<b>Beyerdynamic MCE90</b>	\$649	condenser, large diaphragm   cardioid   30Hz-20kHz
<b>Beyerdynamic MCE91</b>	\$649	condenser, mid diaphragm   cardioid   30Hz to 20kHz
<b>Beyerdynamic TG-X10</b>	\$289	dynamic, small diaphragm   supercardioid   50Hz-15kHz
<b>Beyerdynamic TG-X40</b>	\$329	dynamic, mid diaphragm   hypercardioid   35Hz to 16kHz
<b>Beyerdynamic TG-X60</b>	\$399	dynamic, mid diaphragm   hypercardioid   40Hz to 18kHz
<b>Beyerdynamic TG-X80</b>	\$469	dynamic, mid diaphragm   hypercardioid   30Hz-18kHz
<b>Beyerdynamic TGX-20</b>	\$259	dynamic, mid diaphragm   hypercardioid   45Hz to 16kHz
<b>Beyerdynamic TGX-50</b>	\$249	dynamic, mid diaphragm   hypercardioid   -
<b>BPM Microphones CR10</b>	\$599.99	condenser, large diaphragm   cardioid   20Hz-20kHz

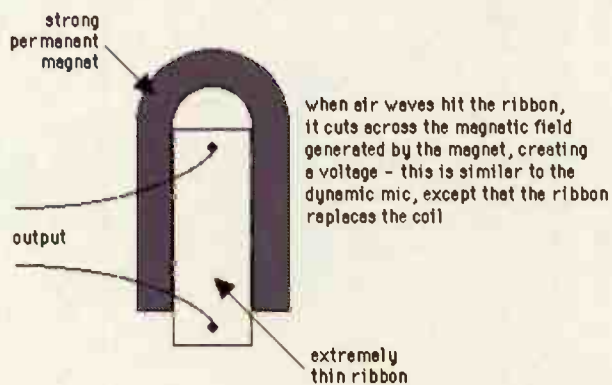


Figure 3



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example, Michael Jackson and Bono of U2 reportedly sing through relatively inexpensive dynamics.

Compared to dynamic models, condenser/electret mics offer superior high-frequency and transient response characteristics. Many condensers additionally exhibit a peak in the high frequencies, giving a larger-than-life sound that is shimmering and crisp.

The condenser is not without its disadvantages, however. This type of microphone generates so little power by itself that it needs a high-gain preamp stage, which as you might expect adds a certain amount of noise and distortion. Additionally, the preamp needs power, so an electret microphone will usually have a battery that requires periodic replacement. Finally, the condenser/electret generally can't take as strong a signal as a dynamic mic. Most of the engineers that I've worked with over the years have favored condenser mics for relatively quiet acoustic instruments (such as acoustic guitar), and vocalists who need "presence" more than they need "warmth."

However, it's important to remember that voices vary greatly, and if you have a variety of microphones available, it's well worth trying out each one briefly and using the model that gives the best match to an individual's voice. For example, I often use a condenser mic when recording my own singing because the extended high-frequency response adds intelligibility and presence. However, when doing narration or commercials I usually switch to a dynamic mic to give a deeper, more full-sounding vocal effect that fleshes out a soundtrack better. You can also make some of these changes via equalization, but equalization can only go so far without sounding gimmicky. It's always better to choose the right mic and go for a little touch-up equalization, rather than use equalization as a crutch to compensate for improper mic selection.

Ribbon microphones are legendary for recording brass, but if it can take the sound pressure levels, guitar amps also sound great with ribbons. Even vocalists can sound good, although ribbons are prone to P-popping (where the loudspeakers thump horri-

## Microphones \$200 - \$999 (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
<b>CAD CAD 90</b>	\$239	dynamic, mid diaphragm   cardioid   40Hz-16kHz
<b>CAD CAD 95</b>	\$239	condenser, small diaphragm   cardioid   40Hz-20kHz
<b>CAD E100</b>	\$469	condenser, mid diaphragm   supercardioid   10Hz-18kHz
<b>CAD E200</b>	\$749	condenser, mid diaphragm   cardioid, omni, figure-8   10Hz-18kHz
<b>CAD E350</b>	\$899	condenser, large diaphragm   cardioid, omni, figure-8   10Hz-29kHz
<b>CAD M177</b>	\$299	condenser, large diaphragm   cardioid   10Hz-20kHz
<b>Crown CM-150</b>	\$899	condenser, mid diaphragm   omnidirectional   20Hz-20kHz
<b>Crown CM-200A/CM-200ASW</b>	\$269/\$289	condenser, mid diaphragm   cardioid   80Hz-15kHz
<b>Crown CM-30</b>	\$229	condenser, small diaphragm   supercardioid   40Hz-20kHz
<b>Crown CM-31</b>	\$229	condenser, small diaphragm   supercardioid   40Hz-20kHz
<b>Crown CM-310A/CM-310ASW</b>	\$289/\$309	condenser, mid diaphragm   differoid   80Hz-15kHz
<b>Crown CM-311A/CM-311AE</b>	\$329/\$239	condenser, mid diaphragm, headset   differoid   50Hz-17kHz
<b>Crown CM-312A/CM-312AE</b>	\$309/\$219	condenser, small diaphragm, headset   hypercardioid   50Hz-17kHz
<b>Crown CM-700</b>	\$299	condenser, mid diaphragm   cardioid   30Hz-20kHz
<b>Crown GLM-200</b>	\$249	condenser, small diaphragm   hypercardioid   60Hz-20kHz
<b>Crown PCC-160</b>	\$319	boundary, small diaphragm   cardioid   50Hz-18kHz
<b>Crown PZM-30D</b>	\$349	boundary, small diaphragm   hemispherical   20Hz-20kHz
<b>Crown PZM-6D</b>	\$349	boundary, small diaphragm   hemispherical   20Hz-20kHz
<b>Crown SASS-P MKII</b>	\$995	condenser, small diaphragm, stereo   omnidirectional (LF)/unidirectional (HF)   20Hz-18kHz
<b>DPA Microphones 4060</b>	\$430	condenser, large diaphragm   omnidirectional   20Hz-20kHz +/-2dB
<b>DPA Microphones 4065</b>	\$599	condenser, large diaphragm, headset   omni-directional   20Hz-20kHz +/-2dB
<b>Earthworks M30</b>	\$500	condenser, small diaphragm   omni   9Hz-27kHz +/-1dB
<b>Earthworks M30BX</b>	\$600	condenser, small diaphragm   omni   9Hz-27kHz +/-1dB
<b>Earthworks QTC1</b>	\$950 ea, \$2,000 matched pair	condenser, small diaphragm   omni   4Hz-40kHz
<b>Earthworks SR68</b>	\$450	condenser, small diaphragm   hypercardioid   50Hz-20kHz
<b>Earthworks SR69</b>	\$350	condenser, small diaphragm   cardioid   50Hz-20kHz
<b>Earthworks SR71</b>	\$450	condenser, small diaphragm   cardioid   50Hz-20kHz
<b>Earthworks SR77</b>	\$599 ea, \$1,300 matched pair	condenser, small diaphragm   cardioid   30Hz-30kHz
<b>Earthworks SR78</b>	\$699 ea, \$1,500 matched pair	condenser, small diaphragm   hypercardioid   30Hz-30kHz
<b>Earthworks SRO</b>	\$350	condenser, small diaphragm   omnidirectional   10Hz-20kHz
<b>Earthworks TC30K</b>	\$500; \$1,100 for matched pair	condenser, small diaphragm   omni   9Hz-30kHz
<b>Earthworks Z30X</b>	\$800 ea, \$1,700 matched pair	condenser, small diaphragm   cardioid   30Hz-30kHz
<b>Earthworks Z30XL</b>	\$900 ea, \$1,900 matched pair	condenser, small diaphragm   hypercardioid   30Hz-30kHz
<b>Electro-Voice N/D468</b>	\$232	dynamic, mid diaphragm   supercardioid   30Hz-20kHz
<b>Electro-Voice N/D767</b>	\$242	dynamic, mid diaphragm   supercardioid   25Hz-22kHz
<b>Electro-Voice N/D868</b>	\$282	dynamic, mid diaphragm   cardioid   20Hz-10kHz



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bly every time the person says the letter "P"), so you need singers who can project into the mic from a few feet away, as well as a wind screen and/or pop filter.

The bottom line is simple: If you have a budget for three mics, don't buy three good condensers, or three good dynamics, or three of any one type. Instead, buy a condenser, dynamic, and ribbon. And once you have your microphones, take care of them: avoid high heat, high humidity, moisture, rough handling, dropping, and vocalists who test a microphone by blowing into it.

## MICROPHONE DIRECTIONALITY

Before closing out, we should also mention that different mics have different pickup or "polar" patterns (Figure 4). Some are omni-directional, meaning that they pick up sound from all directions, while others (mostly ribbon types) are bi-directional, which means that they pick up sound from the front and back but not from the sides. Cardioid or unidirectional mics have a heart-shaped pickup pattern, and tend to pick up sound only from the front. These pickup patterns aren't precise by any means; for example, low frequencies are less directional than high frequencies, so even an omni-directional mic may be "omni" only for certain frequencies and more "uni" for other ones.

Directionality is most important for PA or sound reinforcement work, because in these cases you have to worry about picking up signals that could cause feedback. While recording, directionality is less important unless you are trying to mic several instruments or speakers at once in a single acoustic space and want to minimize leakage.

## PRACTICE MAKES PERFECT

Microphones can sometimes be frustrating to work with, but at the moment they're all we have to turn air motion into electricity. Practice with them, work with them, and listen carefully to the results — eventually, you'll have no trouble matching the right microphone to the right job.

## Microphones \$200 - \$999 (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
Electro-Voice RE1000	\$630	condenser, mid diaphragm   supercardioid   70Hz-18kHz
Electro-Voice RE20	\$655	dynamic, mid diaphragm   cardioid   45Hz-18kHz
Electro-Voice RE200	\$310	condenser, mid diaphragm   cardioid   50Hz-18kHz
Electro-Voice RE27N/D	\$732	dynamic, large diaphragm   cardioid   45Hz-20kHz
Electro-Voice RE500	\$375	condenser, mid diaphragm   cardioid   80Hz-18kHz
Event Electronics Rode NT1	\$349	condenser, large diaphragm   cardioid   20Hz-20kHz
Event Electronics Rode NT2	\$649	condenser, large diaphragm   omnidirectional cardioid   20Hz-20kHz
Event Electronics Rode NTV	\$999	condenser, large diaphragm, tube circuitry   cardioid   20Hz-20kHz, ±3 dB
GT Electronics AMS1	\$549	boundary, large diaphragm   cardioid   —
GT Electronics AMS2	\$699	condenser, large diaphragm   cardioid, omnidirectional, figure 8   —
GT Electronics AM61	\$999	condenser, large diaphragm, tube circuitry   cardioid   —
K&K Accordion External Mic System	\$269	—   omni   20Hz-20kHz
K&K Accordion Internal Mic System	\$299	—   omni   20Hz-20kHz
K&K CSM4 Snare Microphone	\$247	condenser, small diaphragm   hyper unidirectional   20Hz-17kHz
K&K CTM3 Tom Microphone	\$219	condenser, small diaphragm   soft cardioid   100Hz-20kHz
K&K CXM5 Saxophone Microphone	\$235	condenser, small diaphragm   soft cardioid   20Hz-20kHz
K&K DYNA B07	\$269	dynamic, mid diaphragm   super unidirectional   20Hz-18kHz
K&K DYNA 5TB	\$285	dynamic, mid diaphragm   super unidirectional   20Hz-18.5kHz
K&K OXP6 Overhead Microphone	\$209	condenser, small diaphragm   soft cardioid   20Hz-20kHz
K&K Trinity Complete Guitar System	\$350	mini-condenser, piezo   —   —
Manley Langevin CR-3A	\$800	condenser, large diaphragm   cardioid   40Hz-16kHz
Neumann KM 183	\$729	condenser, small diaphragm   omni   20Hz-20kHz
Neumann KM 184	\$729	condenser, small diaphragm   cardioid   20Hz-20kHz
Neumann KM 185	\$749	condenser, small diaphragm   hypercardioid   20Hz-20kHz
Neumann KMS 105	\$595	condenser, small diaphragm   supercardioid   20Hz-20kHz
Neumann TLM 103	\$995	condenser, large diaphragm   cardioid   20Hz-20kHz
Peavey Electronics PM 165	\$259.99	condenser, large diaphragm   cardioid   50Hz - 20kHz
Peavey Electronics PSM 2	\$259.99	condenser, large diaphragm   cardioid in half-space   50Hz - 20kHz

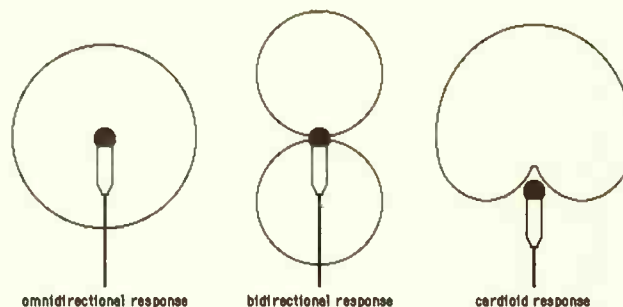


Figure 4



## Microphones \$200 - \$999 (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
Peavey Electronics PVM 480	\$279.99	condenser, large diaphragm   supercardioid   40Hz-20kHz
Peavey Electronics PVM 520i	\$349.99	dynamic, large diaphragm   —   —
Peavey Electronics VCM 2	\$279.99	condenser, large diaphragm   cardioid   50Hz-20kHz
Samson Q3 Drum Microphone	\$224.99	dynamic, small diaphragm   hypercardioid   50Hz-15kHz
Samson UHF Series One Handheld Wireless System	\$499.99	dynamic, mid diaphragm   hypercardioid   20Hz-18.5kHz
Samson UHF Synth 32 Handheld Wireless System	\$699.99	dynamic, mid diaphragm   hypercardioid   60Hz-18kHz
SD Systems Instrument LCM 89 Microphones	\$495	condenser, mid diaphragm   cardioid   20Hz-20kHz
Sennheiser Digital 1000 wireless systems	\$795-\$1,000	wireless system   —   —
Sennheiser E 602	\$319	dynamic, large diaphragm   cardioid   20Hz-16kHz
Sennheiser E 604	\$249	dynamic, large diaphragm   cardioid   —
Sennheiser evolution e604	\$249	—   cardioid   40Hz-18kHz
Sennheiser evolution e865	\$399	condenser   super-cardioid   40Hz-20kHz
Sennheiser evolution wireless 100	\$767-835	wireless system   —   —
Sennheiser MC 67/K6	\$660	condenser, large diaphragm   —   —
Sennheiser MD 421 11	\$485	dynamic, large diaphragm   cardioid   —
Sennheiser MD 425	\$349	dynamic, large diaphragm   supercardioid   —
Sennheiser MD 431 11	\$495	dynamic, large diaphragm   supercardioid   —
Sennheiser MD 441-U	\$695	dynamic, large diaphragm   supercardioid   —
Sennheiser ME 62/K6	\$500	condenser, large diaphragm   omnidirectional   —
Sennheiser ME 64/K6	\$525	condenser, large diaphragm   cardioid   —
Sennheiser ME 65/K6	\$610	condenser, large diaphragm   supercardioid   —
Sennheiser ME 66/K6	\$594	condenser, large diaphragm   shotgun   —
Sennheiser MKE 44P	\$795	condenser, large diaphragm, stereo   cardioid   —
Shure Beta 52	\$387.50	dynamic, large diaphragm   supercardioid   20Hz-10kHz
Shure Beta 52	\$387.80	dynamic, large diaphragm   supercardioid   —
Shure Beta 56	\$300	dynamic, large diaphragm   supercardioid   50Hz-16kHz
Shure Beta 56	\$310	dynamic, large diaphragm   supercardioid   —
Shure Beta 57A	\$275	dynamic, large diaphragm   supercardioid   50Hz-16kHz
Shure Beta 58A	\$332.50	dynamic, large diaphragm   supercardioid   50Hz-16kHz
Shure Beta 87A	\$542.50	condenser, large diaphragm   supercardioid   50Hz-18kHz
Shure Beta 87C	\$542.50	condenser, mid diaphragm   cardioid   50Hz-20kHz
Shure Beta 98	\$349.60	condenser, small diaphragm   cardioid, supercardioid   40Hz-20kHz
Shure DMK57-52	\$663	—   —   —
Shure KSM32	\$959	condenser, large diaphragm   cardioid   20Hz-20kHz
Shure LX Series Beta 58 Wireless	\$852	condenser, large diaphragm   —   —
Shure SM81	\$529.80	condenser, large diaphragm   cardioid   20Hz-20kHz
Shure SM87A	\$350.70	condenser, large diaphragm   supercardioid   50Hz-18kHz
Shure SM94	\$280	condenser, mid diaphragm   cardioid   40Hz-16kHz
Shure T Series SM58 wireless	\$560	dynamic, mid diaphragm   —   —
Shure WL50	\$286-\$340	condenser, small diaphragm   omnidirectional   20Hz-20kHz
Sony Electronics ECM-MS957	\$299.99	condenser, small diaphragm, stereo   XY, MS   50Hz-18kHz
Soundlux R-1	\$599	condenser, large diaphragm   cardioid   20Hz-18kHz

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## Microphones \$1,000 and Above

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
<b>AKG Acoustics C12VR</b>	\$4,821	condenser, large diaphragm, tube circuitry   9 patterns: variable cardioid, omnidirectional, figure-8   30Hz-20kHz
<b>AKG Acoustics C414B ULS</b>	\$1,048	condenser, large diaphragm   cardioid, hypercardioid, omnidirectional, figure-8   20Hz-20kHz
<b>AKG Acoustics C414B/TLII Vintage TL</b>	\$1,225	condenser, large diaphragm   cardioid, hypercardioid, omnidirectional, figure-8   10Hz-20kHz
<b>AKG Acoustics C426B</b>	\$4,944	condenser, large diaphragm, stereo   cardioid, omnidirectional, figure-8, six intermediate positions   20Hz-20kHz
<b>AKG Acoustics Solidtube</b>	\$1,165	condenser, large diaphragm, tube circuitry   cardioid   20Hz-20kHz
<b>Alesis AM62</b>	\$1,299	condenser, large diaphragm, tube circuitry   hypercardioid, cardioid, figure-8, omnidirectional   —
<b>Audio Engineering AEA R44 C</b>	\$2,000	boundary, large diaphragm   bi-directional   30Hz to 20kHz
<b>Audio-Technica AT4060</b>	\$1,695	condenser, large diaphragm, tube circuitry   cardioid   20Hz-20kHz
<b>Beyerdynamic MC-740</b>	\$1,699	boundary, large diaphragm   5 selectable   —
<b>Beyerdynamic MC-742</b>	\$3,399	boundary, large diaphragm, stereo   5 selectable   —
<b>Beyerdynamic MCD100</b>	\$2,500	boundary, large diaphragm   cardioid   20Hz to 20kHz
<b>BPM Microphones CR73</b>	\$1,099	condenser, large diaphragm   cardioid, figure-8   20Hz-20kHz
<b>BPM Microphones CR95</b>	\$1,299	condenser, large diaphragm   cardioid, omnidirectional, figure-8   20Hz-20kHz
<b>BPM Microphones TB95</b>	\$1,999	condenser, large diaphragm, tube circuitry   cardioid, figure-8   20Hz-20kHz
<b>CAD VSM</b>	\$1,299	condenser, large diaphragm, tube circuitry   cardioid   10Hz-20kHz
<b>CAD VX2</b>	\$2,249	condenser, large diaphragm, tube circuitry   cardioid, omni, figure-8   10Hz-20kHz
<b>Coles Electroacoustics 4038</b>	\$1,195	boundary, large diaphragm   bi-directional   30Hz-15kHz
<b>DPA 3541 Large Diaphragm Studio Kit</b>	\$6,000	condenser, large diaphragm   omni   10Hz-20kHz +/-2dB
<b>DPA 4003/4006</b>	4003, \$2,040; 4006, \$2,060	condenser, large diaphragm   omnidirectional   —
<b>DPA 4004/4007</b>	4004, \$2,040; 4007, \$2,060	condenser   omni   —
<b>DPA 4011/4012</b>	\$2,190	condenser, large diaphragm   1st order cardioid   —
<b>Earthworks M550</b>	\$1,500	condenser, small diaphragm   omni   4Hz-50kHz
<b>Electro-Voice RE2000</b>	\$2,042	condenser, mid diaphragm   cardioid   70Hz-18kHz
<b>Event Electronics Rode Classic II</b>	\$1,999	condenser, large diaphragm, tube circuitry   omnidirectional, cardioid, figure-8 in nine steps   20Hz-20kHz
<b>GT Electronics AM62</b>	\$1,299	condenser, large diaphragm, tube circuitry   cardioid, super-cardioid, omnidirectional, figure 8   —
<b>Manley Reference cardioid</b>	\$3,000	condenser, large diaphragm, tube circuitry   cardioid   20Hz-20kHz
<b>Manley Reference Gold</b>	\$5,500	condenser, large diaphragm, tube circuitry   cardioid, omnidirectional, figure-8   20Hz-20kHz
<b>Manley Reference Stereo Gold</b>	\$8,000	condenser, large diaphragm, stereo   tube circuitry   cardioid, omnidirectional, figure-8   20Hz-20kHz
<b>Mipro MA-101</b>	see dealer	wireless system   —   —
<b>Mipro MA-707</b>	see dealer	wireless system   —   —
<b>Neumann M 147 Tube</b>	\$1,995	condenser, large diaphragm, tube circuitry   supercardioid   20Hz-20kHz
<b>Neumann M 149 Tube</b>	\$4,850	condenser, large diaphragm, tube circuitry   cardioid, hyper-cardioid, Wide-cardioid, omnidirectional, figure-8 intermediate positions   20Hz-20kHz
<b>Neumann TLM 193</b>	\$1,495	condenser, large diaphragm   cardioid   20Hz-20kHz
<b>Neumann U 87 AI</b>	\$2,825	condenser, large diaphragm   cardioid, omnidirectional, figure-8   20Hz-20kHz
<b>Sennheiser Evolution wireless 300 Series</b>	\$1,235-\$1,300	wireless system   —   —
<b>Sennheiser Evolution wireless 500 Series</b>	\$1,635-1,776	wireless system   —   —
<b>Shure KSM44</b>	\$1,340	condenser, large diaphragm   switchable: cardioid, omnidirectional, bi-directional   20Hz-20kHz
<b>Shure UC Series Beta 87 Wireless</b>	\$1,858	condenser, large diaphragm   —   —
<b>Shure UHF Series Beta 87 Wireless</b>	\$2,590	condenser, large diaphragm   —   —
<b>Shure VP88</b>	\$1,194	condenser, large diaphragm   stereo mid-side   40Hz-20kHz



## Microphones \$1,000 and Above (cont'd)

MODEL	MSRP	TYPE   PATTERN   FREQUENCY RESPONSE
Sony Electronics C-48	\$1,500	condenser, large diaphragm   omni-, uni, bi-directional   30Hz-16kHz
Sony Electronics C-800 PAC	\$4,665	condenser, large diaphragm, tube circuitry   uni/omnidirectional   20Hz-20kHz
Sony Electronics C800G PAC	\$6,550	condenser, large diaphragm, tube circuitry   uni/omnidirectional   20Hz-18kHz
Sony Electronics ECM-M55	\$1,500	boundary, small diaphragm, stereo   M-S variable pattern   20Hz-20kHz
Soundelux Microphones U99	\$2,500	condenser, large diaphragm, tube circuitry   continuously variable pattern: omni to cardioid to figure-8   20Hz-20kHz

## Mic Preamplifiers

MODEL	MSRP	TYPE   CHANNELS
Aphex Systems Model 107	\$449	hybrid mic preamp   2
ART Dual MP	\$369	all-tube mic preamp   2
ART Pro MPA	\$679	all-tube mic preamp   2
ART Tube MP	\$147	all-tube mic preamp   1
Audio Upgrades High Speed Mic Pre	\$1,500	solid state mic preamp   2
Audio Upgrades High Speed Mic Pre Card	\$125	solid state mic preamp card for consoles   1
Behringer Tube Ultragain T1953	\$699	hybrid mic preamp   2
Benchmark Media Systems MPS-400 4-Channel Mic-Pre	\$1,345	solid state mic preamp   4
Benchmark Media Systems MPS-420/2000 4-Channel Mic-Pre	\$1,545	solid state mic preamp   4
Crane Song Flamingo	\$3,125	solid state mic preamp   2
dbx 786 Precision Mic Preamp	\$2,495.95	solid state mic preamp   1
Earthworks 1024	\$3,500	solid state mic preamp   4
Earthworks LAB102	\$1,500	solid state mic preamp   2
Focusrite Green 1	\$1,099	solid state mic preamp   2
Focusrite Red 1	\$3,600	solid state mic preamp   4
Focusrite Red 8	\$2,495	solid state mic preamp   2
Grace Design Lunatec V2	\$1,495	portable DC-powered mic preamp   2
Grace Design Model 801 Preamplifier	\$4,495	solid state mic preamp   8
Manley Manley 40dB Mic Pre	\$1,600	all-tube mic preamp   1
Manley Manley Dual Mono Mic Pre	\$2,400	all-tube mic preamp   2
Martinsound MSS-10	\$2,250	solid state mic preamp   1
Millennia Media HV-3B	\$1,895	solid state mic preamp   2
Millennia Media HV-3D	\$3,995	hybrid mic preamp   4 or 8
Millennia Media M-2b Stereo Tube Mic Pre	\$3,495	all-tube mic preamp   2   —
Neotek MicMax	\$1,995	solid state mic preamp   2
Neumann Precision 8	\$2,695	solid state mic preamp   8
Oram Octasonic	\$2,118	solid state mic preamp   8
Peavey AMR VMP 2	\$949.99	all-tube mic preamp   2
Precision Analog Systems MPA 100	\$2,200	solid state mic preamp   2

## Mic Preamplifiers (cont'd)

MODEL	MSRP	TYPE   CHANNELS
Retrospec Juice Box	\$595	Direct Input Amplifier   1
Rolls MP110 Direct Drive	\$230	all-tube mic preamp   1
Rolls RP220 Dual Tube Mic Preamp	\$500	all-tube mic preamp   2
Rolls RP520 Studio Tube Mic Preamp	\$600	all-tube mic preamp   2
SPL Mike Man Model 9523	\$699	solid state mic preamp   2
SPL Promike	\$1,299	solid state mic preamp   2
Studio Technologies Mic-PreEminence	\$799	solid state mic preamp   2
Symetrix 302 Dual Microphone Preamplifier	\$299	solid state mic preamp   2
Tube Tech MP-1A	\$2,395	all-tube mic preamp   2

## Channel Strips

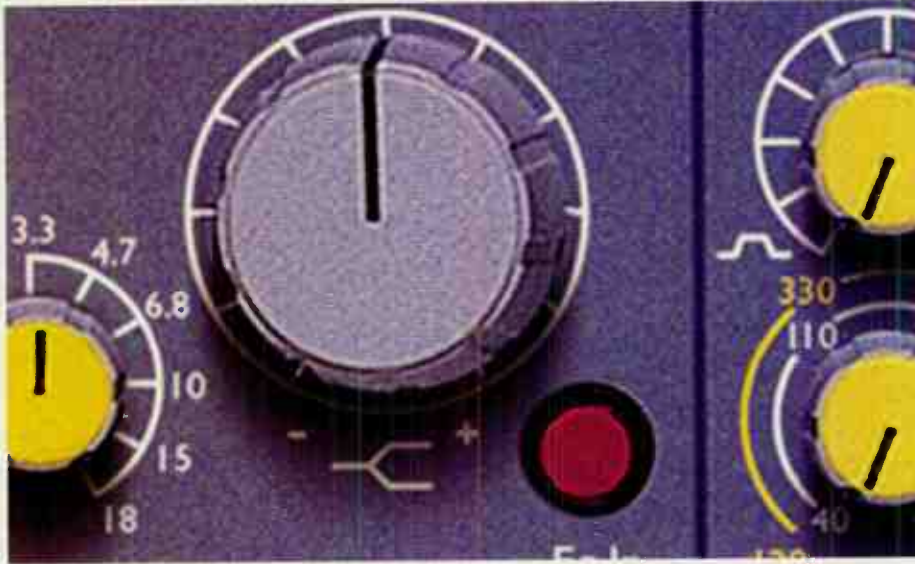
MODEL	MSRP	TYPE   CHANNELS   PROCESSING
Barbetta Electronics Channel One	\$995	solid state mic preamp   1   parametric EQ, compressor
Barbetta Electronics Via Clara	\$1,799	solid state mic preamp   1   parametric EQ, compressor
Behringer Ultragain Pro MIC2200	\$199	hybrid mic preamp   2   48V phantom power, phase reverse, parametric equalizer
dbx 1086 Mic Preamp/Processor	\$749.95	solid state mic preamp   1   dynamics
dbx 286A Mic Preamp/Processor	\$349.95	solid state mic preamp   1   compressor, de-esser, enhancer, and expander/gate
Focusrite Green 5	\$1,599	solid state mic preamp   1   expander, compressor, noise gate, 4-band parametric
Focusrite Green 3	\$1,349	solid state mic preamp   1   expander, compressor, de-esser, 3-band parametric EQ
Focusrite Voicemaster	\$699	solid state mic preamp   1   expander, compressor, de-esser, vocal saturator
Joe Meek C2	\$399.99	—   2   photo-optical stereo compressor
Joe Meek VC1 Studio Channel	\$799.99	solid state mic preamp   1   photo-optical compression/enhancer
Joe Meek VC2	\$1,999.99	hybrid mic preamp   1   photo-optical compression/enhancer
Joe Meek VC3	\$399.99	solid state mic preamp   1   photo-optical compression/enhancer
LA Audio MPX10	\$499.99	hybrid mic preamp   1   noise reduction, compressor, EQ
LA Audio PS-10	\$840.99	hybrid mic preamp   1   de-esser, noise reduction, compressor, and 4-band EQ with sweepable mids
Manley Langevin Dual Microphone Pre	\$1,475	solid state mic preamp   2   EQ
Manley MIC/EQ 500	\$2,900	all-tube mic preamp   1   EQ
Millennia Media STT-1 Origin Twin Topology	\$2,895	hybrid mic preamp   1   opto-compressor/limiters, parametric equalizers, DI instrument input with gain, and opto-de-essers
Oram MWS Microphone Work Station	\$2,590	solid state mic preamp   2   EQ
Rolls/Bellari/RFX RP533 Tube Multi-Processor	\$700	tube mic pre   1   compression, sonic exciter
Steinberg Mindprint EnVoice	\$749	all-tube mic preamp   1   parametric EQ, tube compressor
T.C. Electronic Gold Channel	\$2,495	digitally enhanced mic pre   2   compressor, limiter, gate, EQ, de-esser, digital radiance generator
Tube Tech MEC-1A	\$3,495	all-tube mic preamp   1   compression, EQ

## Phantom Power Supplies

MODEL	MSRP	TYPE   CHANNELS
Calrec RQP4400	\$4,355	phantom power modul. M/S conversion   8
Audio-Technica CP8506 48V	\$180	4-channel phantom power module
Audio-Technica AT880148V	\$75	phantom power module   1



# SIGNAL PROCESSORS



**S**ignal processors have become almost essential in most studios. Compressors, limiters, gates, reverbs, pitchshifting, delays, chorus-ing, and special effects have become integral to the music created by many musicians. In some cases, the effects are as much a part of the performance as the musical instruments or vocals themselves.

We've broken up this section into several categories; reverbs, effects, and multieffects processors can be found under "Effects Processors;" further subdivided by price, while dynamics-based processors, such as gates and compressors, are subdivided based on the processing capabilities they provide. Equalizers have been given their own subsection as well.

Note that many of the processors listed here will crossover between these broad categorizations — it's not uncommon, for example, for a digital multieffects box to provide compression, gating, and EQ along with the expected reverb, chorus, delay, flanging, and other special effects.

## BUYER'S TIPS: EFFECTS

Effects are the icing on the cake. They're the spice that's added to a signal to enhance it or to make it sit correctly in the mix. When we refer to

effects, we're talking about delay, chorus, enhancers, and of course, reverb. While you can certainly do a lot of great work with just one multi-effects processor, it's nice to have at least a couple. We always try to have one unit we can dedicate to reverb, and another that will be used for other effects.

When choosing a reverb, look for a unit that has a number of algorithms

## Effects Processors

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by Craig Anderton	110
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(halls, plates, rooms, auditoriums, and so on); every mix calls for a slightly different reverb sound, and you'll want your processor to cover them all. Listen for the quality of the "tail," or decaying portion of the reverb. Is it smooth, or does it get grainy, with fluttering noises appearing as it dies out? Does the reverb have a metallic quality, or is warm and smooth? (Don't completely discount the unit if it does sound slightly metallic; that sound works very well in certain situations.) How editable are the patches? We look for variable reverb time, some kind of tone shaping, and variable predelay. Others consider editable diffusion essential in a reverb. If the unit has ROM presets only, or limited edit parameters, how useful

## Effects Processors Under \$300

MODEL	MSRP	TYPE OF PROCESSOR   # OF SIMULTANEOUS EFFECTS
<b>Alesis MicroVerb 4</b>	\$249	digital rackmount   1
<b>Alesis NanoVerb</b>	\$135	digital rackmount   2
<b>ART FX-1</b>	\$139	digital tabletop   3
<b>ART Quadra/Fx</b>	\$295	digital rackmount   4
<b>BBE Sound 362</b>	\$259	analog rackmount   1
<b>Behringer DSP1000P</b>	\$149	digital rackmount   2
<b>Behringer DSP1200P</b>	\$149	digital rackmount   1
<b>Big Briar Moogerfooger Lowpass Filter</b>	\$299	analog tabletop   1
<b>Big Briar Moogerfooger Ring Modulator</b>	\$299	analog footpedal   1
<b>Blacet Research Klang Werk 2010</b>	\$199	analog rackmount   —
<b>Crate Pro Audio SM1-SP</b>	\$179.99	digital 1/2 rack   2
<b>Crate Pro Audio SM2-SRS</b>	\$129	digital rackmount   —
<b>Digitech S-100</b>	\$219.95	digital rackmount   4
<b>Electrix EQKiller</b>	\$299	analog rackmount   1
<b>Electrix FilterQueen</b>	\$299	analog rackmount   1
<b>Fostex DE-1</b>	\$179	digital rackmount   —
<b>Korg AX1 B</b>	\$170	digital footpedal   7

# MASSIVE PASSIVE STEREO TUBE EQ



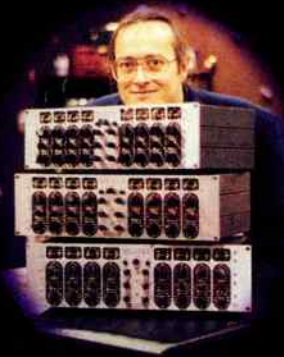
**A PICTURE IS WORTH A THOUSAND WORDS..**

Perhaps, but would photographs of our Variable Mu or VOXBOX have created their successes alone?

You have to hear this gear. You have to use this gear. Put your hands on the knobs and crank 'em.

Engineers who have already gotten hold of the MASSIVE PASSIVE have told us: "Why does it make everything sound so much better?", "It's organic and orgasmic.", "It's a f%#king powerhouse.", "It's unlike any other EQ.", "This is IT. The sound I've always dreamt of but couldn't ever get until now."

**GOT THE PICTURE?**



Craig 'HUTCH' Hutchison designed these monsters...

The MASSIVE PASSIVE is a two channel, four band equalizer, with additional high pass and low pass filters. "Passive" refers to the tone shaping part of this clever new EQ design not using any active circuitry. Only metal film resistors, film capacitors and hand-wound inductors sculpt the sound, kinda like a Pultec EQ on hyper-steroids. Super-beefy, hugely-high-headroom Manley all-tube make-up gain amplifiers deliver your tunes into the next realm. You'll need to experience this.

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are the presets? Do they cover what you need? Be sure to run some different sounds through the unit to check how it responds. What works well on a vocal might not sound that great on a snare drum.

For many years, we didn't consider balanced connections to be essential on an effects unit. Most processors end up patched into the effects send/returns of a mixer, which are rarely balanced. However, this is changing as many computer-based audio interfaces typically offer balanced connections.

## BUYER'S TIPS: DYNAMIC PROCESSORS AND EQ

Sound-shaping processors such compressors, limiters, and equalizers can be invaluable to an engineer. Since most mixers have some form of EQ built-in, you'll probably only need an external unit if you have serious tone-shaping to do, or for putting the final response curve on a song as it goes to mixdown. If you need to get in and really tweak a sound or make corrections to its tone — tonal surgery — you'll want to consider a parametric EQ, which gives you control over the frequency, bandwidth, and amount of EQ applied to each frequency band. Using a parametric EQ effectively can take some practice; that much power can create as many problems as it solves.

A graphic EQ, on the other hand, is well suited to quickly shaping the overall tone of an instrument or mix. Graphic EQs also have the advantage of giving you some basic visual feedback of what you're doing to the signal (the curve of the slider positions on the EQ resembles its response).

Most studios find a need for dynamics processing before they need an outboard EQ. Compression, in particular, is an integral part of many recordings. Look for a compressor that offers a good range of ratios, from 1:1 to 10:1 or even  $\infty$ :1 (limiting). But remember that in most cases, unless you're limiting, you'll probably be working in the 2:1 to 6:1 range. If you're inexperienced with compressors, check out one of the units that offers automatic

## Effects Processors Under \$300 (cont'd)

MODEL	MSRP	TYPE OF PROCESSOR   # OF SIMULTANEOUS EFFECTS
<b>Korg AX1 G</b>	\$160	digital footpedal   7
<b>Korg AX100G</b>	\$250	digital footpedal   7
<b>Korg AX300B</b>	\$275	digital footpedal   7
<b>Korg PX3</b>	\$250	digital tabletop   7
<b>Korg PX3B</b>	\$250	digital tabletop   7
<b>Lexicon MPX 100 Dual Channel Processor</b>	\$299	digital rackmount   2
<b>Marshall BB-2</b>	\$135	analog footpedal   —
<b>Marshall ED1</b>	\$135	analog footpedal   —
<b>Marshall GV2 Guv'nor</b>	\$135	analog footpedal   —
<b>Marshall JH-1</b>	\$145	analog footpedal   —
<b>Marshall SV1</b>	\$145	analog footpedal   —
<b>Marshall VT-1</b>	\$145	analog footpedal   —
<b>Monolith Dunlop Crybaby 535Q</b>	\$185	digital and analog footpedal   —
<b>Peavey Delta Stomp</b>	\$159.99	digital footpedal   —
<b>Peavey Dirty Dog</b>	\$119.99	analog footpedal   —
<b>Peavey Tube Sweetener</b>	\$299.99	analog rackmount   —
<b>Pefftronics Super Rand-O-Matic SB-101</b>	\$229.95	analog footpedal   —
<b>Roland BOSS CE-5 Chorus Ensemble</b>	\$149.50	analog footpedal   1
<b>Roland BOSS DD-5 Digital Delay</b>	\$239.50	digital footpedal   —
<b>Roland BOSS ME-30</b>	\$299	digital and analog footpedal   9
<b>Roland BOSS MT-2 Metal Zone</b>	\$159.50	analog footpedal   1
<b>Roland BOSS RV-3 Reverb/Delay</b>	\$229.50	digital footpedal   2
<b>Rolls RP261 Dual Sonic Exciter</b>	\$200	analog rackmount   —
<b>Rolls RP262 Stereo Sonic Exciter</b>	\$200	analog rackmount   —
<b>Yamaha REV100</b>	\$299	digital rackmount   —

attack/release time setup. These critical settings can be challenging to get right, and having the compressor set them for you while you get your ears around the various sounds can be a great benefit. If you're experienced with compressors, don't completely discount the automatic models. For quick and easy processing, they're tough to beat.

Other things to look for: Fast attack times are nice for controlling peaks, while slower attacks will let you use the compressor for tone shaping as well as level control. A sidechain or trigger input lets the compressor serve as a de-esser and ducker in addition to its regular duties controlling levels. A built-in gate can be a godsend. Compression has a tendency to raise the noise floor

of a signal, and having a gate to clean out the hiss is a great feature.

What about stand-alone noise gates? For most home studios, gates will be of limited usefulness, unless you have a lot of background noise when you're recording, or you're tracking multiple instruments at the same time, in the same room. Gates can, of course, also be used for other applications.

If you're looking to warm or fatten your tracks, consider a tube-based compressor or EQ. While not as clean, nor often as accurate, as a solid-state unit, tube designs definitely will impart a certain character to the signal.

— Mitch Gallagher

## Effects Processors \$300 and Above

MODEL	MSRP	TYPE OF PROCESSOR   # OF SIMULTANEOUS EFFECTS
Alesis MidiVerb 4	\$329	digital rackmount   4
Alesis Q20	\$999	digital rackmount   8
Antares AMM-1 Mic Modeler	\$995	digital rackmount   1
Antares ATR-1a Auto-Tune Intonation Processor	\$849	digital rackmount   1
ART DMV-Pro	\$525	digital rackmount   4
ART PD3	\$850	digital rackmount   1
ART PD3 1000	\$995	digital rackmount   —
BBE Sound 362NR	\$349	analog rackmount   2
BBE Sound 362SW	\$349	analog rackmount   2
BBE Sound 482	\$349	analog rackmount   1
BBE Sound 882	\$599	analog rackmount   1
Big Briar Moogerfooger 12-Stage Phaser	\$399	analog footpedal   1
Digitech Quad 4	\$479.95	digital rackmount   8
Digitech Studio S-200	\$339.95	digital rackmount   4
Electrix FilterFactory	\$399	analog rackmount   2
Electrix Mo-FX	\$449	digital rackmount   4
Electrix WarpFactory	\$399	digital rackmount   1
Eventide DSP4000 Ultra-Harmonizer	\$3,995	digital rackmount   40
Eventide DSP4000B Broadcast Ultra-Harmonizer	\$3,495	digital rackmount   40
Eventide GTR4000 GuitarPro Ultra-Harmonizer	\$2,995	digital rackmount   40
Eventide H3000B+ Broadcast Ultra-Harmonizer	\$2,995	digital rackmount   40
Eventide H3000B/LT Broadcast-Lite Ultra-Harmonizer	\$2,495	digital rackmount   40
Eventide H3000D/SE Studio Enhanced Ultra-Harmonizer	\$2,695	digital rackmount   40
Eventide H3000D/SX Dynamic Ultra-Harmonizer	\$1,995	digital rackmount   —
Eventide H3500B-DFX/E Broadcast Ultra-Harmonizer	\$4,095	digital rackmount   —
Eventide H3500DFX/E Ultra-Harmonizer w/Sampling	\$3,595	digital rackmount   —
Eventide Orville Harmonizer	\$5,695	digital rackmount   —
Klark Teknik DN7103 Delay	\$1,980	digital rackmount   3
Klark Teknik DN7204 Delay	\$2,460	digital footpedal   4
Korg AX1000G	\$350	digital footpedal   8
Korg KA055 Pad	\$350	digital tabletop   2
Lexicon M300/300L Digital Effects System	\$4,995	digital rackmount   2 single or dual
Lexicon 480L Digital Effects System	\$9,899	digital rackmount   Two dual effects
Lexicon MPX 1 Multiple Effects Processor	\$1,299	digital rackmount   6
Lexicon MPX G2 Guitar Effects Processor	\$1,499	digital and analog rackmount   5

## The FX Files

by CRAIG ANDERTON

Effects are to recording as spices are to cooking — they can really enhance whatever's already there, although you have to remember that a little goes a long way. Yet a lot of people aren't really that familiar with their effects; they just dial up a preset and hope for the best.

If you understand how these boxes or plug-ins tick, you can use them much more effectively. The following roundup of common effects clues you in not only to what they are, but also to their crucial parameters, annoying quirks, and some hot applications.

### COMPRESSOR/LIMITER

**Profile:** A compressor/limiter (C/L for short) evens out dynamic range variations by attenuating loud signals to make them softer; this lets you turn up or amplify soft signals. The result is less level difference between soft and loud signals.

**How it works:** Once a signal exceeds a user-adjustable threshold, compression occurs where increasing the input signal does not increase the output level by an equivalent amount. For example, with a compression ratio of 2:1, every additional 2 dB of input level results in only 1 dB of additional output level.

### CRUCIAL PARAMETERS

**Threshold** sets the level above which signals will be compressed or limited. Signal below the threshold are not processed.

**Ratio** selects how the output level changes in relation to the input once the input exceeds the threshold. The higher the ratio, the greater the amount of compression, and the more "squeezed" the sound. Extremely high ratios put an absolute "ceiling" on the signal, which is called limiting.

**Output** adds gain to offset the lower level caused by restricting the dynamic range.

**Attack** sets the reaction time to input level changes. A longer attack time "lets through" more of a signal's original dynamics before the compression kicks in. For example, adding a bit of attack time retains the initial "thwack" of a kick drum.



Behringer DSP 1400P





T.C. Electronic M-ONE



T.C. Electronic D-TWO



T.C. Electronic Finalizer 96

Release determines how long it takes for the C/L to return to its normal state after the input goes under the threshold. With short release times, the C/L tracks very slight level changes, which can produce a “choppy” sound.

**Annoying habits:** Over-compressing results in a thin, unnatural sound, and brings up noise. Don’t add any more compression than needed.

### Hot tips

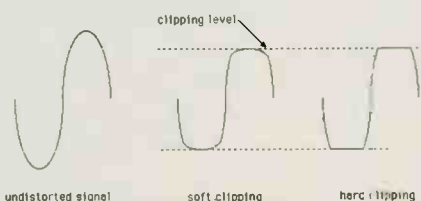
- When used with other effects, if possible place the compressor early in the chain so that it doesn’t bring up the noise from previous stages.
- If it seems as if there’s been a sudden increase in compression but you didn’t increase the compression amount, then the input signal going to the compressor may have increased.
- Some music from the ‘60s featured a drum sound that sounded like it was “sucking” and inhaling. To create this effect, apply lots of compression with an extremely short release time.

### DISTORTION

**Profile:** Distortion mimics the way an amplifier behaves when overloaded, so it’s a popular effect for guitar. However, distortion can also spice up drums, synthesizers, and even vocals.

**How it works:** Not all types of distortion (tube, transistor, digital, etc.) sound the same. Some devices include a tube stage or other analog distortion circuit that can be modified under computer control. Others use DSP to emulate particular types of distortion.

Most musicians prefer “soft” clipping, where the output signal becomes progressively more distorted as the input signal level increases. With hard clipping, the output signal remains undistorted up to a certain point, then becomes extremely distorted as the input increases past that point (see **Figure 1**). This sounds harsher.



**Fig. 1.** An undistorted signal compared to soft- and hard-clipped versions.

## Effects Processors \$300 and Above (cont’d)

MODEL	MSRP	TYPE OF PROCESSOR   # OF SIMULTANEOUS EFFECTS
Lexicon PCM 81 Digital Effects Processor	\$2,995	digital rackmount   4
Lexicon PCM 91 Digital Reverberator	\$2,995	digital rackmount   2
Line 6 Bass POD Pro	\$799	digital rackmount   3
Line 6 POD	\$499	digital tabletop   3
Line 6 POD Pro	\$799	digital rackmount   3
Manley Laboratories Voxbox	\$4,000	analog rackmount   4
Mutronics Mutator	\$1,125	analog rackmount   —
Neotek MultiMax	\$2,795	analog rackmount   —
Oberheim GM-400	\$799	digital rackmount   9
Oberheim GM 1000	\$1,699	digital rackmount   9
Pefftronics RAD-X Random Analogue Delay	\$400	analog rackmount   —
Pefftronics RTSP II Random Time Shift Processor	\$549	analog rackmount   —
Rocktron Intelliflex On-Line	\$719	digital rackmount   5
Rocktron Intelliflex XL	\$959	digital rackmount   5
Rocktron Intellipitch	\$1,079	digital rackmount   5
Roland BOSS GT-3 Guitar Effect Processor	\$495	digital and analog footpedal   13
Roland BOSS GT-5 Guitar Effects Processor	\$795	digital and analog footpedal   15
Roland BOSS VF-1	\$495	digital rackmount   9
Roland SDE-330	\$995	digital rackmount   —
Roland SRV-3030, SRV-3030D	SRV-3030, \$695; SRV-3030D, \$995	digital rackmount   2
Roland SRV-330	\$995	digital rackmount   —
Rolls/Bellari/RFX RPS62 Stereo Tube Sonic Exciter	\$440	analog rackmount   —
Sony Electronics DPS-V55	\$580	digital rackmount   4
Sony Electronics DPS-V77	\$1,875	digital rackmount   4
Sony Electronics DRE-S777PAC	\$12,600	digital rackmount   2
SPL Electronics Charisma Model 9527	\$1,699	analog rackmount   —
SPL Electronics Classic Vitalizer/Model 9215	\$1,099	analog rackmount   —
SPL Electronics De-Esser	\$599	analog rackmount   —
SPL Electronics Loudness Maximizer	\$3,489	digital rackmount   —
SPL Electronics Stereo Vitalizer Mk.II/ 9526	\$699	analog rackmount   —
SPL Electronics Tube Vitalizer 9530	\$3,299	analog rackmount   —
Symetrix 606 Delay F/x Machine	\$649	digital rackmount   2
T.C. Electronic Finalizer Plus	\$2,895	digital rackmount   6
T.C. Electronic FireworX	\$2,195	digital rackmount   —
T.C. Electronic G-Force	\$1,795	digital rackmount   8
T.C. Electronic Intonator	\$1,495	digital rackmount   2
T.C. Electronic M2000	\$1,500	digital rackmount   2
T.C. Electronic M3000	\$2,495	digital rackmount   2
T.C. Electronic M5000	\$4,500	digital rackmount   4
T.C. Electronic TC 1210 Spatial Expander	\$1,684	digital rackmount   —

## CRUCIAL PARAMETERS

*Sensitivity, drive, or input* determines the amount of signal level needed for the onset of distortion. Maximum sensitivity gives the most distortion.

*Output.* Since distortion often adds a great deal of amplification, the output parameter trims the effect's output level to something reasonable.

*Tone controls.* Some distortion effects include tone controls. Distortion adds harmonics to the signal, which increases the high-frequency content; pulling back on the highs reduces shrillness, while boosting the bass gives more depth.

**Annoying habits:** Because of their high gain, distortion boxes can generate a lot of hiss. Also, because many distortion devices are designed for guitar, it's hard to find stereo models for mixing applications.

## Hot tips

- Patch a distortion unit into a mixer's aux bus, and bring the returns back to the mixer. To add some "bite" to a channel, turn up its aux bus send to taste.
- A little distortion can really increase the punch of drum sounds.
- Distortion can make a synthesizer sound a lot more "rock and roll." Add some crunch to organ patches that use rotating speaker effects, or to that old DX7 that's sitting around feeling neglected.

## EQUALIZERS

**Profile:** An equalizer emphasizes (boosts) and/or de-emphasizes (cuts) certain frequencies to change a signal's timbre. The amount of boosting or cutting is expressed in decibels (dB).

**How it works:** Equalizers use filter circuits that pass certain frequencies and reject others. The four most common filter types are lowpass (passes all frequencies below a certain cutoff frequency), highpass (passes frequencies above the cutoff frequency), bandpass (boosts only those frequencies around its *resonant frequency*, while rejecting higher and lower frequencies), and notch (all frequencies around the notch frequency are rejected, while frequencies higher and lower than the *notch frequency* pass through to the filter output). The range of frequencies affected by the boost or notch is called the *bandwidth*.

There are several types of equalizers. *Shelving equalizers* boost or cut at high or low frequencies. The graphic equalizer uses multiple bandpass filters to split the audio spectrum up into a



Line 6 POD Pro

## Effects Processors \$300 and Above (cont'd)

MODEL	MSRP	TYPE OF PROCESSOR   # OF SIMULTANEOUS EFFECTS
T.C. Electronic TC 2290 Dynamic Digital Delay	\$1,995	digital rackmount   —
Yamaha D1030	\$1,299	digital rackmount   —
Yamaha D2040	\$3,999	digital rackmount   —
Yamaha D5000	\$1,400	digital rackmount   —
Yamaha ProR3	\$1,299	digital rackmount   —
Yamaha REV500	\$499	digital rackmount   —
Yamaha SPX990	\$1,239	digital rackmount   —
Yamaha SPX1000	\$1,924	digital rackmount   —

## Gates and Expanders

MODEL	MSRP	TYPE   EFFECTS   # CHANNELS   SIDECHAIN
Alesis NanoCompressor	\$119	analog   gate, limiter, compressor   stereo   sidechain
Behringer Autocom Pro MDX1400	\$149	analog   gate, expander, compressor, enhancer   stereo   sidechain
Behringer Composer Pro MDX2200	\$189	analog   limiter, gate, expander, compressor, peak limiter   stereo   sidechain
Behringer Intelligate XR2000	\$229	analog   gate, expander, ducking   stereo   sidechain
Behringer Multiband Denoiser SNR2000	\$249	analog   noise reduction, expander, de-noise   stereo
Behringer Multigate Pro XR4400	\$229	analog   expander, gate, parametric filter   4 channels



Waves L2

number of bands, with an individual boost/cut control for each band. A *parametric equalizer* is a highly sophisticated form of tone control. Unlike the graphic equalizer, which can boost/cut only at fixed frequencies, a parametric can boost or cut over a continuously variable range of frequencies. In addition, the bandwidth is variable, from broad to sharp (see **Figure 2**). Note that there are also *quasi-parametric* (also called *pseudo-* and *semi-parametric*) equalizers that include frequency and boost/cut controls but no bandwidth control.

## CRUCIAL PARAMETERS

*Frequency* sets the specific part of the audio spectrum where the boosting or cutting occurs.

*Boost/cut* determines the amount of equalization applied at the selected frequency.

*Bandwidth, resonance, or Q.* This control determines the sharpness of the boosting or cutting action. Narrow bandwidth settings affect a very small part of the audio spectrum, while broad settings process a wider range.

**Annoying habits:** Many equalizers don't include bypass switches, making it difficult to compare

equalized and unequalized versions of a sound. Also, some equalizers have a fixed bandwidth, which always seems too narrow or too broad for the intended application.

## Hot tips

- You'll have more headroom if you cut rather than boost. For example, it's often better to cut the midrange than to boost the treble and bass.
- Frequently compare the equalized and non-equalized sounds. You don't want to get into a situation where you boost the treble a lot, which makes the bass seem thin so you boost that, which then makes the midrange seem weak so you boost that, and so on.
- Always use the minimum amount of equalization necessary. Just a few dB of change can make a big difference.
- Suppose you're playing a rhythmic piano part behind a vocalist, but since the piano and voice occupy a similar frequency range, they conflict. The solution: pull back on the piano's midrange somewhat to make room for the vocal frequencies.

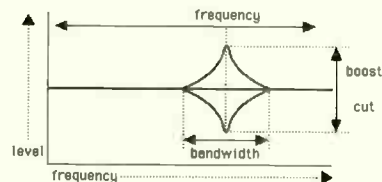


Fig. 2. Graphic representation of parametric equalizer parameters.



# Signal Processors

## Gates and Expanders (cont'd)

MODEL	MSRP	TYPE   EFFECTS   # CHANNELS   SIDECHAIN
<b>Behringer Tube Composer T1952</b>	\$699	all-tube   expander, gate, compressor, limiter   stereo   sidechain
<b>Behringer Ultra-Dyne Pro DSP9024</b>	\$599	digital   limiter, gate, de-esser, compressor, noise reduction, tube simulation, leveler, exciter   stereo   -
<b>Calrec RQP3200</b>	\$3,780	analog   limiter, compressor, gate, expander   stereo   sidechain
<b>Cedar Audio AZ1 Series II</b>	\$16,500	digital   noise reduction, azimuth corrector   stereo   -
<b>Cedar Audio CR1 Series II</b>	\$16,500	digital   noise reduction, deackler   stereo   -
<b>Cedar Audio CRX</b>	\$6,495	digital processor   deackler   stereo   -
<b>Cedar Audio DC1 Series II</b>	\$13,795	digital   noise reduction, declicker   stereo   -
<b>Cedar Audio DCX</b>	\$5,995	digital   declicker   stereo   -
<b>Cedar Audio DH1 Series II</b>	\$16,500	digital   noise reduction, dehisser   stereo
<b>dbx 1066 Compressor/Limiter/Gate</b>	\$549.95	analog   compressor, gate, limiter   -   -
<b>dbx 166XL Compressor/Limiter/Gate</b>	\$329.95	analog   gate, limiter, compressor   stereo   -
<b>dbx 266XL Compressor/Gate</b>	\$249.95	analog   compressor, gate   -   -
<b>dbx DDP</b>	\$599	digital   compressor, limiter, gate, de-esser, parametric EQ   stereo   sidechain
<b>dbx Quantum</b>	\$1,995.95	digital processor   limiter, gate, compressor, EQ   stereo   sidechain
<b>Empirical Labs Distressor EL-8</b>	\$1,499 mono, \$2,899 stereo pair	analog   compressor, expander, limiter, tape saturation simulation, tube simulation   mono   sidechain
<b>Empirical Labs FATSO Jr. EL-7</b>	\$2,499	analog   compressor, tube simulation, expander, tape saturation simulation   stereo
<b>Esoteric Sound Surface Noise Reducer</b>	\$499	analog   noise reduction   stereo   -
<b>Furman Sound LC-6 Limiter/Compressor/Gate</b>	\$439	analog   compressor, gate, limiter, noise reduction   stereo   sidechain
<b>JBL Professional M644 Four-Channel Noise Gate</b>	\$536	analog   gate   4 channels   -
<b>JBL Professional M712</b>	\$536	analog   compressor, gate   stereo   -
<b>Klark Teknik DN504</b>	\$1,396	analog   compressor, gate, limiter, noise reduction, expander   stereo   sidechain
<b>LA Audio FGC2</b>	\$1,199	digital processor   compressor, gate   stereo   -
<b>Rocktron Systems Hush Super C</b>	\$219	analog   gate, noise reduction   stereo   -
<b>Rocktron Systems Studio Hush</b>	\$299	analog   noise reduction, expander   stereo   -
<b>SPL Electronics Dynamaxx Model 9735</b>	\$869	analog   gate, limiter, compressor, decompression   stereo   -
<b>Symetrix 562E Windowing Expander/Gate</b>	\$599	analog   gate, expansion   stereo   sidechain
<b>Symetrix 565E Dual Compressor/Limiter/Expander</b>	\$399	analog   compressor, limiter, expansion   stereo   sidechain
<b>T.C. Electronic Finalizer 96K</b>	\$2,995	digital   noise reduction, parametric EQ, dynamic EQ, de-essing, MS encode/decode   -   -
<b>T.C. Electronic Finalizer Express</b>	\$1,599	digital   -   -   -
<b>Yamaha GC2020C</b>	\$469	analog   mic simulation, limiter, compressor, gate, expander   stereo   sidechain



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- Shure
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- SIB
- Sonic Foundry
- Sonic Filter
- Sony
- Soundcraft
- Spirit
- Stanton
- StudioMaster
- Switchcraft
- Takamine
- Tannoy
- Technics
- Thinline
- TKL
- Toca
- Ultimate
- Ultra
- Vic Firth
- Williams Sound
- Zeta
- Zildjian
- Zoom

## Compressor/Limiters

MODEL	MSRP	TYPE   EFFECTS   # CHANNELS   SIDECHAIN
Alesis 3630 Compressor	\$299	analog   —   stereo   sidechain
Alesis NanoCompressor	\$119	analog   gate, limiter, compressor   stereo   sidechain
ART Dual Leveler	\$369	all-tube   limiter, compressor   stereo   —
ART Pro Channel	\$799	all-tube   compressor, limiter, EQ, mic preamp   mono   —
ART Pro VLA	\$679	all-tube   compressor, limiter   stereo   —
ART Tube Channel	\$525	all-tube   compressor, limiter, EQ, mic preamp   mono   —
ART Tube Compressor	\$147	tabletop   limiter, compressor   mono   —
ART Tube PAC	\$295	tabletop   limiter, compressor, tube mic preamplifier   mono   —
Ashly Audio CLX-S2	\$499	analog   compressor, limiter   stereo   sidechain
Barbetta Electronics Channel One	\$995	analog   compressor, gate   mono   —
Behringer Autocom Pro MDX1400	\$149	analog   gate, expander, compressor, enhancer   stereo   sidechain
Behringer Compser Pro MDX2200	\$189	analog   limiter, gate, expander, compressor, peak limiter   stereo   sidechain
Behringer Multicom Pro MDX4400	\$199	analog   limiter, compressor   4 channels   —
Behringer Shark DSP110	\$169	digital   compressor, filtering, gate, feedback destroyer   mono   —
Behringer Tube Composer T1952	\$699	all-tube   expander, gate, compressor, limiter   stereo   sidechain
Behringer Ultra-Dyne Pro DSP9024	\$599	digital   limiter, gate, de-esser, compressor, noise reduction, tube simulation, leveler, exciter   stereo   —
Behringer Ultrabass Pro EX1200	\$199	digital   limiter, sub-harmonic synthesizer   stereo   —
Behringer Ultramizer Pro DSP 1400P	\$229	digital   limiter, noise reduction, filtering, compressor, surround processor, enhancer, exciter, loudness maximizer   stereo   —
Calrec RQD6400	\$3,595	analog   compressor, limiter   stereo   sidechain
Calrec RQP3200	\$3,780	analog   limiter, compressor, gate, expander   stereo   sidechain
Crane Song Spider	\$6,000	analog   limiter   8 channels   —
Crane Song STC-8	\$4,450	analog   compressor, limiter   stereo   sidechain
Crane Song Trakker	\$2,550	analog   compressor, limiter, vintage sound emulation, VCA and optical emulation   mono   sidechain
Crate Pro Audio SM4-CL	\$199.99	analog   limiter, compressor   stereo   —
dbx 1046 Quad Compressor/Limiter	\$649.95	analog   —   4 channels   —
dbx 1066 Compressor/Limiter/Gate	\$549.95	analog   compressor, gate, limiter   —   —
dbx 160A Compressor/Limiter	\$459.95	analog   —   —   —
dbx 160SL Stereo Compressor/Limiter	\$2,799.95	analog   —   —   —
dbx 166XL Compressor/Limiter/Gate	\$329.95	analog   gate, limiter, compressor   stereo   —
dbx 266XL Compressor/Gate	\$249.95	analog   compressor, gate   —   —
dbx S66 Vacuum Tube Compressor	\$999.95	all-tube   limiter, compressor   —   —
dbx S76 Vacuum Tube Preamp/Compressor	\$599.95	all-tube   compressor   —   —
dbx DDP	\$599	digital   compressor, limiter, gate, de-esser, parametric EQ   stereo   sidechain

### TIME DELAY: FLANGING, CHORUS, ECHO

**Profile:** Time delay produces effects including flanging, echo, chorusing, tapped delay, stereo simulation, and others. Some devices provide dedicated effects for each function; others simply include a general-purpose time delay effect that is flexible enough to provide these different effects.

**How it works:** Time delay effects stuff the input signal into digital memory, then read it out a certain amount of time later. Feeding some of the output back to the input recirculates the delayed sound, thus creating a repeating echo effect. *Modulation*, which varies the delay time over a particular range, produces an animated kind of sound as the delay time sweeps back and forth between a maximum and minimum value.

### CRUCIAL PARAMETERS

*Initial delay* sets the amount of delay time. With echo, this is the time interval between the straight sound and the first echo. With flanging and chorusing, modulation occurs around this initial time delay. Some devices let you synchronize the delay time to MIDI song tempo. Another option is a "tap" or "tap tempo" function, where hitting a switch or button twice sets the delay time interval.

*Balance, mix, or blend.* This parameter adjusts the balance between the straight ("dry") and delayed signals. Flanging typically uses an equal blend of dry and delayed signals, while chorusing uses more straight than delayed sound.

*Feedback, recirculation, or regeneration.* This parameter determines how much of the output feeds back into the input. With echo, minimum feedback gives a single echo; more feedback increases the number of echoes. With flanging, adding feedback increases the effect's sharpness, much like increasing a filter's resonance control.

*Sweep range, modulation amount, or depth* determines how much the modulation section (also called LFO, or sweep) varies the delay time. For example, a delay with a 2:1 sweep range can sweep over a 2:1 time interval (e.g., 5 ms to 10 ms, or 100 ms to 200 ms). A wide sweep range is most important for dramatic flanging effects; chorus and echo don't need much sweep range to be effective. With longer delays, adding a little bit of modulation provides chorusing, but too much modulation will cause detuning effects.

*Modulation type.* The modulation usually comes from periodic waveforms such as triangle or square waves, but some devices include randomized waveforms and/or envelope followers (where the modulation tracks the incoming signal's dynamics).



## Compressor/Limiters (cont'd)

*Modulation rate* sets the modulation frequency. Typical rates are 0.1 Hz (1 cycle every 10 seconds) to 20 Hz. With flanging and chorusing, modulation causes the original pitch to go slightly flat, return to the original pitch, go slightly sharp, then return to the original pitch and start the cycle all over again.

**Annoying habits:** The delay readouts on these devices, particularly older models, aren't always 100% accurate. Also, changing delay times via MIDI invariably results in burping and belching as the device flushes its memory and refills.

**Hot tips**

- For vibrato, set a short initial delay (5 ms or so), monitor delayed sound *only*, and modulate the delay with a triangle or sine wave at a 5 to 14 Hz rate.
- To create a "comb filter," mix a straight signal with the same signal passing through a short, fixed (unmodulated) delay. Try an initial delay of 1 to 10 ms, minimum feedback, no modulation, and an equal blend of processed and straight sound.
- For mono to pseudo-stereo conversion, set a stereo chorus depth parameter to maximum and rate to minimum (or off). This creates a stereo spread without the motion that would result from having a higher modulation rate.
- To calibrate the echo repeat time to a particular rhythmic value, such as an eighth- or quarter-note, the following formula translates beats per minute (tempo) into milliseconds per beat (echo time):  $60,000/\text{tempo} = \text{time (in ms)}$ .

**PITCH TRANSPOSER**

**Profile:** The pitch transposer synthesizes a harmony line from an input signal. Simple pitch transposers are limited to parallel harmonies, while more sophisticated models produce "intelligent" harmonies if you specify a key and mode (major, minor, etc.).

**How it works:** A pitch transposer essentially cuts a signal into a little pieces, then glues them all back together — in real time, except for a few milliseconds of processing time — so that they take up less time (shifts pitch up) or more time (shifts pitch down).

**Crucial parameters.**

*Transposition* sets the harmony line interval, typically in semitones but with an additional fine tuning control.

*Blend or mix.* Sets the balance of dry and transposed signals.

*Feedback, regeneration, or recirculation* feeds some of the output back to the input to create stepped harmonies and other special effects.

MODEL	MSRP	TYPE   EFFECTS   # CHANNELS   SIDECHAIN
<b>dbx Quantum</b>	\$1,995.95	digital processor   limiter, gate, compressor, EQ   stereo   sidechain
<b>Empirical Labs Distressor EL-8</b>	\$1,499 mono, \$2,899 stereo pair	analog   compressor, expander, limiter, tape saturation simulation, tube simulation   mono   sidechain
<b>Empirical Labs FATSO Jr. EL-7</b>	\$2,499	analog   compressor, tube simulation, expander, tape saturation simulation   stereo
<b>Focusrite Green 4</b>	\$1,599	analog   noise reduction, limiter, compressor   stereo   sidechain
<b>Focusrite Green 6</b>	\$1,349	analog   limiter, compressor   4 channels   sidechain
<b>Focusrite Red 3</b>	\$3,995	analog   compressor, limiter   stereo   sidechain
<b>Focusrite Red 7</b>	\$3,995	analog   limiter, compressor, noise reduction, gate   mono   sidechain
<b>Furman Sound C-132 Limiter/Compressor</b>	\$269; balanced, \$303	analog   compressor, limiter   mono   sidechain
<b>Furman Sound LC-6 Limiter/Compressor/Gate</b>	\$439	analog   compressor, gate, limiter, noise reduction   stereo   sidechain
<b>JBL Professional M712</b>	\$536	analog   compressor, gate   stereo   —
<b>JoeMeek SC4 DAD Stereo Compressor</b>	\$2,199.99	digital   compressor   stereo   —
<b>Klark Teknik DN500</b>	\$1,244	analog   compressor, limiter   4 channels   sidechain
<b>Klark Teknik DN504</b>	\$1,396	analog   compressor, gate, limiter, noise reduction, expander   stereo   sidechain
<b>LA Audio FGC2</b>	\$1,199	digital processor   compressor, gate   stereo   —
<b>LA Audio BCL20</b>	\$979	analog   compressor, limiter   stereo   sidechain
<b>LA Audio FGC2</b>	\$1,199.99	analog   compressor, gate   stereo   sidechain
<b>LA Audio GCX20</b>	\$390	analog   compressor, gate   stereo   —
<b>LA Audio TCX20</b>	\$584.99	all-tube   compressor   stereo   —
<b>Manley Langevin Electro-Optical Stereo Limiter</b>	\$1,775	analog   limiter   stereo   —
<b>Manley Electro-Optical Stereo Limiter</b>	\$2,500	all-tube   limiter   stereo   —
<b>Manley Laboratories Variable Mu Stereo Limiter/Compressor</b>	\$4,000	all-tube   limiter, compressor   stereo   —
<b>Millenia Media TCL-2 Twincom Compressor/Limiter</b>	\$2,995	all-tube   compressor   stereo   —
<b>Millenia Media Twincom TCL-2</b>	\$2,495	all-tube   compressor, limiter   stereo   sidechain
<b>Peavey Electronics AMR VC/L-2</b>	\$1,249.99	all-tube   compressor   stereo   —
<b>Retrospec Squeeze Box</b>	\$495	tabletop   compressor, limiter   mono   —
<b>Rolls/Bellari/RFX LA120 Tube Compressor/Limiter</b>	\$160	tabletop   limiter, compressor   mono   —
<b>Rolls/Bellari/RFX RP583 Studio Tube Compressor/Limiter</b>	\$650	all-tube   limiter, compressor   stereo   sidechain
<b>SPL Electronics Dynamaxx Model 9735</b>	\$869	analog   gate, limiter, compressor, decompression   stereo   —
<b>Symetrix S65E Dual Compressor/Limiter/Expander</b>	\$399	analog   compressor, limiter, expansion   stereo   sidechain
<b>Tube Tech CL-1B Compressor</b>	\$2,195	all-tube   compressor   —   —
<b>Tube Tech LCA-2B Stereo Compressor</b>	\$3,495	all-tube   compressor, limiter   stereo   —
<b>Waves L2 UltraMaximizer Rack</b>	\$1,995	digital processor   limiter   stereo   —
<b>White ParaMedic series</b>	\$1,420-\$2,085	digital   limiter   stereo   —
<b>Yamaha GC2020C</b>	\$469	analog   mic simulation, limiter, compressor, gate, expander   stereo   sidechain

## Equalizers

MODEL	MSRP	TYPE   EQ TYPE   # CHANNELS   # BANDS
Alesis M-EQ 230	\$299	analog   graphic   2   30
ART 341	\$249	analog   graphic   2   15
ART 351	\$249	analog   graphic   1   31
ART 355	\$389	analog   graphic   2   31
ART Dual Tube EQ	\$525	all-tube   parametric   1 or 2   8 or 4
ART Tube EQ	\$295	all-tube   parametric   1   4
Ashly Audio GQX-1502	\$529	analog   graphic   2   15
Ashly Audio GQX-3101	\$629	analog   graphic   1   31
Ashly Audio GQX-3102	\$1,059	analog   graphic   2   31
Ashly Audio MQX-1310	\$499	analog   graphic   1   31
Ashly Audio MQX-2150	\$399	analog   graphic   2   15
Ashly Audio MQX-2310	\$799	analog   graphic   2   31
Ashly Audio PQX-571	\$399	analog   parametric   1   5
Ashly Audio PQX-572	\$699	analog   parametric   2   5
Ashly Audio Protea System II 2.24GS	\$1,199	digital   graphic   2   31
Ashly Audio Protea System II 4.24G	\$2,599	digital   graphic   4   31
Ashly Audio Protea System II 4.24GS	\$1,899	digital   graphic   4   31
Ashly Audio Protea System II 4.24PS	\$1,899	digital   parametric   4   12
Behringer Tube Ultra-Q T1951	\$699	all-tube   parametric   2   4
Behringer Ultra-Curve Pro DSP8024	\$599	digital   graphic and parametric   2   31 graphic/2 x 3 parametric
Behringer Ultra-Graph Pro GEQ3102	\$199	analog   graphic   2   31
Behringer Ultra-Q Pro PEQ2200	\$129	analog   parametric   1   5
Calrec RQQ2200	\$3,060	analog   parametric   2   3
CLM Dynamics Expounder Dynamic EQ	\$1,995	analog   graphic and parametric   2   4
Crate Pro Audio LS1-131	\$199.99	analog   graphic   1   31
Crate Pro Audio LS2-215	\$199.99	analog   graphic   2   15
Crate Pro Audio LS3-231	\$299.99	analog   graphic   2   31
Crate Pro Audio SM3-PE	\$129.99	analog   parametric   1   3
dbx 2031 Equalizer/Limiter	\$549.95	-   -   2   31
dbx 2215 Equalizer/Limiter	\$549.95	-   -   2   15
dbx 2231 Equalizer/Limiter	\$799.95	analog   parametric   2   31
dbx 3031 1/3-Octave Graphic EQ	\$749.95	analog   graphic   2   31
dbx 3215 2/3-Octave Graphic EQ	\$749.95	analog   graphic   2   15
dbx 3231 Equalizer/Limiter	\$1,199.95	analog   graphic   2   31
Electro-Voice EQ-131	\$524	analog   graphic   1   31
Electro-Voice EQ-215	\$548	analog   graphic   2   15
Electro-Voice EQ-231	\$840	analog   graphic   2   31
Esoteric Sound Re-Equalizer	\$316	analog   parametric   2   36

*Intelligent harmony settings.* These consist of key and scale data so the pitch transposer generates harmonies based on the rules of harmony for the specified scale.

**Annoying habits:** It takes a lot of processing power to do pitch transposition, and the sound quality sometimes suffers. For example, there might be a fluctuating tremolo effect, or occasional glitches. The greater the degree of transposition, the more objectionable the problems.

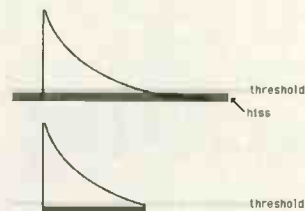
### Hot tips

- Even if your transposer doesn't offer "intelligent" harmonization, you can often change the transposition amount via MIDI by using continuous controllers as you play.
- For glissando effects, set the transposed pitch very slightly higher than normal (a few cents), then advance the regeneration control. This recirculates and pitch shifts each note, thereby initiating a stepped, upward glissando effect (the harmony pitch control controls the step interval).
- Pitch transposers can give excellent flanging/chorusing effects. Set the pitch control for a very slight amount of transposition (1 to 20 cents or so) and add regeneration to taste.

### NOISE GATE

**Profile:** The noise gate helps remove noise and hiss by shutting off the audio whenever the input signal drops below a certain threshold. As a bonus, some noise gates can also provide special effects.

**How it works:** The presence of a loud musical signal masks hiss, which becomes audible only during quiet parts when the music isn't playing. Setting the threshold just above the hiss level will allow the signal to pass if its level exceeds the threshold, but will block the output if the signal level drops below the threshold and consists solely of hiss (see **Figure 3**).



**Fig. 3.** The upper diagram shows the signal before gating. In the lower diagram, note that although we've masked the noise while the gate is open, the decay cuts off more abruptly than normal.

### Crucial parameters

*Threshold or sensitivity* determines the reference level above which the gate opens. High threshold levels are useful for special effects, such as removing substantial amounts of an instrument's decay to make a more percussive or gated sound.



## Equalizers (cont'd)

**Attenuation.** Some noise gates feature adjustable attenuation for the gate-off state. With less attenuation, the gate doesn't shut down all the way so that some of the signal can still pass through. In some cases, this can sound more natural than complete silence between notes or phrases.

**Decay time** sets a fadeout time for the audio when the signal goes under the threshold.

**Attack time** works in reverse: when a signal exceeds the threshold, the noise gate fades in over a specified period of time.

**Key input** This allows an external audio signal to open and close the gate.

**Annoying habits:** Sometimes the gate drops out some signals that you do want to hear. Also, noise gates work best on signals that don't need to be cleaned up too much. Eliminating high noise levels also means nuking substantial portions of the signal.

### Hot tips

- If possible, avoid noise gates for noise reduction since they tend to destroy low-level dynamics.
- The key input is very cool for special effects. For example, gate a sustained chord with a kick drum beat to "chop" the chord into rhythmic slices.
- For a huge drum sound, mic the drums so they include a lot of room sound, compress the heck out of the signal, then gate it with a high threshold. This lets through bursts of room sound, but eliminates the reverberant decay.

## REVERBERATION

**Profile:** Reverberation simulates the sound of audio reflections bouncing around inside an acoustic space (e.g., large hall or auditorium). Digital reverb can also create spaces that don't exist in nature.

**How it works:** Digital reverb processes audio signals through an algorithm that creates a series of delays with filtering, similar to the reflections that occur when sound waves bounce off acoustical surfaces.

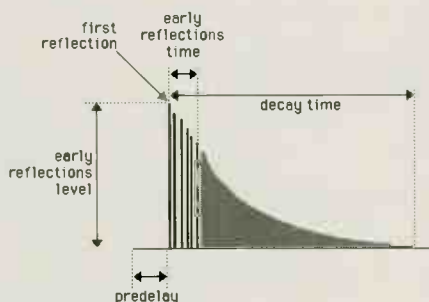


Fig. 4. Common reverb parameters.

MODEL	MSRP	TYPE   EQ TYPE   # CHANNELS   # BANDS
Focusrite Green 2	\$1,249	analog   parametric   1   4
Focusrite ISA 215	\$4,950	analog   parametric   2   4
Focusrite Red 2	\$3,995	analog   parametric   2   4
Focusrite Red 6	\$2,995	analog   parametric   1   4
Focusrite Tone Factory	\$699	analog   parametric   1   7
Furman PQ-3	\$299, bal. \$333	analog   parametric   1   3
Furman PQ-4	\$379	analog   parametric   1   4
Furman Q-151	\$399, bal. \$467	analog   graphic   2   15
Furman Q-152	\$489, bal. \$557	analog   graphic   2   15
Furman Q-301	\$389, bal. \$423	analog   graphic   1   30
Furman Q-302	\$469, bal. \$503	analog   graphic   1   30
Furman Q-602	\$699, bal. \$767	analog   graphic   1   30
Gemini Sound EQ-30	\$149.95	analog   graphic   2   15
JBL Professional DSC260	\$2,039	digital   parametric   2   up to 36
JBL Professional DSC280	\$5,024	digital   parametric   2   2
Kawai EQ 8	\$299	analog   graphic   8   1
Klark Teknik DN300	\$1,260	analog   graphic   1   30
Klark Teknik DN332	\$1,204	analog   graphic   2   16
Klark Teknik DN360	\$1,880	analog   graphic   2   30
Klark Teknik DN3600	\$3,300	analog   graphic   2   30
Klark Teknik DN4000	\$4,600	digital   parametric   2   9
Klark Teknik DN405	\$924	analog   parametric   1   5
Klark Teknik DN410	\$1,372	analog   parametric   2   5
LA Audio DigEQ	\$2,849.99	digital   graphic and parametric   2   31
LA Audio EQ231G-5P	\$1,649.99	analog   graphic   2   31
LA Audio EQ2315	\$973.99	analog   graphic   2   31
Manley Enhanced Pultec EQ	\$2,150	all-tube   parametric   1   3
Manley Langevin Pultec EQ	\$1,275	analog   parametric   1   3
Manley MID EQ	\$1,750	all-tube   parametric   1   3
Millenia Media NSEQ-2	\$2,995	analog   parametric   2   4
Millenia Media NSEQ-2 Twin Topology	\$3,295	hybrid   parametric   2   4
Oram HD-EQ-2	\$4,802	analog   parametric   2   8
Rane MQ 3025	\$399	analog   graphic   2   30
Rane MQ 302L	\$599	analog   graphic   2   30
Redwood Music STK-HVQ131	\$539.95	analog   graphic   1   31
Redwood Music STK-HVQ215	\$539.95	analog   graphic   2   15
Redwood Music STK-HVQ231	\$949.95	analog   graphic   2   31
Redwood Music STK-VQ15	\$249.95	analog   graphic   2   15
Redwood Music STK-VQ31	\$249.95	analog   graphic   1   31
Roland EQ-131	\$345	analog   graphic   1   31
Roland EQ-215	\$395	analog   graphic   2   15
Roland EQ-231	\$495	analog   graphic   2   31
Rolls/Bellari/RFX REQ131	\$250	analog   graphic   1   31
Rolls/Bellari/RFX REQ215	\$460	analog   graphic   2   15
Rolls/Bellari/RFX REQ231	\$525	analog   graphic   2   31

## Equalizers (cont'd)

MODEL	MSRP	TYPE   EQ TYPE   # CHANNELS   # BANDS
Rolls/Bellari/RFX REQ232	\$460	analog   graphic   2   31
Rolls/Bellari/RFX RPY160	\$300	analog   parametric   1   4
Samson E30	\$199.99	-   -   2   15
Samson E31	\$199.99	-   graphic   -   31
Samson E62	\$299.99	-   graphic   2   31
Speck Electronics EQ16-16	\$1,395	analog   parametric   16   3
Speck Electronics EQ16-32	\$1,895	analog   parametric   32   3
SPL Electronics Qure	\$1,799	all-tube   parametric   2   3
Stuudio-master SEQ-152	\$349	analog   graphic   2   15
Stuudio-master SEQ-311	\$329	analog   graphic   2   31
Symetrix 531E	\$599	analog   graphic   1   31
Symetrix 532E	\$749	analog   graphic   2   31
Symetrix 533E	\$949	analog   graphic   2   31
Symetrix 551E	\$449	analog   parametric   1   5
Symetrix 552E	\$749	analog   parametric   2   5
T.C. Electronic TC2240	\$1,288	analog   parametric   2   4
Tsunami EQ-131L Graphic Equalizer	\$279	analog   graphic   1   31
Tsunami EQ-215L Graphic Equalizer	\$295	analog   graphic   2   15
Tube Tech EQ-1A	\$4,395	all-tube   parametric   1   5
Tube Tech ME-1B	\$1,819	analog   graphic   1   3
Tube Tech PE-1C	\$1,850	all-tube   parametric   1   2
White Instruments 4200A	\$1,315	analog   graphic   1   28
White Instruments 4400	\$1,285	analog   graphic   1   28
White Instruments 4675	\$1,010	analog   graphic   2   14
White Instruments 4828	\$880	analog   graphic   1   28
White Instruments 4856	\$1,670	analog   graphic   2   28
XTA Electronics DP202EQ	\$2,125	digital   parametric   2   14
XTA Electronics DP226	\$3,995	digital   parametric   6   8 in/5 out
XTA Electronics GQ600	\$1,650	analog   graphic   2   30
Yamaha GQ2051A	\$429	analog   graphic   2   15
Yamaha YDG2030	\$1,299	digital   graphic   2   30
Yamaha YDP2006	\$1,299	digital   parametric   2   12

### Crucial parameters (see also Figure 4)

**Type** determines the kind of reverb to be emulated: room, hall, plate, spring (the classic "twangy" reverb sound used in guitar amps), etc.

**Room size** determines the room's volume. Changing this parameter often changes other parameters, such as low and/or high frequency decay.

**Early reflections level.** Early reflections are closely spaced discrete echoes, as opposed to the later "wash" of sound that constitutes the reverb's tail. This parameter determines the level of these initial, discrete echoes.

**Predelay** sets the amount of time before the first group of reflections or room reverb sound begins, and is usually 100 ms or less. A longer predelay setting gives the feeling of a larger acoustical space.

**Decay time** adjusts how long it takes for the reverb tail to decay to the point of inaudibility. Note that there may be separate decay times for different frequency bands so you can more precisely tailor the room's characteristics.

**Crossover frequency** applies only to units with separate decay times for high and low frequencies. This parameter determines the

"dividing line" between the highs and lows. For example, with a crossover frequency of 1 kHz, frequencies below 1 kHz will be subject to the low-frequency decay time, while frequencies above 1 kHz will be subject to the high-frequency decay time.

**High frequency rolloff.** In a natural reverberant space, high frequencies tend to dissipate more rapidly than lows. High frequency rolloff helps simulate this effect.

**Mix balance, or blend.** Sets the mix between the reverberated and straight signals.

**Diffusion, or density.** A "smoothness/thickness" parameter. Increasing diffusion packs the early reflections closer together giving a thicker sound. Decreasing diffusion spreads the early reflections further apart. Some reverb units call this density, and some diffusion controls affect all reflections, not just the early ones.

**Annoying habits:** Even the best digital reverbs don't really sound like clapping your hands in a cathedral. An real acoustic space is still the best way to do reverb.

### Hot tips

- Different instruments can sound better with different reverb settings. For example, low density settings can be problematic with percussive sounds, since the first reflection could sound more like a discrete echo than part of the reverb. Increasing the density solves this. However, low density settings can work very well with voice to add more fullness to the overall sound.
- To create a "bigger" sound, set the low-frequency decay longer than the high-frequency decay. For a more ethereal sound, do the reverse.
- To improve the intelligibility of vocals when processing them with reverb, try increasing the predelay time. This moves the reverb out of the way of the dry signal. This trick can also work with other instruments and signals.

### TREMOLO

**Profile:** This provides a periodic amplitude change so that the sound seems to "pulsate."

**How it works:** A modulation source, such as a triangle or sine wave, controls amplitude.

### CRUCIAL PARAMETERS

**Modulation amount, or depth** determines how much the modulation section varies the amplitude.

**Modulation type.** Some tremolos include different modulation waveforms.

**Modulation rate** sets the modulation frequency.

**Annoying habits:** You usually can't sync up the tremolo modulation frequency to MIDI tempo.



## Hot tips

- Tremolo is the driving sound behind surf music, but it was also used on vocals back in the '60s, when people were so stoned they thought it actually sounded good.

## EXCITER

**Profile:** An exciter increases brightness without necessarily adding equalization. The result is a brighter, "airier" sound without the stridency that can sometimes occur when simply boosting treble.

**How it works:** Different processors vary, but one popular model adds subtle amounts of high-frequency distortion. Sometimes phase changes will also factor into the sound.

## Crucial parameters

*Exciter frequency* sets the frequency at which the "excitation" starts to kick in.

*Exciter mix* varies how much "excited" sound gets added to the straight sound.

**Annoying habits:** People usually turn these up too much, and ruin otherwise perfectly good-sounding songs.

## Where Are the Knobs?

More effects are moving out of hardware boxes, and into computers with digital audio interfaces. And why not? Most digital signal processors require lots of computing power, so using a computer-based "brain" can give advantages not available with standard hardware.

These "plug-ins" generally work in a conjunction with a host program, such as a digital audio editor or hard disk recorder, although some can work in stand-alone mode. Windows has two main plug-in formats, Direct X and VST; there are several competing formats on the Mac, including VST, MAS, Premiere, and others. Some hardware-dependent DAWs (digital audio workstations) also support plug-ins. Digidesign's TDM format is one such popular format.

So which is better, software or hardware? If you're playing a club, go with the hardware box. But in the studio, software effects can enhance your sound with a minimal investment in money and space. See page 130 for more on plug-ins

## Hot tips

- Don't process an entire mix through one of these boxes, it's usually overkill.
- For best results, drive the exciter with an aux bus and add in subtle amounts for various channels, as needed.

## VOCODER

**Profile:** A vocoder primarily creates "talking instrument" effects.

**How it works:** A vocoder has two inputs, the carrier input for an instrument, and the modulator input for a microphone or other signal source. Talking into the microphone superimposes vocal effects on whatever is plugged into the instrument input by opening and closing filters that process the instrument sound according to the frequencies present in the human voice.

## Crucial parameters

*Carrier input level* sets the level of the carrier signal (duh).

*Modulator input level* adjusts the modulator signal level.

*Balance* sets the blend of mic with vocoded sound.

*Highpass filter* adds in some high frequencies from the mic channel directly into the output to increase intelligibility.

**Annoying habits:** The filters are so sharp, it's easy to overload them and get horrible distortion.

## Hot tips

- Vocoders are good for much more than talking instrument effects. For example, play drums into the microphone input instead of voice, and use this to control a keyboard playing sustained chords.

- For best results, the instrument being processed should have plenty of harmonics. This is why distorted guitar works well with vocoding.

## SIGNING OFF

Signal processors are really cool, but when you add MIDI control, they get even better. Few people have truly exploited the possibilities inherent in today's effects and multieffects, so get creative — you just may discover some incredible signature sound that's uniquely your own.

## Multiple Effects

Complex setups may require patching several different boxes together, which can connect in series or parallel (see **Figure 5**). Parallel setups require a mixer (although some multieffects include the mixer as another effect), but allow more flexibility. For example, bass through wah-wah sounds thin because the wah blocks the bass frequencies. However, feeding the wah-wah into a mixer in parallel with an EQ set to boost the bass frequencies gives the best of both worlds.

With series effects, order does matter. Generally dynamics processors (compressors and limiters) either go at the beginning of the chain to create a smooth, sustained signal for subsequent effects, or at the end to minimize level variations.

Next in line are effects that add new pitches or harmonics to the basic sound, such as distortion, octave dividers, and pitch transposers. Then comes EQ so you can tame the tone, time-delay effects (e.g., chorusing, echo and delay) to start adding ambience, and finally, reverb to create a room. Of course, this is just one option; there are many variations on this particular theme.

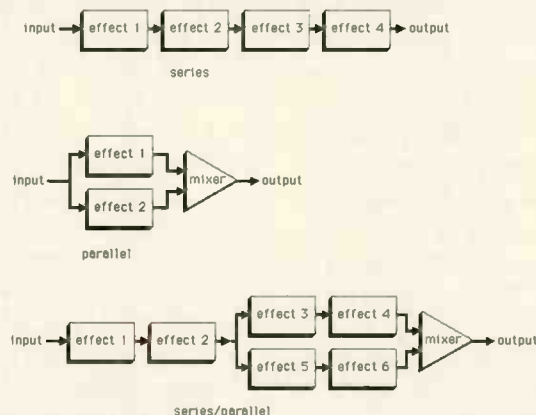


Fig. 5. Series, parallel, and series/parallel configurations.

# COMPUTER HARDWARE & SOFTWARE



In this section of the *Music Technology Buyer's Guide*, we'll be focusing on hardware and software that allows you to make music and record/process audio with a home computer, whether it be a Mac or a Windows-based PC.

## BUYER'S TIPS: COMPUTER/AUDIO INTERFACES

Getting audio in and out of computers with decent quality has recently become a goal of many studio owners and musicians. Once the audio is inside the computer, there's an incredible amount that can be done with it. A number of manufacturers have risen to the challenge of providing the hardware support for those chasing this goal. While this provides a large number of choices for you, it can also make reaching a decision on which one to buy a real dilemma.

Our advice is to approach the decision methodically. Start with your computer platform. Next examine your computer to determine what kind of slots or connection possibilities you have. On the Mac, older machines will have NuBus slots, more current models will have PCI format slots. Increasingly important in the future will be USB and FireWire for connecting audio interfaces; a big advantage to both is that

they don't require an internal card slot to work. A simple cable connection on the back of the computer is all that's needed.

On the PC, older machines will have ISA/EISA slots, while newer computers will have PCI. Some current models support both ISA/EISA and PCI. New PCs have also implemented USB support, although FireWire has been slow to appear on PCs.

Once you've determined which interfaces are physically compatible with your computer, look at the audio connector situation. Do you need only analog connections to interface your audio gear with the card, or are you also intending to use digital? If you will be using digital, which formats do you need? Cards and interfaces are available that support AES/EBU, coaxial S/PDIF, optical S/PDIF, and ADAT optical.

If you're working with analog connections, how many do you need? How many inputs will you be sending into the interface at once? How many outputs do you require? If you'll be mainly overdubbing tracks one at a time, and mixing down within the computer, you can probably get by with a two-in/two-out interface. As with mixers, keep an eye towards the future, planning for possible expansion of your system. Few people regret having an

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extra input or output on their interface.

Beyond the basic parameters listed above, look at any bells and whistles the interface might have. Some support direct connection of guitars and mics, others have headphone outputs, and a few even offer built-in MIDI interfaces. Make a list of what you need, and what the potential interfaces will do, and it should be fairly easy to at least narrow your choices down.

## BUYER'S TIPS: SOFTWARE

Many home studios are built around computers these days, and what is it that makes the computer world go 'round? You got it, software. A wide variety of very powerful software is available in the budget realm. Regardless of your needs, you'll likely be able to find a program that will cover you.

## DIGITAL AUDIO

There are several types of digital audio software out there: Programs designed for editing and processing audio files, those oriented towards working with loops and remixing, and utilities for accomplishing specific tasks such as data-compressing audio files for archiving.

## INTEGRATED SEQUENCER/MULTITRACK AUDIO

These programs are the powerhouses of the studio world, combining a MIDI sequencer with digital audio recording, mixing, and editing. You won't necessarily find all the



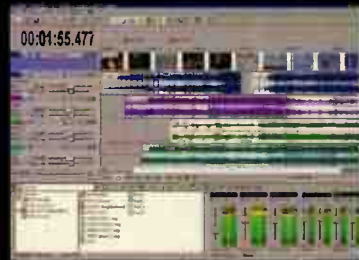
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- Simultaneous play and record
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- Envelopes lock to events
- Video and AVI file support
- Real-time play and record meters
- Multiple I/D configurations
- MIDI Time Code synchronization
- 24-bit/96 kHz file support
- 32 assignable DirectX FX sends
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- Cut, copy, and paste envelopes
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features in the budget version that you might in a top-of-the-line program. The trade-off is that budget versions are often easier to use, require less computer power, and don't have the steep learning curves of their big brothers — a good thing if your goal is to produce music, not to be a computer software expert.

## MIDI SEQUENCERS AND AUTO ACCOMPANIMENT

Programs in this category provide MIDI sequencing, which may be all you need for composing certain types of instrumental music. Also in this category are auto accompaniment programs that provide intelligent backing tracks via MIDI.

## EDITOR/LIBRARIANS

In this category, you'll find programs dedicated to helping you improve the efficiency of your MIDI rig. Editors allow you to manipulate the parameters of your synths via the computer screen, a distinct improvement over the small LCDs built into most keyboards and modules. Librarians allow you to archive and organize the patches you've collected for your rig, giving you quick access to any sound you might need.

## NOTATION

Notation software is dedicated to one task: Creating legible notated versions of your songs. Look for a program that allows you to enter the music by several means: playing it in from a MIDI keyboard, entering it onscreen with the mouse, and using QWERTY keyboard commands. Also look at the quality of the notation once it's been printed out on paper. Can you adjust and manipulate the score layout? What kinds of editing options are provided? Do you need alternate note heads or unusual notation symbols?



M Audio Delta

## Computer-Based Hard Disk Recording Systems

MODEL	MSRP	PLATFORM   ANALOG I/O   DIGITAL I/O   SOFTWARE
<b>CreamWare Scope/DP</b>	\$7995	Mac OS, Win 95   —   ADAT   Scope
<b>Digidesign 882 20 I/O Audio Interface</b>	\$1,245	Mac, Win NT   8 bal. I/O   S/PDIF   Pro Tools
<b>Digidesign 888 24 I/O Audio Interface</b>	\$3,695	Mac, Win NT   8 bal I/O   AES/EBU, S/PDIF   Pro Tools
<b>Digidesign ADAT Bridge I/O</b>	\$1,245	—   —   —   —
<b>Digidesign Digi 001</b>	\$995	Mac, Win 98   8 bal/8 bal.   S/PDIF coax, ADAT   Pro Tools
<b>Digidesign Digi ToolBox XP</b>	\$545	Mac, Win 98   2 RCA/2 RCA   S/PDIF coax   Pro Tools LE
<b>Digidesign Pro Tools 24</b>	\$5,995, core system, \$1,995, extra DSP Farm PCI	Mac, Win. NT   Multiple I/O configurations available   Pro Tools
<b>Digidesign Pro Tools 24 MIX and MIXplus</b>	MIX, \$7,995; MIXplus (MIX core and Farm), \$9,995; additional MIX Farm cards, \$3,995	Mac, Win. NT   Multiple I/O configurations available   Pro Tools
<b>Digital Audio Research SoundStation STORM</b>	contact manufacturer	Proprietary system   16 bal./16 bal.   AES/EBU, S/PDIF coax, TDIF, ADAT   STORM
<b>E-mu / Ensoniq Paris</b>	bundle 1, \$2,895; bundle 2, \$3,495; bundle 3, \$3,895	Win. 95/98, Mac   Multiple I/O configurations available   Paris
<b>SADiE 24.96 DAW</b>	\$8,995 for cardset	PC   8 bal., 8 unbal./8 bal., 8 unbal.   AES/EBU out   Sadie
<b>Steinberg Cubase VST Project Pak</b>	\$349	Win   3 unbal./ 2 RCA   S/PDIF   Cubase
<b>Steinberg Cubase VST Studio Pak</b>	\$849	Win   1 unbal I/O   S/PDIF, ADAT   Cubase
<b>Wave Distribution StudioPC</b>	\$1,990 to \$12,000	PC, Mac   Multiple I/O configurations available   —   Pre-configured DAWs optimized for ProTools, VST, Logic, and Cakewalk

## Audio Interfaces

MODEL	MSRP	PLATFORM   ANALOG I/O   DIGITAL I/O
<b>Aardvark Aark 24</b>	\$899	Win 95/98   8 bal./8 bal.   AES/EBU, S/PDIF coax, ADAT
<b>Aardvark Aark TDIF</b>	\$425	Win 95/98   —   T/DIF   —
<b>Aardvark Direct Mix USB3</b>	\$299	USB for Mac, Win   3 bal./ 2 bal., 1 unbal.   —
<b>Aardvark Direct Pro 2496</b>	\$699	Win 98/95   8 bal./6 bal.   S/PDIF
<b>Aardvark Direct Pro LX6</b>	\$499	Win 98 /95   4 bal. I/O   S/PDIF
<b>Alesis ADAT/EDIT Editing System</b>	\$499	Mac   Win 95   —   ADAT
<b>Antex StudioCard 2000 Plus</b>	\$895	Win 2000   4 bal. I/O   AES/EBU, S/PDIF
<b>Digidesign Audiomedia III PCI</b>	\$795	Mac, Win   2 RCA I/O   S/PDIF
<b>Digital Audio Labs CardDeluxe</b>	\$595	Win 95 / NT   2 bal I/O   AES/EBU, S/PDIF
<b>Digital Audio Labs V8</b>	contact manufacturer	PC   16 bal./ —   AES/EBU, S/PDIF coax and optical, T/DIF, ADAT   —
<b>Echo Daria24</b>	\$379	Mac, Win, Beos   2 bal. in   —
<b>Echo Gina24</b>	\$495	Mac, Win, Beos   2 bal., 2 unbal./8 bal., 8 unbal.   S/PDIF, ADAT



You won't find that most budget and easy-to-use notation software can rival the tweaky notation capabilities of high-end programs, but the power available in an easy-to-use program is outstanding for lead sheets, composing, rough drafts, or printing out quick copies.

## PLUG-INS

Plug-ins are small applications that run within a host program, and extend the host's capabilities in some way. In a way, plug-ins are conceptually similar to buying accessories for your car. For example, some digital audio editors don't include guitar-oriented effects such as tremolo and amp emulation. A plug-in can provide that kind of processing.

Plug-ins aren't like running two programs simultaneously; they're actually integrated into the host program, as if they were part of it. You don't have to open a plug-in — it shows up right in a plug-in menu within the host.

In the music world, most plug-ins are audio processors of one sort or another. The range of plug-ins available is truly staggering, and there's sometimes surprisingly little difference between those on the high end and those on the low end. You'll give up a little control and maybe a few features, but the basics will be there, and the sound quality will usually be very good.

Plug-ins offer a cost-effective alternative to hardware gear if you're already working in the computer/digital audio world. In addition, the audio signals remain completely in the digital domain, helping to ensure high audio quality. Before you spring for a hardware compressor or effect, take a look at what these little beauties can do — you may be surprised (and pleased) at how much power you can get for your dollars.

—Mitch Gallagher



SEK'D Sequoia

## Audio Interfaces (cont'd)

MODEL	MSRP	PLATFORM   ANALOG I/O   DIGITAL I/O
<b>Echo Layla24</b>	\$995	Mac, Win, Beos   8 bal. 8 unbal.   S/PDIF ADAT
<b>Echo Mia</b>	\$250	Mac, Win, Beos   2 bal. I/O   S/PDIF
<b>Echo Mona</b>	\$995	Mac, Win, Beos   8 bal., 4 unbal./6 bal., 6 unbal.   S/PDIF, ADAT
<b>Edirol Roland AudioCanvas UA-100</b>	\$495	USB audio interface   2 unbal., 2 RCA/2 RCA   S/PDIF optical out
<b>Emagic GmbH Audiowerk2</b>	\$299	Mac, Win   2 RCA I/O   S/PDIF
<b>Frontier Design Dakota</b>	\$599	Win 98/95   —   S/PDIF, ADAT
<b>Frontier Design Dakota/Tango24</b>	\$899	PC   8 bal./8 bal.   S/PDIF coax and optical, ADAT
<b>Frontier Design Tango24</b>	\$799	Mac, Win 95/98   8 bal. I/O   ADAT
<b>Frontier Design Tango24 + WaveCenter/PCI</b>	\$789	PC   8 bal./8 bal.   AES/EBU, S/PDIF coax, ADAT
<b>Frontier Design WaveCenter</b>	\$498	Win 95   —   S/PDIF, ADAT
<b>Frontier Design WaveCenter/PCI</b>	\$389	Win 98/95, Mac   —   S/PDIF, ADAT
<b>JDSound RME Project Hammerfall 96S2</b>	\$650	Mac, Win 98/NT   —   —
<b>Kurzweil DMTi</b>	\$1,310; \$1,495 w/ TDIF ; \$1,595 w/ ADAT	K2500   —   ADAT, S/PDIF, TDIF, ADAT
<b>Lexicon Core2 Desktop Audio System</b>	\$419	Win. 95/98, Mac   4 unbal./8 bal.   S/PDIF coax and optical, ADAT
<b>Lynx Studio Technology LynxONE</b>	\$549	Win NT/98 /95/2000, Mac   2 bal. I/O   AES/EBU, S/PDIF
<b>M Audio Audiophile 2496</b>	\$229.95	PC   2 RCA I/O   S/PDIF
<b>M Audio Delta 44</b>	\$399.95	Linux, Mac, Win 2000/95/98 /NT   4x4 balanced or unbalanced I/O   —
<b>M Audio M-Audio Delta 66</b>	\$499.95	Linux, Mac, Win 2000/95/98 /NT   4x4 balanced or unbalanced I/O   S/PDIF
<b>M Audio Omni I/O</b>	\$299.95	Delta 44 or 66   2 bal./4 bal.   —
<b>Metalithic Digital Wings for Audio Elite</b>	\$1,248	PC   8 bal./8 bal.   S/PDIF coax
<b>Metric Halo Mobile I/O 2882</b>	\$1,495	Firewire, Win, Mac   8 bal., 4 unbal./8 bal.   AES/EBU, S/PDIF
<b>Micro Technology Microeditor</b>	\$1,595	PC   —   —
<b>MOTU 1224</b>	\$1,295 Core system; \$995 expansion I/O	Mac, Win   8 bal./8 bal.   AES/EBU
<b>MOTU 1296</b>	\$2,095 core system; \$1,795 expansion I/O	Mac, Win   12 bal./12 bal.   AES/EBU
<b>MOTU 2408mkII</b>	\$995 core system; \$695 expansion i/o	Mac, Win 95/98/Me   8 bal./10 bal.   S/PDIF coax, TDIF, ADAT
<b>MOTU 24i</b>	\$1,495 core system; \$1,195 expansion I/O	Mac, Win 95/98/Me   24 bal./2 bal.   S/PDIF coax and optical outs
<b>MOTU 308</b>	\$695	Mac, Win 95/98   —   AES/EBU, S/PDIF coax and optical
<b>Opcode Systems DATport</b>	\$249.95	USB, MacOS   —   S/PDIF
<b>Opcode Systems SONICport</b>	\$299.95	USB, MacOS   —   S/PDIF
<b>Opcode Systems SONICport Optical</b>	\$299.95	USB, Mac   —   Toslink
<b>Roland US AF-70</b>	\$395	—   2 bal. I/O   —
<b>SeaSound Solo EX</b>	\$849.95	Mac, Win 95/98   2 bal., 4 unbal./4 unbal.   S/PDIF coax
<b>SeaSound Solo Expander</b>	\$429.95	—   6 bal. I/O   —
<b>SeaSound Soloist</b>	\$499.95	Mac, PC   1 bal., 4 unbal./2 bal.   —
<b>SEK'D ARC 88</b>	\$749	Mac, Win   8 RCA I/O   S/PDIF

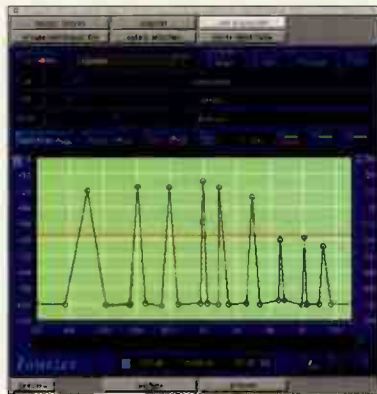
## How to Choose a Windows Audio Interface

by CRAIG ANDERTON

Computers can be pretty smart, but when it comes to sound, they need a translator that can convert sound waves into the digital language of ones and zeroes. Soundcards provide this translation by including analog-to-digital (A/D) converters that get sound into your computer, and digital-to-analog (D/A) converters that can take digital data and turn it back into sound waves. Many consumer-oriented soundcards also include on-board music synthesizers that can play back a composition you've created, provide high-class bleeps and bleeps for your favorite video games, or even reproduce sounds attached to an Internet greeting card.

Most Windows machines come bundled with a soundcard, which allows for working not only with music, but with any audio-related applications, such as voice recognition and speech-to-text translation. However, these cards are often consumer-grade devices with acceptable, but not great, sound quality. While fine for casual applications, if you want quality sound for digital audio editing or multitrack recording, you'll want to upgrade. And if you're buying a new PC, you can often knock a few bucks off the price by asking that a soundcard not be bundled, then adding your own.

But the growing sophistication and functionality of soundcards has spawned a new product category, the audio interface,



Hyperprism Ionizer

## Audio Interfaces (cont'd)

MODEL	MSRP	PLATFORM   ANALOG I/O   DIGITAL I/O
SEK'D Prodif 96 Pro	\$799	Mac, Win   1 TRS I/O   AES/EBU, S/PDIF, ADAT
SEK'D Prodif Plus	\$549	Mac, Win   1 TRS I/O   AES/EBU, S/PDIF, ADAT
SEK'D Prodif T 2496	\$689	Win   —   ADAT
SEK'D Siena	\$599	Mac, Win   8 RCA I/O   —
Sonorus STUDI/O	\$849	Win, Mac   1 bal. I/O   S/PDIF, ADAT
Sound Devices USBPre	\$695	USB, Mac, Win   2 bal., 2 unbal., 2 RCA/2 stereo   —
Soundscape Mixtreme PCI Card	\$550	Win   —   TDIIF, S/PDIF, ADAT
Soundscape SS8i/o-1	\$1,995	—   8 bal. I/O   TDIIF, ADAT
Soundscape SS8i/o-2	\$600	—   —   TDIIF, ADAT
Soundscape SS8i/o-3	\$600	—   8 RCA I/O   TDIIF
Swissonic America USB Studio/D	\$849	USB, Mac, Win   2 bal., 2 unbal., 2 RCA/6 RCA   S/PDIF
Yamaha AX16AT PCI	\$299.95	Mac, Win   —   —

## Digital Audio Multitrack Recording Software

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
BIAS Deck	\$299	Mac   Premiere
Cakewalk Club Tracks	\$49	Win 98, PC   —
Cakewalk Guitar Studio	\$249	PC, Win 98, Win NT   DirectX
Cakewalk Guitar Tracks	\$49	PC, Win 98   DirectX
Cakewalk Home Studio	\$129	PC, Win 98, Win NT   DirectX
Cakewalk Metro	\$249	Mac   VST, Adobe Premiere
Cakewalk Metro Special Edition (SE)	\$29	Mac   Premiere and VST
Cakewalk Music Creator	\$49	Win NT, Win 98, PC   —
Cakewalk Pro Audio	\$429	Win 98, Win NT, PC   DirectX
CreamWare TripleDat 3.0	\$920	PC   proprietary
Digidesign ToolBox for Macintosh Bundle	\$895	Mac   AudioSuite
Emagic Logic Audio Gold	\$499	Win 98, PC, Mac OS 9, Mac   VST, DirectX, Premiere, AudioSuite, TDM
Emagic Logic Audio Platinum	\$799	Win 98, PC, Mac, Mac OS 9   VST, DirectX, Premiere, AudioSuite, TDM
Emagic Logic Audio Silver	\$299	Mac OS 9, Win 98, PC, Mac   VST, DirectX
Emagic MicroLogic AV	\$99	Mac, PC, Mac OS 9, Win 98   Emagic
Innovative Quality SAW32	\$500	PC   IQS, DirectX, VST
Innovative Quality SAWPlus	\$300	PC   IQS
Innovative Quality SAWPlus32	\$700	PC   IQS, DirectX, VST
Innovative Quality SAWPro	\$950	PC   IQS SAW API, DirectX, VST
Intelligent Devices Virtual PARIS	\$249	PC, Mac   —
Intelligent Devices Virtual PARIS Pro	\$599	Mac, PC   VST and DirectX
Metalithic Systems Digital Wings For Audio Elite	\$1,248	PC   —
Minnetonka Audio MxS1 Native	\$699	PC, Win NT, Win 98, Win 2000   DirectX
Minnetonka Audio MxTrax Native	\$399	Win NT, PC, Win 2000, Win 98   DirectX



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## Digital Audio Multitrack Recording Software (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>MOTU Digital Performer</b>	\$795	Mac   MOTU Audio System, TDM, Adobe Premiere
<b>Musicator Musicator Win</b>	\$299	PC   —
<b>Opcodes Systems Studio Vision Pro</b>	\$995	Mac   VST, Premiere, TDM
<b>Opcodes Systems Vision DSP</b>	\$199.95	Mac   VST, Premiere
<b>PG Music PowerTracks Pro Audio</b>	\$29	PC   PG Music or user-programmed; source code provided
<b>SEK'D Red Roaster</b>	\$369	PC, Win 2000, Win 98, Win NT   Samplitude, DirectX
<b>SEK'D Samplitude Studio</b>	\$479	PC, Win 2000, Win 98, Win NT   Samplitude, DirectX
<b>Sonic Foundry Vegas Audio 2.0</b>	\$699	PC   DirectX
<b>Syntrillium Software Cool Edit Pro</b>	\$399	PC   DirectX
<b>Tracer Technologies Audio Pro</b>	\$349	PC   DirectX
<b>Voyetra Turtle Beach Digital Orchestrator</b>	\$159.95	PC   —
<b>Voyetra Turtle Beach Digital Orchestrator Pro</b>	\$199.95	PC   —

## Digital Audio Processing Software

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT   AUDIO FORMAT
<b>Antares Auto-Tune AS</b>	\$399	Mac   —   AIFF
<b>Antares Infinity</b>	\$325	Mac   —   AIFF, SDII
<b>Arboretum Harmony 1.0</b>	\$349	Mac   —   QuickTime, SDII, AIFF, WAV
<b>Arboretum Hyperprism 2.5 for HyperEngine</b>	\$299	Mac   —   AIFF, QuickTime, SDII, WAV
<b>Arboretum Ionizer 1.3 for HyperEngine</b>	\$499	Mac   —   QuickTime, SDII, AIFF, WAV
<b>BIAS Peak</b>	\$499	Mac   TDM, AudioSuite, Premiere   AIFF, QuickTime, Real Audio, SDII, WAV
<b>BIAS Peak LE</b>	\$99	Mac   Premiere   QuickTime, SDII, WAV, MPEG, AIFF
<b>BIAS Peak - TDM Edition</b>	\$499	Mac   Premiere, TDM, Audiosuite   MPEG, WAV, AIFF, SDII, QuickTime
<b>Digidesign Sound Designer II</b>	\$495	Mac   Sound Designer II plug-ins   AIFF, SDII
<b>Dissidents Sample Wrench 24/96</b>	\$259	PC   —   AIFF, VOC, WAV
<b>Dissidents Sample Wrench XE</b>	\$99	PC   —   AIFF, VOC, WAV
<b>IK Multimedia T-Rack5</b>	\$299	PC, BeOS, Mac   Plug-in version available soon   WAV, SDII, AIFF
<b>Intelligent Devices AD-1 Pro Audio Analyzer</b>	\$349	Mac   —   —
<b>Intelligent Devices SES Speech Extraction System</b>	call for price	Mac, PC   —   AIFF, WAV, SDII, QuickTime
<b>Metric Halo MLM *3 Master Level Meter</b>	\$100	Mac   TDM, MAS   —
<b>Metric Halo SpectraFooHDSP</b>	TBD	Mac   Sonic HDSP   —
<b>MicroMat SoundMaker</b>	\$49.95	Mac   —   AIFF, QuickTime, SDII, WAV
<b>Minnetonka Audio CPU HAWG</b>	free download	PC, Win 2000, Win 98, Win NT   —   —
<b>Minnetonka Audio SurCode CD Professional for DTS</b>	\$499	PC, Win 2000, Win 98, Win NT   —   WAV, AIFF
<b>Minnetonka Audio SurCode DVD Professional for DTS</b>	\$1,995	PC, Win NT, Win 2000, Win 98   —   AIFF, WAV

which goes beyond traditional soundcards in terms of quality and feature set. Whereas older soundcards focused on onboard synthesis to provide game sounds, then added digital audio capabilities almost as an afterthought, audio interfaces place a premium on digital audio, and in many cases, dispense with synthesis functions entirely. They deliver clean, pro-level sound quality at relatively affordable prices.

The only downside is that the growing sophistication has led to an overload of options. Do you go for analog or digital inputs? S/PDIF or AES/EBU? 44.1 or 96 kHz sampling rates? Choices are nice, but it becomes hard to separate what manufacturers want to sell you as opposed to what you really need. Let's investigate how you can choose the audio interface that's right for you.

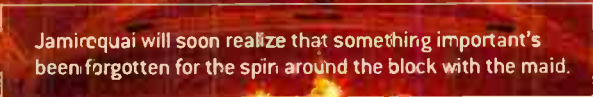
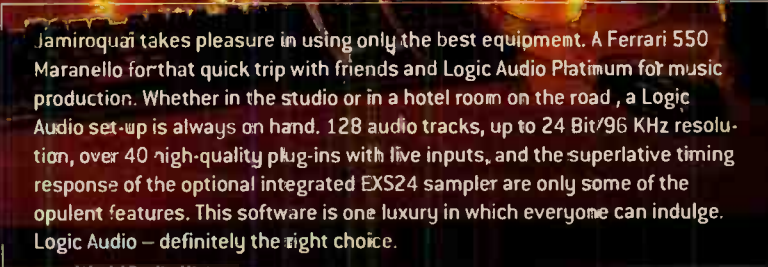
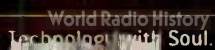
### MOTHERBOARDS AND DRIVERS

Windows motherboards incorporate two types of card slots, ISA and PCI; busses carry data among these slots. While the ISA bus dominated the early days of PCs, many modern PCs have no ISA slots at all, which gives you an idea of their current relevance. Bottom line: avoid ISA bus cards like the plague. (Incidentally, second-generation PowerMacs also adopted the PCI bus to replace its aging NuBus architecture.)

Regarding drivers, you want at least Windows 95/98 drivers, but also check for Windows NT/2000 support. More pro audio fans are gravitating toward this operating system, although currently, Windows 98 remains the dominant lifeform on the PC.

Note that soundcards exhibit some degree of latency (delay from input to output), which means that monitoring the signal you're recording will be slightly delayed compared to what's recorded on the hard drive. The amount of delay depends on the drivers, computer, and soundcard design. If you plan to do multichannel work, ASIO (Advanced Streaming Input/Output) drivers provide the most efficient operation, often with minimal latency. Other driver types for Windows include DirectX and MME. However, these are not true multichannel protocols; therefore, a multichannel soundcard can treat multiple channels only as groups of stereo pairs.



The emagic logo is located in the top right corner of the advertisement. It consists of the word "emagic" in a lowercase, sans-serif font, with a blue swoosh above the "i".The "logic audio" logo is positioned below the emagic logo. It features the words "logic audio" in a lowercase, sans-serif font, with "logic" in white and "audio" in blue, set against a dark blue background.The text "Music Production Software" is located at the bottom of the dark blue bar containing the "logic audio" logo. It is written in a white, sans-serif font.A white-bordered text box is centered in the upper half of the image. It contains the text: "Jamiroquai will soon realize that something important's been forgotten for the spin around the block with the maid." The background of the box is a semi-transparent dark color.The phrase "Definitely Luxurious." is written in a large, white, serif font across the middle of the image. The background is a rich, ornate interior with a chandelier and bookshelves.A white-bordered text box is located in the bottom right corner. It contains the following text: "Jamiroquai takes pleasure in using only the best equipment. A Ferrari 550 Maranello for that quick trip with friends and Logic Audio Platinum for music production. Whether in the studio or in a hotel room on the road, a Logic Audio set-up is always on hand. 128 audio tracks, up to 24 Bit/96 KHz resolution, over 40 high-quality plug-ins with live inputs, and the superlative timing response of the optional integrated EXS24 sampler are only some of the opulent features. This software is one luxury in which everyone can indulge. Logic Audio – definitely the right choice." The background of the box is a semi-transparent dark color.The tagline "World Radio History Technology with Soul." is located at the bottom center of the advertisement. It is written in a small, white, sans-serif font.The website address "www.emagic.de" is located in the bottom right corner of the advertisement. It is written in a small, white, sans-serif font, oriented vertically.



## PLUG AND PLAY

This concept was first introduced to PCs with Windows 95. The intention was to replace the cumbersome process of manually setting interrupt (IRQ), memory I/O address, and Direct Memory Access (DMA) with a simplified, semi-automatic installation routine. Early plug and play devices got a bad rap because many didn't work as expected, or with all possible computer scenarios. Manufacturers now have a better handle on the situation, so plug and play can definitely simplify installation; but be prepared for a possible call to tech support if you're one of the unlucky few for whom plug and play doesn't work as advertised.

## BIT RESOLUTION

An important spec, bit resolution, greatly influences the overall sound quality. To understand why, though, we need to investigate how a computer "listens" to sound.

In the real world, sounds are analog changes in air pressure, which microphones convert into a varying voltage suitable for feeding into an audio interface. To computers, sounds are series of numbers. The soundcard's A/D converter handles this translation by measuring the incoming analog signal's instantaneous voltage tens of thousands of times a second, then converting each value into a binary number "on the fly." Recording is simply the process of the computer storing this string of numbers on its hard drive.

The accuracy with which the incoming voltage is measured helps determine the converter's sound quality. CDs use 16-bit resolution, which allows measuring about 65,000 discrete voltage values, and provides a theoretical signal-to-noise ratio in excess of 95 dB (for non-technical types, that means "real quiet").

20-bit and 24-bit converters are becoming standard on soundcards. Each extra bit doubles the resolution, so a 20-bit converter can slice up the signal into about 1,040,000 discrete voltages. While it may seem silly to worry about extra bits when a CD can only produce 16-bit sound anyway, a 16-bit converter is not accurate enough to provide more than 14 or 15 bits of actual resolution due to factors such as noise, circuit design, and manufacturing tolerances.

## Digital Audio Processing Software (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT   AUDIO FORMAT
<b>Minnetonka Audio SurCode for Dolby Digital</b>	\$995	Win 2000, Win 98, Win NT, PC   -   AIFF, WAV
<b>NYS Software X-Incarn</b>	Shareware, \$49	PC   -   WAV
<b>QDesign i-Media Audio MPEG Pro</b>	\$299	PC   -   MPEG, WAV
<b>QDesign Music Codec 2 Professional Edition</b>	\$399	PC, Mac   -   AIFF, WAV, MPEG, QuickTime
<b>SEK'D Sampltools Declicker</b>	\$249	PC   -   -
<b>SEK'D Sampltools IR</b>	\$99	-   -   -
<b>SEK'D Samplitude 2496</b>	\$979	Win 2000, Win 98, PC, Win NT   Sampltools, DirectX   AIFF, MP3, MPEG, QuickTime, WAV
<b>SEK'D Sequoia PR</b>	\$2,999	Win NT, PC, Win 2000, Win 98   Sampltools, DirectX   -
<b>Sonic Desktop Software Smartsound</b>	\$199, 22kHz; \$299, 44.1kHz	PC, Mac   -   -
<b>Sonic Foundry Acid Pro 2.0</b>	\$399	Win NT, Win 2000, Win 98   DirectX   AIFF, WAV
<b>Sonic Foundry Sound Forge</b>	\$499	PC   DirectX   VOC, WAV, SMP, AIFF
<b>Steinberg Prosoniq TimeFactory</b>	\$599	Mac, PC   -   AIFF, WAV
<b>Steinberg ReCycle!</b>	\$199	Mac, PC   -   SDII, QuickTime, AIFF, WAV
<b>Steinberg SonicWorx Artist Pro</b>	\$199	Mac   -   AIFF, SDII
<b>Steinberg SonicWorx PowerBundle</b>	\$699	Mac   -   AIFF, SDII
<b>Steinberg Time Bandit</b>	\$399	Mac   -   AIFF, SDII
<b>Steinberg WaveLab</b>	\$499	PC   VST, Wavelab, Direct X   AIFF, WAV
<b>Symbolic Sound Corporation Kyma 4.64/Capybara-320</b>	\$3,300	Mac, PC   -   WAV, SDII, AIFF
<b>Synchro Arts Limited Titan</b>	\$1,495	Mac   -   SDII
<b>Synchro Arts Limited VocAlign PRO</b>	\$995	Mac   -   SDII
<b>Syntrillium Software Cool Edit 96</b>	\$50	PC   -   AIFF, SMP, WAV, VOC
<b>TC Works Spark</b>	\$499	Mac   -   -
<b>ZH Computer Dart Pro 32</b>	\$399	PC   -   WAV

## Plug-Ins for Digital Audio

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>Antares Auto-Tune VST LE</b>	\$99	Mac   VST
<b>Antares AutoTune</b>	Pro Tools TDM, \$599; MOTU MAS, \$399; RTAS, \$399; VST, \$399; DirectX, \$299	Mac, PC   TDM, RTAS, MAS, VST, DirectX
<b>Antares JVP Antares Voice Processor</b>	\$199	Mac   TDM
<b>Antares MDT Multiband Dynamics Tool</b>	\$249	Mac   TDM
<b>Antares Microphone Modeler</b>	Pro Tools TDM, \$599; MOTU MAS, \$399; RTAS, \$399; VST, \$399; DirectX, \$299	PC, Mac   TDM, MAS, VST, DirectX
<b>Arboretum Harmony 1.0</b>	\$349	-   -
<b>Arboretum Hyperprism 2.5</b>	\$199	Mac   Premiere
<b>Arboretum Hyperprism AudioSuite 2.5</b>	\$199	Mac   AudioSuite
<b>Arboretum Hyperprism DX 2.5</b>	\$199	PC   DirectX
<b>Arboretum Hyperprism for Soundscape</b>	\$299	Win   Soundscape



## Plug-Ins for Digital Audio (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>Arboretum Hyperprism Plug-In-Pack 2.5</b>	\$399	PC, Mac   DirectX, Premiere, VST, AudioSuite
<b>Arboretum Hyperprism TDM 2.5</b>	\$499	Mac   TDM
<b>Arboretum Hyperprism VST 2.5</b>	\$199	Mac   VST
<b>Arboretum Ionizer 1.3</b>	\$499	Mac   Premiere, AudioSuite, MAS
<b>Arboretum Ray Gun</b>	\$99	Mac, PC   Premiere, AudioSuite, VST, DirectX, Arboretum HyperEngine
<b>Arboretum Ray Gun for RTAS</b>	\$99	Mac   RTAS
<b>Arboretum Realizer Pro</b>	\$74.95	Mac, PC   VST, DirectX
<b>Arboretum Restoration-NR</b>	\$199	PC   DirectX
<b>Audio Ease Nautilus Bundle</b>	\$299	Mac   MAS
<b>Audio Ease Rocket Science Bundle</b>	\$195	Mac   MAS
<b>BIAS SFX Machine</b>	\$199	Mac   Premiere
<b>Bomb Factory Classic Compressors 1176 and LA-2A</b>	\$599	Mac, PC   TDM, RTAS, AudioSuite, MAS
<b>Cakewalk Audio FX 1</b>	\$199	PC   DirectX
<b>Cakewalk Cakewalk Audio FX 2</b>	\$199	PC   DirectX
<b>Cakewalk Cakewalk Audio FX 3</b>	\$249	PC   DirectX
<b>Cool Stuff Labs Generator X</b>	\$70	Mac   TDM, AudioSuite
<b>Digidesign Access Virus TDM</b>	\$795	Mac, PC   Pro Tools 24 MIX/TDM
<b>Digidesign Bruno/Reso-Cross Synthesis TDM</b>	\$395	Mac, PC   TDM

A 20- or 24-bit converter can provide a true 16 bits to the computer, which is why 24-bit audio transferred to CD can sound better than 16-bit audio. Even if the computer uses only 16 bits of the conversion process, the sound will be better.

At the output, the D/A converter translates the digital data back into analog voltages we can plug into an audio amp and hear. Budget audio software may maintain 16-bit resolution as the signal travels through the computer (one exception is when the computer or card performs internal

signal processing, which is often done at a higher bit resolution to provide better sound quality). But most modern software maintains a 24-, 32-, or even 64-bit data path. This allows internal calculations to be carried out with greater accuracy.

Although 20- and 24-bit data require 25% and 50% more storage space respectively than 16-bit data, the difference in sound is very noticeable on anything other than budget systems. Having better converters means you'll be ready to handle these higher-resolution data streams.

## THE HIGH-END NOISE REDUCTION AND MASTERING SOFTWARE

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**NOISE REDUCTION:** Just hit the Noise button, Ionizer detects noise in your signal and adjusts the thresholds automatically. Or select a specific segment of noise then pull the noise out of your track by hand. Correlation, Attack and Release settings get rid of the artifacts.

**EQ + COMPRESSION + LIMITING + EXPANSION:** Control the gain across up to 512 bands of dynamic EQ. Make smooth roll-offs or drastic brick wall filters with a few mouse clicks. Do any one of these, or all at once, using easy Ionizer presets.

**512 BAND VOCODING:** Create classic funk and science fiction effects! The Keying feature allows you to configure Ionizer for rich, analog-sounding Vocodering. Try it on voices, guitars or synth parts.

**EQ MORPH:** Not only can you "steal" the EQ curves right off your favorite record, the Morph function's frequency remapping is a powerful sound design tool. Or use it to match looped ADR and Foley cues with the sounds from location or set recordings.

**COMPLETELY FLEXIBLE:** Run separate processes on different bands of the audio spectrum. Just reconfigure the red and blue curves to suit your particular task. Picture yourself de-essing the vocal, EQing the high end, compressing the mid range and expanding the low end, **all at the same time.**

## HYPERPRISM

Dozens of different effects: Reverbs, Vocoder, Pitch Shift, Ring Modulator, Harmonic Exciter, Bass Maximizer, Granulator and more. Hyperprism works with every major Windows 95/98/NT DirectX and Mac VST, Premiere or AudioSuite compatible audio program. More than 30 different plug-ins with it's unique gestural control

## RAY GUN

Remove pops, clicks, hum, hiss and other noise from digital audio files simple and quick to use. Run as a stand alone processor or plug-in with any Windows 95/98/NT DirectX or Mac VST, AudioSuite, RTAS or Premiere compatible audio editing program. Works wonders on LPs, 45s, 78s, cassettes, home recordings and video soundtracks.

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## BALANCED VERSUS UNBALANCED ANALOG INPUTS

You'll also have to decide what kind of audio inputs are most appropriate. Analog I/O can be either balanced or unbalanced. Balanced inputs use two signal leads inside each wire instead of the usual one, which can help minimize electrical interference induced into a cable. Balanced inputs are popular in pro installations that use long cables, which are more prone to picking up interference than short cables.

Unbalanced inputs are fine if any cables connected to the card are under six feet or so. Whether an input is balanced or unbalanced makes little difference inside the card itself, and virtually all consumer-level soundcards use unbalanced operation. However, if you're using a computer in an environment like a radio station to cut jingles and promos, then a card with balanced capabilities is worth the extra bucks for its ability to reject interference.

Balanced line systems use either XLR or TRS (tip-ring-sleeve) 1/4-inch stereo connectors. (Even though TRS types use stereo con-

## Plug-Ins for Digital Audio (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>Digidesign D-Fi</b>	\$395	Mac, PC   TDM, AudioSuite
<b>Digidesign D-fx</b>	\$249	PC, Mac   AudioSuite
<b>Digidesign D-Verb</b>	\$495	Mac, PC   TDM, AudioSuite
<b>Digidesign DINR Intelligent Noise Reduction</b>	\$995	Mac, PC   TDM, AudioSuite
<b>Digidesign DINR Intelligent Noise Reduction TDM</b>	\$995	Mac, PC   TDM, AudioSuite
<b>Digidesign DPP-1 Pitch Processor</b>	\$495	Mac, PC   TDM
<b>Digidesign Focusrite d2 Multi-Band Equalizer</b>	\$995	Mac, PC   TDM
<b>Digidesign Focusrite d3 Compressor/Limiter</b>	\$795	Mac, PC   TDM, AudioSuite
<b>Digidesign Maxim</b>	\$445	PC, Mac   TDM, AudioSuite
<b>Digidesign Reverb One TDM</b>	\$995	Mac, PC   TDM, AudioSuite
<b>Digidesign Sound Replacer</b>	\$395	Mac, PC   TDM, AudioSuite
<b>Dsound America Stomp'n FX Vol.1</b>	\$149	Mac, PC   DirectX, VST
<b>DUY S.A. All TDM Tools Bundle</b>	\$1,299	Mac   TDM
<b>DUY S.A. DaD Tape</b>	\$549	Mac   --
<b>DUY S.A. DaD Valve</b>	\$699	Mac   RTAS, AudioSuite, MAS, VST, Premiere, TDM
<b>DUY S.A. DSPider</b>	\$1,195	Mac   --
<b>DUY S.A. DSPider for TDM</b>	\$1,195	Mac   TDM
<b>DUY S.A. DUY Analog TDM Bundle</b>	\$879	Mac   TDM
<b>DUY S.A. DUY Global TDM Bundle</b>	\$1,649	Mac   TDM
<b>DUY S.A. DUY Shape</b>	\$659	Mac   TDM, VST, MAS, Audiosuite, RTAS, Premiere
<b>DUY S.A. DUY TDM Mastering Bundle</b>	\$999	Mac   TDM
<b>DUY S.A. DUY Wide</b>	\$329	Mac   TDM, VST, Premiere, Audiosuite, MAS, RTAS
<b>DUY S.A. EverPack</b>	\$499	Mac   VST, MAS, RTAS, Audiosuite, Premiere
<b>DUY S.A. Max DUY</b>	\$389	Mac   TDM, RTAS, MAS, Audiosuite, VST, Premiere
<b>DUY S.A. RedSpider</b>	\$549	Mac   --
<b>FXpansion Audio Series One Bundle</b>	\$100	Mac, PC   VST, DirectX
<b>Gallery Software Dat Studio</b>	\$2,995	Mac   Pro Tools
<b>Ingram GRM Tools Volume 1</b>	\$499	Mac   TDM
<b>Ingram GRM Tools Volume 2</b>	\$499	Mac   TDM
<b>Intelligent Devices AD-1</b>	\$449	Mac   TDM
<b>Intelligent Devices DeSert</b>	\$249	Mac, PC   VST
<b>Intelligent Devices Fireball</b>	\$174	Mac   Premiere
<b>Intelligent Devices Fireball (VST)</b>	\$249	Mac, PC   VST
<b>Intelligent Devices I.Q. Intelligent Equalizer</b>	\$749	Mac   TDM
<b>Intelligent Devices Marshall Time Modulator</b>	\$249	Mac, PC   VST
<b>Kind of Loud RealVerb</b>	\$249	Mac   RTAS, MAS
<b>Kind of Loud RealVerb S.1</b>	\$795	Mac   TDM
<b>Kind of Loud RealVerb TDM</b>	\$495	Mac   TDM
<b>Kind of Loud SmartCode Pro DTS-CD</b>	\$495	Mac   AudioSuite
<b>Kind of Loud Woofie/Tweetie</b>	\$449	Mac   RTAS, TDM

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## Plug-Ins for Digital Audio (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>Bundle</b>		
Lexicon LexiVerb	\$699	Mac   TDM
Line 6 Amp Farm	\$595	Mac   TDM
Line 6 Echo Farm	\$495	PC, Mac   TDM
McDSP MC2000	\$595	Mac   TDM
Metric Halo SpectraFoo *3	\$500	Mac   TDM, MAS
Mike Norris SoundMagic FX	\$15	Mac   MicroMat SoundMaker
Opcode Systems Fusion Filter	\$29.95	Mac, PC   Premiere, DirectX, AudioSuite, VST, TDM
Opcode Systems Fusion Monster FX	\$59.95	Mac, PC   VST, Premiere, Direct-X
Opcode Systems Fusion Vinyl	\$29.95	Mac, PC   Premiere, Direct X, Audiosuite, VST
Opcode Systems Fusion Vocode	\$29.95	PC, Mac   Premiere, Direct X, Audiosuite, VST, TDM
PSP Professional PSP MixPressor	\$30	PC, Mac   VST
PSP Professional PSP MixSaturator	\$30	Mac, PC   VST
PSP Professional PSP StereoPack	\$24	PC, Mac   Cubase, WaveLab, Logic, VST
SEK'D Sampltools DEQ	\$99	PC   DirectX
Sonic Foundry Noise Reduction	\$349	PC   DirectX
Sonic Foundry XFX1	\$149	PC   DirectX
Sonic Foundry XFX2	\$149	PC   DirectX
Sonic Foundry XFX3	\$149	PC   DirectX
Steinberg Ambisone	\$199	Mac, PC   VST
Steinberg AudioTrack	\$249	Mac, PC   VST, WaveLab
Steinberg D-Pole VST	\$199	Mac, PC   VST
Steinberg DeClicker	\$399	PC, Mac   VST, TDM, DirectX
Steinberg DeNoiser	\$399	Mac, PC   VST, DirectX
Steinberg Dynasone	\$199	Mac, PC   VST
Steinberg Free Filter	\$199	Mac, PC   VST, Direct X
Steinberg Free-D	\$199	Mac   VST
Steinberg GRM Tools	\$199	Mac, PC   VST
Steinberg Loudness Maximizer	\$199	Mac, PC   VST, TDM, DirectX
Steinberg Magneto	\$199	Mac, PC   VST, WaveLab, TDM
Steinberg Master Tools	\$799	Mac   TDM
Steinberg Mastering Edition	\$499	PC, Mac   VST
Steinberg Orange Vocoder	\$199	PC, Mac   VST
Steinberg Q-Metric	\$299	Mac, PC   VST
Steinberg QuadraFuzz	\$69	Mac, PC   VST
Steinberg Red Valve It	\$199	Mac   VST, TDM
Steinberg Roomulator	\$399	Mac, PC   VST
Steinberg Spectralizer	\$199	Mac, PC   VST, WaveLab, TDM, DirectX
Steinberg SPL De-Esser	\$199	Mac, PC   VST
Steinberg TL Audio EQ1	\$199	PC, Mac   VST, TDM, DirectX
Steinberg Voice Designer	\$99	PC, Mac   VST, DirectX
Steinberg Voxciter	\$199	Mac, PC   VST
Synchro Arts ToolBelt	\$425	Mac   Pro Tools
Synchro Arts VocAlign PC	\$995	PC   Soundscape, SADiE, X-Track
TC Works Mega Reverb	\$799	Mac   TDM
TC Works Native Bundle	\$599	PC   Direct X, VST

nectors, they still carry only a mono signal. The tip carries the signal's "hot" line, and the ring carries the out-of-phase version required for balanced line operation.) However, plugging into a TRS jack with a mono plug will convert it to unbalanced operation. Unbalanced lines use either RCA phono jacks or standard 1/4-inch mono phone jacks.

### DIGITAL VERSUS ANALOG I/O

Placing converters directly on a card represents a real challenge to engineers, who must keep computer noise out of the audio circuitry. From an electrical standpoint, a computer is a very "dirty" environment, so soundcards require extensive shielding to protect them from interference. It's not impossible for converters located inside a computer to sound good, but it takes a lot of effort to produce a board immune enough to computer pollution to give truly quiet results.

For minimum noise, a card with digital inputs and outputs is best. You can then use an external, high-quality set of D/A and A/D converters to shuttle data to and from the soundcard and the outside world. As a bonus, you can upgrade the converters at a later date without having to switch soundcards.

There are three popular types of digital interfaces:

- S/PDIF. This is the most common digital interface. It carries a stereo digital audio signal and uses either RCA (phono) or TOSLINK fiber-optic connectors for in and out connections (some cards include both optical and electrical I/O). Many CD and DAT players include S/PDIF outs you can send to a soundcard's inputs. Conversely, you can patch the soundcard's S/PDIF out into a DAT for recording. Unfortunately, S/PDIF recognizes the Serial Copy Management System (SCMS), which prevents you from making a digital copy of a digital copy. This is bad news when you mix a bunch of tracks, copy them over to a master tape, then try to back up your precious DAT master (oops). Fortunately, most cards designed for pro applications "forget" to implement SCMS (thank you).

- AES/EBU. This is another two-channel interface that is very similar to S/PDIF, but

generally uses balanced, XLR-style connectors and is more of a pro feature. Some cards offer AES/EBU as an option. AES/EBU does not recognize SCMS.

- **ADAT optical interface.** This eight-channel interface uses TOSLINK optical connectors, and sends/receives signals over a fiber-optical cable. While originally used with the Alesis ADAT recorders, it has grown to become a de facto multichannel standard — mixers, synthesizers, hard disk recorders, and other devices often include an ADAT interface. Although this is a pro-level feature, if you plan to get deep into multitrack digital recording, it's worth having. TASCAM has designed an eight-channel interface called TDIF that uses a DB-25 connector instead of TOSLINK. Although it hasn't achieved the same acceptance as the ADAT optical interface, it is still fairly popular, particularly in post-production setups.

With analog I/O, you have no choice but to use your ears to decide how quiet it really is. Noise specs supplied by the manufacturer can be deceiving: the card may have been connected to the bus via an "umbilical" so its signal quality could be measured outside the computer. In typical applications, not only is this unlikely, it is also probable that the card will sit next to video cards and other noisemakers. (If you use analog I/O and experience noise problems, sometimes plugging the card into a different slot will reduce the problem.) Some noise figures might also be "weighted" (in other words, noise is measured only in the audio range) to make the card look better than an equivalent card with an unweighted noise spec.

Analog I/O is convenient as it already includes converters, whereas digital gives higher performance. Some cards include both, which neatly solves the dilemma — use the analog outputs for "proofing" audio, and the digital I/O to transfer high-quality signals among various pieces of gear. Another option is to use two cards, such as a SoundBlaster-type consumer card with analog I/O and a built-in synth, and a second, pro-level card to handle the digital connections.

## SAMPLING RATE

Not all cards support all sample rates. It's frustrating to load a file sampled at 48 kHz, only to have your digital audio edit-

## Plug-Ins for Digital Audio (cont'd)

MODEL	MSRP	PLATFORM   PLUG-IN FORMAT
<b>TC Works TC Dynamizer</b>	\$799	PC   SoundScape
<b>TC Works TC MasterX</b>	\$995	Mac   TDM
<b>TC Works TC Native EQ Works</b>	\$549	PC   DirectX, VST
<b>TC Works TC Native Essentials</b>	\$199	PC   DirectX
<b>TC Works TC Native Reverb</b>	\$549	PC   DirectX, VST
<b>TC Works TC Native Reverb</b>	\$299	Mac   VST
<b>TC Works TC Reverb</b>	\$699	PC   SoundScape
<b>TC Works TC Tools 3.0</b>	\$995	Mac   TDM
<b>Terzoid Software Audio Ecstasy WaveShop</b>	\$39.95	PC   DirectX
<b>Waves DSP Bundle</b>	\$1,000	PC   Digital Audio Labs V8
<b>Waves EasyWaves Bundle</b>	\$150	Mac, PC   —
<b>Waves Gold Bundle</b>	\$2,300	Mac   —
<b>Waves Native Power Pack</b>	\$500	Mac, PC   —
<b>Waves Native Power Pack II</b>	\$500	PC, Mac   MAS, VST, AudioSuite, Premiere
<b>Waves Pro-FX Native Bundle</b>	\$400	Mac, PC   —
<b>Waves Pro-FX TDM Bundle</b>	\$700	Mac   TDM
<b>Waves TDM Bundle</b>	\$1,000	Mac   TDM
<b>ZH Computer DART DeClick</b>	\$149	PC   DirectX
<b>ZH Computer DART DeHiss</b>	\$149	PC   DirectX

## Music Notation Software

MODEL	MSRP	PLATFORM/TYPE   INPUT OPTIONS
<b>Ars Nova Software Songworks II</b>	\$125	Mac, notation   MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts, importing Standard MIDI Files
<b>Cakewalk Guitar Studio</b>	\$249	PC, notation/MIDI/audio   importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>Cakewalk Home Studio</b>	\$129	PC, notation/MIDI/audio   importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, MIDI step entry, point-and-click with mouse
<b>Cakewalk Metro</b>	\$249	Mac, notation/MIDI/audio   importing Standard MIDI Files, interpreting scanned graphic files, point-and-click with mouse, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts, tablet and stylus
<b>Cakewalk Metro Special Edition (SE)</b>	\$29	Mac, notation/MIDI/audio   importing Standard MIDI Files, point-and-click with mouse
<b>Cakewalk Overture</b>	\$349	Mac, PC, notation/MIDI   importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>Cakewalk Pro Audio</b>	\$429, Deluxe \$529	PC, notation/MIDI/audio   importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, point-and-click with mouse, MIDI step entry
<b>Cakewalk ScoreWriter</b>	\$99	PC, notation   point-and-click with mouse, importing Standard MIDI Files
<b>Coda Finale Finale Allegro PrintMusic!</b>	\$545, \$275 edu/theo \$199 \$69.95	Mac, PC, notation   importing Standard MIDI Files, interpreting scanned graphic files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts



## Music Notation Software (cont'd)

MODEL	MSRP	PLATFORM/TYPE	INPUT OPTIONS
<b>Datasonics Music Master Performa or Professional</b>	\$125 or \$350	PC, notation/MIDI	MIDI step entry, realtime MIDI entry while listening to previously recorded parts, importing Standard MIDI Files, point-and-click with mouse, realtime MIDI entry
<b>Emagic Logic Audio Platinum, Gold, Silver</b>	\$799, \$499, \$299	PC, Mac, notation/MIDI/audio	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts, tablet and stylus
<b>Emagic MicroLogic AV</b>	\$99	PC, Mac, notation/MIDI/audio	realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts, MIDI step entry, importing Standard MIDI Files, point-and-click with mouse
<b>Erato Music Manuscriptor</b>	\$700	PC, notation	MIDI step entry, tablet and stylus, point-and-click with mouse, importing Standard MIDI Files, QWERTY keyboard
<b>G-VDX Encore</b>	\$599.99	Mac, PC, notation	importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, QWERTY keyboard, point-and-click with mouse, MIDI step entry
<b>G-VDX MusicTime Mac</b>	\$69.99	Mac, notation	importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts, QWERTY keyboard, point-and-click with mouse, MIDI step entry
<b>MIDIsoft Desktop Sheet Music</b>	\$129.95	PC, notation/MIDI	MIDI step entry, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, importing Standard MIDI Files, point-and-click with mouse
<b>MOTU Mosaic</b>	\$395	Mac, notation	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>Musicator Musicator Win</b>	\$299	PC, notation/MIDI/audio	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>MusicEase</b>	\$79.95	PC, notation	importing Standard MIDI Files, QWERTY
<b>Musicware Nightingale</b>	\$199.95	Mac, notation	MIDI step entry, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, point-and-click with mouse, interpreting scanned graphic files, importing Standard MIDI Files, QWERTY keyboard
<b>Musicware Personal Composer</b>	\$199.95	PC, notation/MIDI	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>Musitek SmartScore</b>	\$399	PC, Mac, score scanning/MIDI	interpreting scanned graphic files, realtime MIDI entry, importing Standard MIDI Files, point-and-click with mouse, QWERTY keyboard
<b>Musitek SmartScore Piano Edition</b>	\$149	Mac, PC, score scanning/MIDI	importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts, realtime MIDI entry, QWERTY keyboard, point-and-click with mouse, interpreting scanned graphic files, MIDI step entry
<b>NoteHeads AB Igor Engraver</b>	free download	Mac, notation	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry
<b>Personal Composer 8, 16, or 44</b>	\$69, \$139, \$199	PC, notation/MIDI	QWERTY keyboard, realtime MIDI entry, point-and-click with mouse, MIDI step entry, importing Standard MIDI Files, realtime MIDI entry while listening to previously recorded parts
<b>Sibelius Software Sibelius</b>	\$595; call for academic pricing	Mac, PC, notation	importing Standard MIDI Files, interpreting scanned graphic files, MIDI step entry, point-and-click with mouse, QWERTY keyboard, realtime MIDI entry, realtime MIDI entry while listening to previously recorded parts
<b>Sincrosoft Opus</b>	\$499	Mac, PC, notation	importing Standard MIDI Files, MIDI step entry, point-and-click with mouse, realtime MIDI entry
<b>Sion Software Copyist</b>	\$69.95	PC, notation	QWERTY keyboard, point-and-click with mouse

ing program flash an error message on playback that says "your cheapo output device cannot handle 48 kHz" (or you may hear your audio play back at a lower pitch). 44.1 kHz is the standard for audio CDs; 32 kHz, which won't reproduce frequencies much over 15 kHz, is used for "extended play" digital recording as well as some broadcast applications (satellite dish TV channels usually use 32 kHz for their "CD-quality" sound). Some multimedia productions require 22.050 kHz and 11.025 kHz sample rates, which produces a sound quality somewhat similar to AM radio on a bad hair day.

DVD Audio specifies further options, the most popular of which seem to be 96 kHz and 192 kHz. However, 88.2 kHz is sometimes used as well. For the present, a soundcard that works at 44.1, 48, and 96 kHz will take care of 90%, if not 100%, of your needs.

### IS YOUR DUPLEX FULL?

Full-duplex operation means a card can record and play back sound at the same time. A half-duplex board can record audio, but you won't be able to monitor any previously recorded material — not very useful. Note that some half-duplex cards simulate full-duplex operation in software. While this works, it's not as universal a solution as true duplex operation, so make sure your card offers true, full-duplex operation.

### +4 AND -10 LEVELS

This is another pro vs. semi-pro subject. Pro audio analog devices use a high signal level, nominally +4 above 0 VU on an analog meter. The higher signal provides a better signal-to-noise ratio, as the signal is significantly louder than any noise generated by the electronics through which it passes. However, these elevated levels demand sufficient headroom throughout a system to handle the higher levels, and somewhat more costly electronics. Nominal levels of -10 below 0 VU trade off headroom and noise for lower cost. In most cases, -10 will be fine for whatever you do, as this level will match CD players, guitar preamps, synthesizers, consumer DATs, MiniDisc, and the like. +4 systems generally use balanced lines, whereas -10 systems use unbalanced connections.

Connecting +4 and -10 gear together creates what's called a gain mismatch.

Feeding a -10 output into a +4 input compromises the signal-to-noise ratio, as the lower level can't take full advantage of the +4 gear's extended dynamic range. Sending a +4 output to a -10 input will usually cause overloading and distortion, as the -10 input can't handle the excessive level. There are ways to deal with gain mismatches (such as adding preamplification with signals that are too soft, and "padding down" signals that are too hot), but that goes beyond the scope of this article.

## EASE OF PATCHING

Connectors often mount on the back of the card, which means you need to reach around the back of your computer to plug and unplug. A breakout box that carries the patch points to a separate, more convenient location simplifies patching.

## ABOVE AND BEYOND

Pros need to consider other features. SMPTE sync is an industry-standard timing signal that can synchronize, for example, an audio recorder to a video deck. Thus, the audio follows along in time with the video. Two types of SMPTE are in use: Linear Time Code (LTC) and VITC (Vertical Interval Time Code). Of the two, LTC is most common for synchronizing different pieces of audio gear (e.g., sequencer and digital audio recorder), while VITC is used almost exclusively with pro video applications.

Another pro option, but quickly becoming necessary for any digitally oriented studio, is word clock input and output. Word clock is a sync signal, identical to the sample rate, which insures that digital audio signals are all clocked at the same rate. When connecting two pieces of gear together, one device's input simply follows the clock signal generated by the other piece of gear. However, with multiple pieces of equipment, you want all digital audio to sync to a common clock signal to prevent jitter, a phenomenon caused by slightly offset audio signals, which degrades audio quality.

In any event, soundcards have made dramatic progress over the years, from purveyors of sounds for games to full-blown, high-fidelity audio interfaces that let your computer communicate with the outside world. For a relatively modest investment, you'll obtain results that go way beyond what tens of thousands of dollars bought only a decade ago.

## Music Notation Software (cont'd)

MODEL	MSRP	PLATFORM/TYPE   INPUT OPTIONS
<b>Sion Software QuickScore Elite S.1, QuickScore Elite Level II</b>	\$79.95, \$179.95	PC, notation/MIDI   realtime MIDI entry while listening to previously recorded parts, point-and-click with mouse, importing Standard MIDI Files, MIDI step entry
<b>Voyetra Turtle Beach Music Write Plus</b>	\$49.95	PC, guitar tablature   realtime MIDI entry, importing Standard MIDI Files, MIDI step entry, point-and-click with mouse

## Sequencing Software

MODEL	MSRP	PLATFORM   TYPE   NOTATION
<b>Cakewalk Guitar Studio</b>	\$249	PC   MIDI, audio   prints parts, prints score
<b>Cakewalk Home Studio</b>	\$129	PC   MIDI, audio   prints parts, prints score
<b>Cakewalk Metro</b>	\$249	Mac   MIDI, audio   prints parts, prints score
<b>Cakewalk Pro Audio</b>	\$429	PC   MIDI, audio   prints score, prints parts
<b>Datasonics Music Master Performa</b>	\$125	PC   MIDI   multiple voices per staff, prints parts, prints score
<b>Datasonics Music Master Professional</b>	\$350	PC   MIDI   edit beam slants, multiple voices per staff, prints parts, prints score
<b>Diemer Sequel</b>	\$149	-   -   -
<b>Emagic Logic Audio Gold</b>	\$499	PC, Mac   MIDI, audio   edit beam slants, multiple voices per staff, prints parts, prints score
<b>Emagic Logic Audio Platinum</b>	\$799	PC, Mac   MIDI, audio   edit beam slants, prints score, prints parts, multiple voices per staff
<b>Emagic Logic Audio Silver</b>	\$299	Mac, PC   MIDI, audio   edit beam slants, multiple voices per staff, prints parts, prints score
<b>Emagic MicroLogic AV</b>	\$99	PC, Mac   MIDI, audio   multiple voices per staff, prints parts, prints score
<b>G-VOX Master Tracks Pro</b>	\$89.99	Mac, PC   MIDI   prints parts
<b>MAGIX Music Studio Generation 6</b>	\$49.99	PC   MIDI, audio   prints score
<b>MOTU Freestyle</b>	\$195	Mac, PC   MIDI   multiple voices per staff, prints parts, prints score
<b>MOTU Performer</b>	\$495	Mac   MIDI   prints parts, prints score
<b>Musicator Musicator Win</b>	\$299	Win   MIDI, audio   prints score, edit beam slants, multiple voices per staff, prints parts
<b>Opcode Systems Revolve</b>	\$99.95 in store, \$59.95 Web download	PC   MIDI   -
<b>Opcode Systems Revolve 100m</b>	\$99	PC   MIDI   -
<b>Opcode Systems Studio Vision Pro</b>	\$399.95	Mac   MIDI, audio   multiple voices per staff, prints parts, prints score
<b>Opcode Systems Vision DSP</b>	\$199.95, boxed; \$59.95, Web	Mac   MIDI   prints parts, prints score
<b>Opcode Systems Vision Windows</b>	\$99.95	PC   MIDI   prints score, prints parts
<b>PG Music Band-in-a-Box</b>	Pro \$88; MegaPAK \$249, add-ons \$29 each	Mac, PC   MIDI auto-accompaniment   prints parts
<b>PG Music PowerTracks Pro Audio</b>	\$29	PC   MIDI, audio   prints parts
<b>PowerKeys PowerKeys for Logic Audio</b>	39.95	Mac, PC   keyboard overlay   -
<b>PowerKeys ProKeys</b>	\$54.95, \$139.95	Mac   keyboard overlay   -
<b>Steinberg Cubase Score VST Mac/PC</b>	\$549	Mac, PC   MIDI, audio   prints score, edit beam slants, multiple voices per staff, prints parts
<b>Steinberg Cubase VST</b>	\$399	Mac, PC   MIDI, audio   prints score, prints parts, multiple voices per staff
<b>Steinberg Cubase VST Producer Pac</b>	\$999	Mac, PC   MIDI, audio   edit beam slants, multiple voices per staff, prints parts, prints score



## Sequencing Software (cont'd)

MODEL	MSRP	PLATFORM   TYPE   NOTATION
Steinberg Cubase VST Score	\$549	Mac, PC   MIDI   edit beam slants, multiple voices per staff, prints parts, prints score
Steinberg Cubase VST/24	\$799	Mac, PC   MIDI, audio   edit beam slants, multiple voices per staff, prints parts, prints score
Steinberg Cubase VST/24 Producer Pac	\$999	PC, Mac   MIDI, audio   multiple voices per staff, prints parts, prints score, edit beam slants
Steinberg Cubasis AV	\$99	Mac, PC   MIDI, audio   multiple voices per staff, prints parts, prints score
Voyetra Turtle Beach MIDI Orchestrator Plus	\$49.95	PC   MIDI   prints parts, prints score
Wildcat Canyon Autoscore	Deluxe \$119, Pro \$249	PC, Mac   pitch-to-MIDI   prints parts, prints score, multiple voices per staff
Yamaha XGworks	\$99	PC   MIDI, audio   edit beam slants, multiple voices per staff, prints parts, prints score

## Editor/Librarian Software

MODEL	MSRP	PLATFORM   DESCRIPTION
Dissidents SXVirtual	\$79	PC   sampler/controller interface
Emagic SoundDiver	\$199	Mac, PC   universal editor/librarian
ILIO Interval Music Systems TransferStation	\$149	Mac   sample/audio librarian
ILIO Entertainments SampleLog	\$29	Mac   sample/audio librarian
MOTU Unisyn	\$295	PC, Mac   universal editor/librarian
Opcodes Galaxy	free with Vision	Mac   universal librarian
Opcodes Galaxy Plus Editors	\$59.95 download	Mac   universal editor/librarian
PG Music SC-Pro Editor/Librarian	\$29	PC, Mac   Roland Sound Canvas Editor/Lib
Sonic Science Sonic Search	\$495 - \$1,495	Mac   sample/audio librarian
Sound Quest Midi Quest	\$249	Atari, Mac, PC   universal editor/librarian
Sound Quest MIDI Quest Jr.	\$79	Atari, Mac, PC   universal librarian
Sound Quest Solo Quest	\$99	PC   1-install editor/librarian
Terzoid Software NoiZe for Windows	\$99.95	PC   universal editor/librarian
Terzoid Software NoiZe:Lib	\$49.95	PC   universal librarian
Terzoid Software NoiZe:One	\$79.95	PC   1-install editor/librarian

## MIDI Files

MODEL	MSRP	DESCRIPTION
ATS Sequences Arabic & Turkish MIDI Files	contact manufacturer	GM/GS sequences
Beatboy Eddie Bayers Country	\$49.95	live MIDI country drumming
Beatboy Nigel Olsson Pop	\$49.95	song-length live MIDI drums
Beatboy Ramon Yslas Contemporary Percussion & Drums	\$49.95	live MIDI contemporary percussion/drums
Beatboy Richie Gajate-Garcia Latin Percussion & Drums	\$49.95	latin percussion and drum live MIDI performances
Beatboy Rod Morgenstein Power Rock	\$49.95	live MIDI song-length grooves
Beatboy Rod Morgenstein Progressive Rock	\$49.95	live MIDI song-length grooves
Beatboy Studio Series Hip-Hop	\$29.95	500 2-and 4-bar MIDI hip-hop loops
Beatboy Studio Series House/Techno	\$29.95	2-and 4-bar loops and song-length grooves



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## MIDI Files (cont'd)

MODEL	MSRP	DESCRIPTION
Beatboy Ultima 3000 Collection	\$59.95	2-and 4-bar loops: Pop/Top 40, Jazz, Rock, New Age, and Latin Percussion
Five Pin Press 101 Instant Standards for Band-in-a-Box	\$39.95; SMFs \$14.95 extra	includes printed book with all songs in fake book style
Five Pin Press 200 Instant Drum Patterns	\$39.95	200 varied drum patterns and fills
Five Pin Press Instant Rap Drum Patterns	\$39.95	rap and funk drum patterns
Keyfax Bottoms Up, The Bass Volume	\$39.95	MIDI bass lines on guitar, synth bass, tuba, etc.
Keyfax Guitar Grooves	\$39.95	guitar parts from session ace JJ Belle
Keyfax Hip Hop Shop	\$39.95	beats, drum loops, FX, scratches and hooky solo lines
Keyfax Master Series Bill Bruford	\$39.95	100s of grooves both acoustic and electronic
Keyfax LA Riot	\$39.95	hip-hop
Keyfax Master Series Paul Kodish Dangerous Drums	\$39.95	drum 'n' bass
Keyfax Modular Madness	\$39.95	15 related grooves that can be applied to any sound/MIDI channel
Keyfax Twiddly.Bits Country	\$39.95	fiddle parts, banjos, pedal steel, plus simple bass and drums
Keyfax Twiddly.Bits Drums & Percussion	\$39.95	different time signatures, feels, 2-bar grooves.
Keyfax Twiddly.Bits Electric & Acoustic Guitar	\$39.95	strums, funk grooves, slides, trills, finger picking, Spanish
Keyfax Twiddly.Bits Gate Effects	\$39.95	MIDI gate effect templates
Keyfax ware Twiddly.Bits General Instruments	\$39.95	drum grooves, bass lines, guitar parts, brass parts, piano, organ & strings
Keyfax Twiddly.Bits Jazz	\$39.95	sax, trumpet, vibes, organ, and guitar
Keyfax Twiddly.Bits Jazz: Piano Bass Drums	\$39.95	smooth jazz, to modern, to acid jazz
Keyfax Twiddly.Bits MIDI BreakBeats	\$39.95	slow hip hop thru speedfreak drum 'n' bass
Keyfax Twiddly.Bits Programmer's ToolKit	\$39.95	MIDI effects
Keyfax Twiddly.Bits The Funk	\$39.95	drumbeats, basslines, guitar, electric piano, Clav, and brass
Keyfax World Series	\$39.95	beats from Brazil
Keyfax Yamaha RM1x Funk Groove Library	\$29.95	raging funk grooves
Keyfax Yamaha RM1x Hip-Hop & R&B Groove Library	\$29.95	hip-hop & R&B grooves
Laser Band Macau Roland MC-50mkII	\$30-\$40	sequences for the MC-50mkII
Peter Solley The Best MIDI Files Money Can Buy	\$9 per file; \$7 for purchases of 20 or more	standard MIDI files formatted in GM/GS
Ron Fry's Custom Sequencing	\$10 each	500-title catalog of GM Standard MIDI Files
SoundSations 2,000+ Rhythm Pattern Library	\$69.95	over 2,000 rhythm patterns, fills, intro, breaks, solos
Vamtech Enterprises Drumtrax 3.0 CD ROM	\$99.95	25,000 measures of drumset and percussion
Voyetra Turtle Beach MIDI Music Gallery	\$99.95	collection of music files for learning, creating multimedia

## Miscellaneous Software

MODEL	MSRP	PLATFORM   DESCRIPTION
Adaptec CeQuadrat just!audio	\$49	PC   burn CDs from LP, cassette, etc.
Adaptec CeQuadrat WinOnCD Power Edition	\$99	PC   All-in one CD-recording software



## Miscellaneous Software (cont'd)

MODEL	MSRP	PLATFORM   DESCRIPTION
<b>Adaptec Easy CD Creator 4 Deluxe</b>	\$99 with \$20 upgrade	PC   create audio and backup CDs
<b>Adaptec Jam</b>	\$299	Mac   Red Book audio CDs and recordable CDs (CD-R)
<b>Adaptec SoundStream</b>	\$49 with \$10 mail-in rebate	PC   music CDs from MP3s, WAV files, and tracks off existing CDs
<b>Adaptec Toast 4 Deluxe</b>	\$99 with \$20 mail-in rebate	Mac   music, data, and multimedia CDs
<b>AlterMedia Studio Suite</b>	\$389	Mac, PC   studio management software
<b>Anthion Guitar Theorist</b>	\$49	PC   computes guitar chords/scales
<b>Auricle The Film Composer's Time Processor</b>	\$1,995	PC   control the metric and temporal characteristics of feature film music
<b>Cakewalk Cakewalk Pyro</b>	\$49	PC, Win 98   recording, playing, and organizing digital music
<b>Catovah Arts Arranger's Tool</b>	\$39	PC   harmonizing melodies, assisting in building chord progressions, searching for chords
<b>Cesium Sound Flex Processor</b>	\$189	Mac   gesture synthesis software
<b>Coda SmartMusic Studio for Instrumentalists</b>	\$79.95	Mac, PC   wind instrument practice and accompaniment
<b>Coda SmartMusic Studio for Instrumentalists or Vocalists</b>	\$119.95 full; \$79.95 voc or inst.	Mac, PC   vocal and instrumental practice and accompaniment
<b>Crown IQ for Windows</b>	free download	PC   controls all IQ-PIP modules, including older legacy models
<b>Digidesign Masterlist CD</b>	\$495	Mac   professional CD audio mastering
<b>Eccentric Software A Zillion Kajillion Rhymes and Cliches</b>	\$65	Mac, PC   rhyming dictionary and phrase thesaurus
<b>Emagic Wave Burner Pro</b>	\$299	Mac   CD mastering/authoring software
<b>ILIO GrooveMaker 2.0 with Magnetic and Dancity</b>	\$79.95/\$129.95 for 4 CD-ROM DJ version	Mac, PC   random groove generator for remixing
<b>Imaja Bliss Paint</b>	\$149.95	Mac   MIDI and sound-triggered animation program
<b>JLCooper Electronics V-Desk 02R</b>	\$599.95	Mac   mixing software for Yamaha 02R
<b>Justonic Tuning Pitch Palette</b>	\$79	Mac, PC   MIDI realtime microtuning software
<b>Mixman Studio</b>	\$49.95	PC   sample looping and arranging
<b>Mixman Studio Mac</b>	\$79.95	Mac   sample looping and arranging
<b>Mixman Studio Pro</b>	\$89.95	PC   sample looping and arranging
<b>NEATO CXK-192567</b>	\$29.95	Mac, PC   design, print and apply custom CD labels
<b>PG Music Jazz Guitar Master Class</b>	\$29 per volume, \$49 for both	PC   60 lessons
<b>PG Music Jazz Piano Master Class Class</b>	\$29 per volume, \$49 for both	PC   60 topics
<b>PG Music Master Flatpick Guitar Solos</b>	\$49	PC   50 songs
<b>PG Music Master Jazz Guitar Solos</b>	\$49	PC   50 songs
<b>PG Music Multi MPU401 Driver</b>	\$19	PC   allows 10 programs to use the MPU401 simultaneously
<b>PG Music Oscar Peterson CD-ROM</b>	\$79.95	PC   audio/visual performances, notation, autobiography
<b>PG Music The Bluegrass Band</b>	\$49	Mac, PC   50 bluegrass standards
<b>PG Music The Blues Pianist</b>	\$49	Mac, PC   huge library of original blues tunes
<b>PG Music The Children's Pianist</b>	\$49	Mac, PC   70 great piano performances of the world's best-loved children's songs
<b>PG Music The Christmas Pianist</b>	\$49	Mac, PC   50 all-time favorite Christmas songs

## Miscellaneous Software (cont'd)

MODEL	MSRP	PLATFORM   DESCRIPTION
<b>PG Music The Gospel Pianist</b>	\$49	Mac, PC   50 gospel piano standards
<b>PG Music The Latin Pianist</b>	\$49	Mac, PC   50 tunes played by Rebeca Mauleón-Santana
<b>PG Music The Modern Jazz Pianist</b>	\$49	Mac, PC   50 tunes in a wide variety of modern jazz styles
<b>PG Music The New Age Pianist</b>	\$49	Mac, PC   solo piano compositions which draw their inspiration from the natural world
<b>PG Music The New Orleans Pianist</b>	\$49	PC, Mac   65 New Orleans style piano standards
<b>PowerKeys Hard Disk Maintenance Kit</b>	\$11.95	Mac   how to keep your hard disk in working condition
<b>PowerKeys PowerKeys for Logic Audio</b>	\$39.95	Mac, PC   color-coded keyboard overlay
<b>PowerKeys Sampler Database for Roland</b>	\$49.95	Mac, PC   FileMaker Pro 4 database of Patch and Performance information for 35 Roland sampler CD libraries
<b>PowerKeys Studio Organizer Kit</b>	\$9.95	Mac, PC   set of Excel spreadsheets to organize your studio work
<b>QDesign MVP</b>	Free	Mac, PC   MP3 and QDesign/QuickTime audio encoder
<b>Salsa King Salsa Styles Disk #1</b>	\$29	PC   10 Salsa styles for PG Music Band In A Box
<b>SEK'D AudioCaster</b>	\$2,499	--   broadcast automation software for radio and installations
<b>SEK'D JingleCaster</b>	\$1,999	--   jingle and title player for theatre and other performances
<b>Sonic Desktop Smartsound</b>	\$199 for 22kHz, \$299 for 44.1kHz	Mac, PC   audio auto-composition
<b>Sound Quest Infinity</b>	\$299	PC   user-configurable MIDI processing/programming
<b>Sound Quest SQ Midi Tools</b>	\$89	PC   11 MIDI tools
<b>Steinberg X◇Pose</b>	\$399	Mac   MIDI visual sampler and synthesizer
<b>Steinberg X◇Pose IT</b>	\$69	PC, Mac   visual sampler
<b>Tracer Diamond Cut Audio Restoration Tools 32</b>	\$199	PC   noise reduction software
<b>Voyetra Turtle Beach Audio Station 32</b>	\$19.95 download	PC   integrates multimedia files
<b>Voyetra Turtle Beach Digital Sound Gallery, Vols. 1 &amp; 2</b>	\$19.95 each	PC   digital production music and sound effects in WAV format
<b>Voyetra Turtle Beach History of Music</b>	\$19.95	PC   interactive audio
<b>Voyetra Turtle Beach History of Music Keyboards</b>	\$19.95	PC   history of keyboard instruments and MIDI technology
<b>Voyetra Turtle Beach Jammin' Keys</b>	\$19.95	PC   create songs in 5-part band accompaniments
<b>Voyetra Turtle Beach Multimedia Audio Access</b>	\$19.95	PC   17 programs plus multimedia files
<b>Voyetra Turtle Beach Multimedia Music Games</b>	\$19.95	PC   three video music games
<b>Voyetra Turtle Beach Music Theory</b>	\$19.95	PC   introduction to the fundamentals of music
<b>Voyetra Turtle Beach Musical Instruments</b>	\$19.95	PC   history, development of instruments
<b>Voyetra Turtle Beach Recording Station</b>	\$19.95	PC   combines digital audio and MIDI tracks
<b>Voyetra Turtle Beach Video Station</b>	\$19.95	PC   VCR tape deck-style interface for viewing video
<b>Warme Software MidiView MIDI Player</b>	shareware, \$25	PC   displays notes in colors based on channel, instrument, track, note/key, or volume
<b>Wildcat Canyon Software Internet Music Kit</b>	\$49	PC   puts music on Web pages
<b>Wing and a Prayer Software RhymeWIZARD</b>	\$29.95	Mac, PC   rhyming dictionary with over 100,000 words and phrases



# MIDI Sequencer Features

by CRAIG ANDERTON

A MIDI sequencer stores digital data that represent a musical performance. Playing a MIDI-compatible instrument (keyboard, drums, guitar, etc.) generates this MIDI data; play a note, and a piece of data identifying that note appears at the MIDI output. Release the note, and more data comes along to update the situation ("note released").

MIDI data isn't just notes, though. All the moves you make on a keyboard (or other MIDI instrument) — the dynamics of your playing, the pressure you apply to the keys after they're down (called aftertouch), the sustain pedal position, amount of vibrato, degree of pitchbend, and so on — are all represented in real time by pieces of data that appear at the MIDI output. Furthermore, up to 127 "continuous controller" commands per channel can control just about any parameter that the instrument's designers allow to be MIDI-controlled — filter cutoff, envelope attack, and so on.

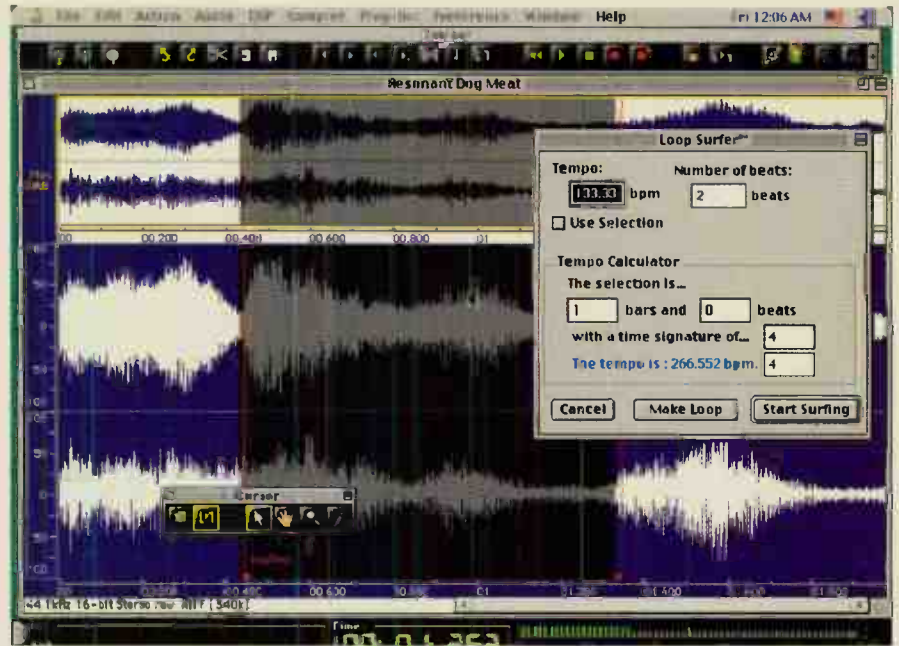
If a computer remembers these messages and the times at which they occurred, then playing back this data into the instrument's MIDI input causes it to respond just as if you were playing. The concept is like a player piano, except that the paper roll has been replaced with computer RAM.

In many cases, you don't have to commit to edits as some programs let you apply edits to playback only, while leaving the original data undisturbed. This takes the pressure off when trying out different effects. Even if an edit does change the data, there's usually an undo button if you change your mind.

The options presented by today's MIDI sequencers are amazing — let's check them out.

## View Options

A sequencer offers several ways of looking at musical data, each optimized for a parti-



BIAS Peak

cular type of editing operation.

The Song Editor, Overview, or Arrangement window gives an overview of the tune. It's intended for making sweeping, major changes, such as modifying one or more tracks, or even changing everything within a particular region of the song.

Another window, the Track Editor, lets you "zoom in" on the data in a particular track. There are three popular options, most sequencers include all three

- **Piano roll editing.** Each note shows up as a rectangular block, which is probably the most "intuitive" way of seeing track data. (The longer the rectangle, the longer the note.) You can shift and move notes manually with some kind of onscreen tool, click with an eraser to erase, etc.

- **Event list editing.** This gives detailed, numerical information about each piece of data — note value, velocity, controllers if present, aftertouch, etc. It's the most precise way to edit notes, but lacks the "friendliness" of a graphical interface. It's best for detailed edits, and seeing the characteristics of a passage of notes in one glance. Event lists generally let you view only the data you specify; you don't have to, for example, wade through hundreds of pitchbend messages looking for note data you want to modify.

- **Notation editing.** If you were raised on sheet music, you may find this the most comfortable way to work. However, it doesn't convey as much information about individual notes as the other two methods. For example, if a note starts a little bit early, it will be easier to see that with piano roll or event list editors.

Controller, modulation, aftertouch, and other parameters might be edited in the same window as the notes (often taking the form of one or more "strip charts"), in their own window, or in a window that shows multiple controller streams.

Furthermore, sequencers will often let you save particular screen sets, so you can have preset window setups optimized for editing, recording, mixing, and so on.

## Precision-Timing Interfaces

Because modern programs place serious demands on computers, sometimes the timing with which notes are played back can be sloppy, because the computer is occupied with other tasks (e.g., updating screen displays). As a workaround, some sequencers are designed to work with companion MIDI interfaces (usually USB-compatible) that eliminate these timing problems by "buffering" notes, then playing them back while referencing their timing to an extremely accurate timebase.

## Editing

Suppose you record a pretty good drum part on one track, but think you can record a better one. Mute the original track, then play into a new track. You may even decide to cut or copy the best bits from the two tracks and paste them into a third track to create a bitchin' composite track. These tracks would be assigned to the channel that drives the drums (channel 10 in a General MIDI setup). After creating the composite track, you'll probably want to delete the source tracks to minimize confusion.

## Record Filter

You may not want to record all types of data at all times. For example, some keyboards produce aftertouch, which represents how much pressure is applied to a key after it is down (for adding vibrato, increasing volume, etc). However, aftertouch produces a lot of data, and should be used only when necessary. Filtering out aftertouch avoids clogging up a sequence with unneeded data.

To illustrate another application, suppose you decide to overdub pitchbend data to notes that have already been played. Set the record filter to ignore notes, and play the part into a new track. This records only the pitchbend data, which can then merge (mix) with the existing notes.

## Quantization

Quantization lets you specify a rhythmic "grid" (eighth-notes, sixteenth-notes, etc.) to which notes "snap." This is great for cleaning up parts where the rhythm is a little off; quantize the part, and all notes fall right on the desired beat or sub-beat. It's sort of like a spellchecker for rhythm.

However, real humans don't play with machine-like precision. To prevent the quantized sound from being too sterile, many sequencers allow for setting the quantization strength or percentage. This shifts the note a certain percentage closer to the ideal (e.g., 50% strength moves a note halfway to the nearest specified rhythmic value). You can keep doing this over and over until you get the right tradeoff between precision and "groove."

There are also various ways to quantize: attack only (retains note length), entire



Kind of Loud, RealVerb for RTAS

note (may change note length), and "groove" quantize. This sets up a rhythmic grid that matches a particular kind of rhythm pattern (e.g., the clave pattern used in salsa, a certain type of shuffle, or a Motown groove). Generally these "push" or "lag" particular notes to give a certain feel.

## Controllers

Controllers are some of the coolest signals around because they make real time, dynamic changes to the sound, which adds expressiveness. Whenever you move a keyboard's mod wheel to add vibrato, or push down on the volume pedal, you're sending out controller data.

Controller data generally ranges from 0-127 (0 is the minimum amount). There are several editing options that let you mess with these numbers; following are some of the most common.

- **Add:** This adds a constant to make a wholesale change to the selected con-

trollers (make something louder, softer, faster, etc.).

- **Scale:** This multiplies or divides by a constant.

- **Change smoothly between two values:** Select a region of notes, and a starting and ending value; all values in between will change smoothly between those two values.

- **Change smoothly by percentage:** This variation on the above lets you specify the percentage of change instead of an absolute value. For example, you could define a region to change from, for example, 50% of the first value in the region to 75% of the last value in the region.

- **Random:** Assigns random values to any controller values in the selected region, often with settable limits (e.g., no lower and/or higher than a certain value). This is used mostly for special effects.



## Duration and Legato

Duration changes note length (specified in clicks as well as standard notational symbols), and usually offers the same editing operations as controllers (add, subtract, scale, etc.). You can turn a part into instant staccato by cutting duration by 80%.

The legato option determines how much the tail of one note overlaps the head of the next. This is useful when cleaning up a woodwind, brass, or other single-note lines since these instruments cannot have two overlapping notes.

Preventing overlap can also help with voice-stealing if your synthesizer has limited polyphony — why make it play two voices at once if it needs to play only one?

## Logical (Conditional) Editing

Different manufacturers call conditional editing by different names (such as logical editing, change filter, selection filter, split notes, etc.). But these all have the same basic purpose: set up note criteria (such as pitch range, values above or below a particular velocity level, and the like) to which editing operations — cut, transpose, quantize, etc. — then apply.

As an example of logical editing, suppose you want to accent a kick drum part on just the first beat of every measure. Rather than go to each measure, click on the note, then change it, you can simply tell the sequencer to increase velocity on only those notes falling within a certain number of clicks

from the first beat of each measure. You could even tell it to accent those notes only if they had, for example, a velocity of 105 or less. If there are several drum sounds on the track, then specify the pitch range that affects only the kick drum.

There's also another form of conditional selection that works with a graphic interface, called non-contiguous selection. With non-contiguous selection, it's possible to select several different regions simultaneously, and have them all subject to the same editing operation. With contiguous editing, you can click and drag across only one region of data.

## Tempo Changes

Unlike audio recording, tempo changes don't affect a sequence's pitch. Sequencing pros know that a sequence isn't really finished until you've tweaked the tempo track — real musicians speed up and slow down, sometimes imperceptibly, to add emotional shading to a song. (Tempo changes are also important for people who do music for commercials, as they often have to "fudge" the tempo so that particular visual actions happen on the beat.)

Want to really set up your song as it goes into the chorus? Drop the tempo just before the chorus for about a measure or so. Want to energize a solo passage? Then up the tempo a shade.

There are several ways to approach tempo editing. One option, tap tempo, lets

you create a tempo track by simply tapping a key on the keyboard at whatever tempo you'd like. Or, you can graphically draw a line to represent tempo, or use some of the same types of commands used for controllers (add, subtract, and change smoothly are the most common options).

## Slide Data

Sliding data moves a track forward or backward in time, so it can hit earlier or later than what you played. This has practical uses, such as moving a string part with a long attack time ahead so that it sounds more "on the beat," as well as more groove-oriented techniques. For example, moving a part ahead of the beat gives a more "nervous" feel, while moving the part later sounds more "laid back."

Another trick is to move two harmony lines so that one is slightly ahead of the beat, and the other slightly behind. This helps separate the two and makes each one more distinct.

## Insert/Delete Measure(s)

Back in the days of tape recorders, you'd rearrange parts of a song by grabbing a razor, then cutting and splicing pieces of tape. Those days are gone, thanks to insert and delete measure commands.

Sometimes this is handled in a dialog box (click at a point in the song, then enter how many measures you want to insert). Other sequencers require you to drag over the region where you want the insert. Assume you want to insert four measures; doing so pushes the rest of the song four measures later, leaving four blank measures in its place.

Cutting measures is usually simpler: just drag across what you want to cut and blast 'em away. Inserting and deleting measures is wonderful for arranging after the fact — you can add space for a solo where none existed, or turn an overindulgent 16-bar solo into a trim four-bar version.

## Delete Data

This gets rid of unwanted data from a track. Suppose you forgot to use the record filter, and ended up recording several hundred kilobytes of aftertouch for patches that aren't even set to respond to it. Imagine trying to get rid of this data in an



Syntrium Cool Edit ProEQ

event list editor (truly tedious). With delete or strip data, you can define a region or track and say "remove all aftertouch." The same could be done to notes, controllers, pitchbend, program changes, etc.

You can usually specify the channel where you want the data stripped. This is handy if you happen to import a Type 0 Standard MIDI File, which records all channels in a single track. Strip channel 2 data and paste it to track 2, strip channel 3 data and paste it to track 3, and so on until each channel's worth of data lives in its own track. This makes it much easier to edit and manipulate data.

### Thin data

Most controllers generate lots of data that's not really needed. As one example, your ear isn't all that sensitive to volume variations, so if you're moving a volume pedal, you could probably get by with much less data and obtain the same apparent effect. Thinning data selectively removes data, either by some kind of fixed algorithm, or according to criteria you specify.

### Transpose

When it was first introduced, one of the MIDI sequencer's most endearing characteristics was that you could change pitch without changing tempo, which was a major change from the world of tape recording. Need to compensate for a singer's range? No problem. Want to turn your six-string guitar into a soprano? Just transpose.

But transposition has other uses, such as making drum parts more realistic. In the real world each drum stroke has a slightly different sound, whereas with most drum machines, each stroke sounds exactly the same. There's an easy fix: assign the same sound, but with very slightly different tuning, to two notes. Transpose every other note to the second drum sound, and the drum part will have a lot more variation.

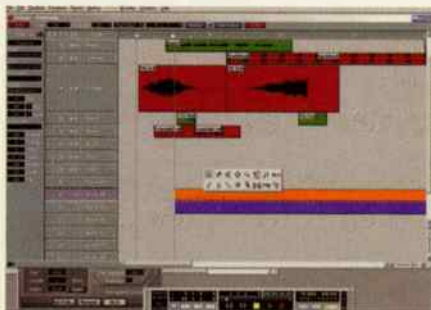
### Chase Controllers

Continuous controllers hold a particular value until the next controller value comes along. With controller chasing, whenever you start the sequencer it looks back for the most recent controller, pitchbend, aftertouch, and similar parameters, and

sets everything accordingly. The only trade-off is that sometimes it takes a little time for the sequencer to check back on all the tracks, but it's worth the wait.

### Autolocation and Finding Places

If you need to jump back and forth between two points (for example, making changes to one chorus and comparing it to another chorus), it's helpful to be able to jump from one section of a sequence to another. Different sequencers handle this in different ways; there may be markers that you "tab" between to move from one section of a song to another, or a "hot key" that places you at some defined place (such as where you last clicked). Sometimes different keystrokes will take you different places, such as hitting a key once to go to where you last clicked, or hitting a key twice to go back to the beginning of the song.



Steinberg Cubase 5

### Special Record Modes

You can record in the usual way — press record to record, and stop to stop — but sequencers offer far more imaginative options.

As one example, the precision of sequencers is ideal for setting automated punch-in and punch-out points. This eliminates once and for all the chance of punching in at the wrong place (and if you do, there's always the undo command).

Looped (cycled) recording is another punching tool. With this, a piece of music you define "loops" over and over again. The new data can either replace previously played data as you go along, or add to what was played previously (sound on sound). Replacing is great for trying out solos — just keep playing until you get something you like, then stop. Sound on

sound works well for building up drum parts (play a kick, then overdub the snare, hi-hats, etc.).

Some sequencers will even create a new track for every pass so that new data is easy to differentiate from old data, yet nothing gets erased. This is the best choice for recording composite tracks, where you cut and paste together different parts of different tracks to create one mind-bogglingly incredible track with all the best bits.

### MIDI Mixing Sliders

Not only can you sequence with today's sequencer, you can mix by using a mouse to move onscreen faders. On playback, the faders will move in response to the recorded controller changes. What's more, you can usually customize a "console" of faders, each assigned to whatever controller you want, on whatever channel you want.

But do you want to have to program 16 onscreen faders with a mouse? Of course not. Companies such as JL Cooper, Peavey, Kenton Electronics, and KeyFax make external hardware boxes with faders or knobs that you can link to the onscreen faders you want to control. For example, if one of the onscreen faders is set to channel 1, controller 7, setting one of the external faders to channel 1, controller 7 will move the onscreen slider.

Using sliders to do a mix is a lot easier than using a mouse, but this can produce much data if you're not careful. The thin data option mentioned earlier comes in handy here.

### Recording Program Changes on a Track

Want to change sounds in the middle of a track, maybe turn a muted trumpet into a non-muted version? You can cut the part you want, paste it to a separate track, and assign it to a separate channel to drive the alternate sound...or you could simply insert a program change command in the existing track to switch from one instrument to another.

However, there are some potential problems with inserting program changes. If notes are sustaining, selecting a new program may cut them off abruptly. Also, there may be a slight lag between the time



a synthesizer receives a program change, and when it actually flushes out the old data and loads in the new. It's often a good idea to place program changes slightly before the beat to compensate for this.

## Recording Sys Ex

System exclusive messages (sys ex for short) contain non-standard MIDI data, such as representations of a synthesizer's control settings. If you record sys ex representing a particular patch at the beginning of a track, playing back that track will load all the correct parameters into the synth. In this respect, the sequencer acts like a "librarian" as it can store not only compositions, but the data needed to create the required sounds in the instruments you're using.

Sys ex can take up a lot of memory. For this reason, it's preferable to record the sys ex for an individual patch, not for all the programs in the synthesizer. Also, most record filters default to not recording sys ex, so if a program doesn't seem to record sys ex, check the data filter setting.

## Digital Audio Options

Most sequencers can now record, edit, and play back digital audio as well as MIDI data. In many cases, these options are almost as powerful as what's found in high-end hard disk recorders (conversely, many hard disk recording systems also provide MIDI recording and editing capabilities). At the very least, you want to be able to cut, paste, copy, and perform other editing-related functions. Other useful features include:

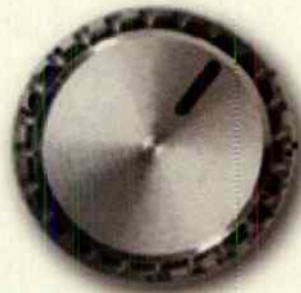
- *Normalization.* This ensures that the signal uses the maximum available headroom.
- *Reverse.* Fun for special effects, and inserting subliminal satanic messages (just kidding).
- *Pitch shift and time stretch.* What if you change your sequence tempo from 120 to 122 BPM, or the key from A to B flat? You'll need to alter the audio to follow along, which these functions allow.
- *Ability to accept plug-ins.* This way, you're not limited as to the ways in which you can alter the sound.

• *Onboard processing.* If there's EQ, dynamics, and similar functions "built-in," you won't have to go outside the program for editing.

## BUT WAIT, THERE'S MORE...

Amazingly, we've just scratched the surface. Today's sophisticated sequencers have progressed far beyond the norm of only a few years ago.

Also note that by this point, sequencers are pretty mature programs. Often the differences between models have more to do with style and the user interface than any fundamental features. Therefore, as some guitarists choose Les Pauls and other Stratocasters, your choice of a sequencer may depend on whether it has a look you'd want to stare at for hours at a time



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*TC Electronic's M-ONE and D-TWO are very powerful yet affordable new multi-effects units from one of the most highly respected names in signal processing. I highly recommend the M-ONE and D-TWO.*  
Mike Collins - Electronic Musician (US)



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- 1/4" Jacks - Dual I/O

*A studio effects processor dedicated solely to providing digital delay is a rare thing in this age of all-singing, all-dancing multi-effects units. In the D-TWO, TC have produced a very attractive delay unit that sounds exemplary and offers some unique features as well as all of the expected ones.*  
Paul White - Sound On Sound (UK)

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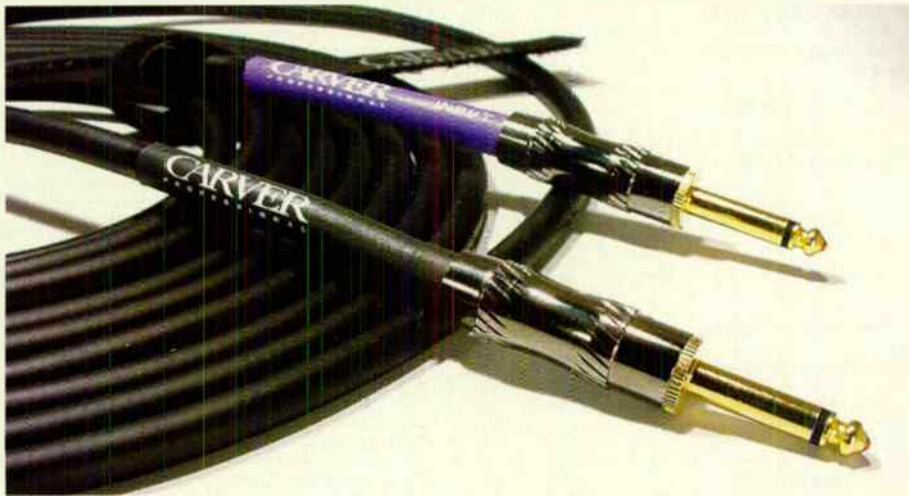
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# Studio Essentials



**F**ar from being a “miscellaneous catch-all” category, the Studio Essentials section contains the products that make the rest of your studio really work the way it’s supposed to. In addition to studio furniture for ergonomically setting up your gear in the best way possible, you’ll find AC power distribution and power conditioners, which ensure that your equipment is being fed the best, and cleanest, possible AC power — critical for optimal audio performance, especially in these digital, CPU-intensive days.

The Studio Essentials also include synchronizers, highly important in this day and age of multiple recording formats and digital audio transfers — whether you need low-jitter word clock sync, SMPTE for locking audio decks to video decks, or a MIDI interface with built-in in timecode, this is the place to look.

Two other important categories of gear can be found here: Digital Audio Format Converters, which are vital in many studios for making sure that interconnected digital audio products are speaking the same language, and Audio Patchbays, which greatly increase the flexibility and convenience of your rig.

Finally, don’t forget Acoustic Treatments. If your studio environment isn’t acoustically accurate, your job as an engineer is much, much more difficult.

— Mitch Gallagher

## Studio Furniture & Accessories

### ADAM

**AKS-1000 Adjustable Stand** MSRP \$69  
DESCRIPTION keyboard stand.

**AKS-1160 Keyboard Stand** MSRP \$59.50  
DESCRIPTION keyboard stand.

**AKS-1163 X-Type Stand** MSRP \$48 DESCRIPTION  
keyboard stand.

**AKS-1165 Double Support X-Type Stand** MSRP \$58.50 DESCRIPTION keyboard stand.

**AKS-1175 Flat Top Stand** MSRP \$102 DESCRIPTION  
keyboard stand.

**AKS-33 Portable Keyboard Stand** MSRP \$255 DESCRIPTION keyboard stand.

### ARGOSY CONSOLE

**90 Series Console Housing** MSRP \$1,629 and up DESCRIPTION desk and rack system, for any combination of 19” rack gear, producer desk, and computer equipment

**Dual 15** MSRP \$1,999 DESCRIPTION desk and rack workstation for digital-based recording, mixing, and post editing systems

**Nevis Console Housing for Mackie 8-Bus** MSRP \$699.95 and up DESCRIPTION desk and rack system for Mackie 8-Bus mixer, outboard gear, patchbays, computer equipment, and producer’s desk

**Nevis Console Housing for Soundcraft Ghost** MSRP \$819.95 and up DESCRIPTION desk and rack system, integrates Soundcraft Ghost mixer, outboard gear, patchbays, computer equipment, and producer’s desk

**Nevis Console Housing for Yamaha O2R** MSRP \$819.95 and up DESCRIPTION desk and rack system, integrates Yamaha O2R mixer, outboard gear, patchbays, computer equipment, and producer’s desk

**Spire Rack Enclosures** MSRP \$299.95 and up DESCRIPTION rack system, single, double, and quad 14-space rack bays available

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**Spire Stands** MSRP single, \$54.95; pair, \$99.95; set of 3, \$139.95 DESCRIPTION 42” speaker stand unit.

### ASA CASE

**Reasonable Rax/True Composite Cases** MSRP \$200-\$3,500 DESCRIPTION racks, shock racks, keyboard, guitar, and all other custom cases, guitars, keyboards, drums

### AUDIO ENGINEERING ASSOCIATES

**AEA 25 HDB** MSRP \$495 DESCRIPTION 25’ tall heavy-duty mic stand for location or studio use

**AEA 40HDCFB** MSRP \$1,000 DESCRIPTION microphone stand

**AEA 45HDCFB** MSRP \$1,450 DESCRIPTION 45’ microphone stand for large acoustic spaces

### BEYERDYNAMIC

**GST 400** MSRP \$79 DESCRIPTION microphone boom stand

**GST 500** MSRP \$99 DESCRIPTION microphone stand

**GST 590** MSRP \$99 DESCRIPTION low level microphone boom stand, for mixing drums

**ST400** MSRP \$59 DESCRIPTION microphone stand tripod

**ST500** MSRP \$79 DESCRIPTION microphone stand tripod

### CARVER PROFESSIONAL

**Toneline Pro cables** MSRP \$20 to \$75 DESCRIPTION instrument cable, in lengths from 6 inches to 30 feet

**ZEROpoint 3D Session** MSRP \$36 to \$220 DESCRIPTION instrument cables, in lengths from 1 foot to 50 feet.

**ZEROpoint 3D Session High Current Cable** MSRP \$40 to \$190 DESCRIPTION speaker cable available in lengths from 2 feet to 50 feet

**ZEROpoint 3D Session High Definition** MSRP \$62 to \$180 DESCRIPTION cables packaged as 2 channel sets from 2 feet to 20 feet

### CHICAGO CASE COMPANY

**ATA-style Shipping Containers** MSRP \$220-\$600 DESCRIPTION Foam-filled shipping containers, with and without built-in telescoping handle and wheels

**MFC22149MIC** MSRP \$180 DESCRIPTION Carrying case for microphones. Holds 21 2” mics and accessories. Meets strict airline carry-on size restrictions

**MFCART22149** MSRP \$270 DESCRIPTION foam-filled carry-on cart case

### FLIGHT FORM CASES

**assorted models** MSRP Varies DESCRIPTION cases for a wide variety of rackmount and keyboard equipment

### GEORGE L'S CABLES

**10' Prepak** MSRP \$14.50 DESCRIPTION 10' cable in pre-pack,

**15' Prepak** MSRP \$17.50 DESCRIPTION 15' cable in pre-pack

**20' Prepak** MSRP \$20.50 DESCRIPTION 20' cable in pre-pack

**Cable by the Foot** MSRP \$.58 per foot DESCRIPTION Bulk cable

**Cable Warehouse** MSRP \$499.70 DESCRIPTION 500' cable and 50 plugs

**Effects Kit** MSRP \$50.40 DESCRIPTION 5' cable and 10 right-angle plugs in pre-pack

**Solderless Plugs** MSRP straight, \$4.40; right-angle, \$4.75 DESCRIPTION straight and right-angle 1/4" plugs

## JAMIES MUSIC

**Kool Case 1A** MSRP \$5 DESCRIPTION dust cover

## KABLE KEEPERS

**Wrap-All Straps** MSRP \$1.00 per strap DESCRIPTION cable straps

## LITTLITE/CAE

**L-Series Lampsets** MSRP \$47 and up DESCRIPTION task lamps

## MILES TECHNOLOGY

**ACT-1 Audio/Cable Tester** MSRP \$119 DESCRIPTION cable tester and test oscillator

## MUSIC INTERFACE

**GAS Terminator** MSRP 2 meter cable, \$100 DESCRIPTION high-performance interface for connection between amp/head unit and speaker cabinet

**Ripcord Bass** MSRP 10' cable, \$100; 15' cable, \$115; 20' cable, \$130 DESCRIPTION high-performance interface for use with electric basses and acoustic basses with pickups

**Ripcord Guitar** MSRP 10' cable, \$100; 15' cable, \$115; 20' cable, \$130 DESCRIPTION high-performance interface for use with electric guitars and acoustic guitars with pickups

**Ripcord Guitar HE** MSRP 10' cable, \$100; 15' cable, \$115; 20' cable, \$130 DESCRIPTION high-performance interface for use with electric guitar overdriven sounds

**Z-Cord** MSRP 2 meter cord, \$100 DESCRIPTION removable AC power cord

**Z-Cord II** MSRP 2 meter cord, \$175 DESCRIPTION removable AC power cord

## OMNIRAX

**C14** MSRP \$240 DESCRIPTION rolling rack

**C2** MSRP \$1,920 DESCRIPTION desk and rack system, expanded version of Commander

**CC14D** MSRP \$360 DESCRIPTION rolling rack

**CODA** MSRP \$900 DESCRIPTION desk and rack system, provides a compact, ergonomic environment for digital mixing and editing. Compatible with Mackie HUI and Yamaha O3D

**Commander** MSRP \$1,560 DESCRIPTION keyboard workstation for up to 88-note keyboard

**CW22** MSRP \$330 DESCRIPTION rolling rack

**CW22T** MSRP \$950 DESCRIPTION rolling rack

**CW30** MSRP \$360 DESCRIPTION console workstation for rack-mount mixers

**Force 12** MSRP \$1,450 DESCRIPTION three 4-space rack bays below a wide monitor bridge, 24 additional rack spaces

**Force 24** MSRP \$1,700 DESCRIPTION two 12-space rack bays below, computer keyboard/mouse shelf, heavy-duty casters

## Synchronization Devices

MODEL	MSRP	FUNCTION   SYNC TYPE
Aardvark Aard DDA	\$645	sync box   1 x 6 AES/EBU, S/PDIF
Aardvark AardSync II	\$1,795	digital audio sync generator   AES/EBU, Digidesign Super Clock, video sync, word clock
Aardvark Sync DA	\$845	sync box   Digidesign Super Clock, S/PDIF, AES/EBU, word clock
Aardvark TimeSync II	\$1,295	digital audio sync generator   AES/EBU, Digidesign Super Clock, MTC, SMPTE, video sync, word clock
Digidesign Universal Slave Driver	\$2,095	digital audio sync generator   Digidesign Super Clock, MTC, SMPTE, word clock, AES/EBU null clock
Digidesign Video Slave Driver	\$995	digital audio sync generator   Digidesign Super Clock, word clock
Edirol Roland SI-80SP	\$335	sync box   MTC, video Control-L Edit-E
JLCooper Data Master	\$649.95	sync box   ADAT, MMC, MTC, SMPTE
JLCooper Data Sync 2	\$299.95	sync box   MTC, SMPTE, MIDI clock
JLCooper MMC 9 Pin	\$499.95	MIDI interface for PC, MMC-to-Sony 9-pin connector   —
JLCooper PPS-100	\$449.95	Sync box and event generator   SMPTE, FSK, SPP, DTL, DIN, and ppqn sync
JLCooper PPS-2	\$169.95	sync box   FSK, SMPTE, MTC
Lucid Technology SSG192 Studio Sync Generator	\$1,795	digital audio sync generator   AES/EBU, Digidesign Super Clock, video sync, word clock, 1024X Lucid UltraClock
MOTU Digital Timepiece	\$995	digital audio sync generator   Digidesign Super Clock, MMC, SMPTE, MTC, word clock, ADAT sync, DAB8 Sync, S/PDIF sync, Sony 9-pin, video-sync, VITC
MOTU MIDI Timepiece AV	\$595	digital audio sync generator   word clock, ADAT sync, Digidesign Super Clock, MMC, MTC, SMPTE, LTC
Opcode Systems Studio 64XTC	\$549.95	digital audio sync generator   Digidesign Super Clock, MMC, MTC, SMPTE, word clock, ADAT sync
Soundscape Rosendahl WIF	\$775	sync box   VITC, MTC, LTC

## Audio Format Converters

MODEL	MSRP	INPUT FORMATS   OUTPUT FORMATS   # CHAN
Behringer Ultramatch SRC2000	\$229	S/PDIF, AES/EBU   S/PDIF, AES/EBU   3
Benchmark Media AD2408-96	\$4,995	AES/EBU, analog   AES/EBU   1
Crane Song Ltd. HEDD - 192	\$3,495	analog, S/PDIF, AES/EBU   AES/EBU, analog, S/PDIF   2
Crane Song Ltd. Spider	\$6,000	AES/EBU, S/PDIF   ADAT, S/PDIF   8
dbx S04X Digital Output Card	\$399.95	AES/EBU, S/PDIF   AES/EBU, S/PDIF   —
dbx 704X Digital Output Card for dbx (60Si and 786	\$799.95	AES/EBU, S/PDIF   AES/EBU, S/PDIF   —
DTS DTS CAE-4 Professional Encoder	\$7,250	AES/EBU   —   —
Fostex COP-2	\$225	S/PDIF coaxial to optical   S/PDIF coaxial to optical   2
Lucid Technology AD9624	\$899	AES/EBU, S/PDIF   AES/EBU, S/PDIF   1
Lucid Technology DA9624	\$749	AES/EBU, S/PDIF   AES/EBU, S/PDIF   1
Lucid Technology SRC9624 Converter	\$1,995	AES/EBU, S/PDIF   AES/EBU, S/PDIF   2
MIDIMan CO3	\$249.95	AES/EBU, S/PDIF   AES/EBU, S/PDIF   3
MIDIMan DigiPatch 12X6	\$499.95	S/PDIF, ADAT   S/PDIF, ADAT   —
MIDIMan Flying Cow	\$399.95	AES/EBU, S/PDIF   AES/EBU, S/PDIF   1



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# Studio Essentials

**M8** MSRP \$540 DESCRIPTION desk and rack system, fits Mackie 24x8 mixer

**MB 70** MSRP \$240 DESCRIPTION desk and rack system, monitor bridge holds multiple video and near-field monitors

**MiniStation** MSRP \$720 DESCRIPTION workstation for keyboards up to 46.5" wide

**MixStation 24x8E** MSRP \$1,560 DESCRIPTION multi-level working environment for Mackie 24x8 plus 24E expander, computer, and associated peripherals

**MOBI** MSRP \$480 DESCRIPTION mobile computer workstation

**Pro 10** MSRP \$140 DESCRIPTION 10-space rack unit

**Pro 20** MSRP \$240 DESCRIPTION 20-space rolling rack

**Pro 316** MSRP \$720 DESCRIPTION 3-bay producer's studio rack

**Producer's Corner** MSRP \$1,560 DESCRIPTION desk and rack system

**ProStation** MSRP \$1,080 DESCRIPTION desk and rack system,

**ProStation Jr.** MSRP \$840 DESCRIPTION desk and rack system

**ProStation MC** MSRP \$1,020 DESCRIPTION desk and rack system

**Synergy** MSRP \$1,080 + DESCRIPTION desk and rack system

**Synthrax 76** MSRP \$900 DESCRIPTION 3 sliding shelves for 76-note synths

**Synthrax 88** MSRP \$990 DESCRIPTION 3-tier cabinet with 3 sliding shelves for 88-note synths

**Tyro** MSRP \$750 DESCRIPTION small keyboard workstation for keyboards up to 43" wide

**WDA** MSRP \$250 DESCRIPTION angled workstation desk

**WDAD** MSRP \$360 DESCRIPTION deep-angled workstation desk to create a corner working area

**WDF** MSRP \$270 DESCRIPTION freestanding workstation desk

**WDFD** MSRP \$330 DESCRIPTION workstation desk

**WRF** MSRP \$120 DESCRIPTION desktop riser shelf

## ON-STAGE STANDS

**SS7750B Steel Speaker Stand** MSRP \$86.99 DESCRIPTION supports speaker cabinets up to 200 lbs.

## PER MADSEN DESIGN

**RACKIT System 19 Cassette 19 (Cassette 19-10)** MSRP \$225-\$295 DESCRIPTION Modular, stackable oak drawer units hold standard, DAT, 8mm cassette, MiniDisc, and floppy disks

**Rackit System 19 CD/DVD/VHS 19** MSRP \$245-\$265 DESCRIPTION modular, stackable oak drawer units hold CD, DVD, MiniDisc, Zip, and VHS

**Rackit System 19 Component Rack 19 with shelves** MSRP \$90-\$110 DESCRIPTION rack system for all audio/video equipment

**RACKIT System 19 Component Racks with mounting rails** MSRP \$110-\$185 DESCRIPTION rack system

**RACKIT System 19 Dolly** MSRP \$55 DESCRIPTION dolly for all RACKIT System 19 units, 300 lb. rolling load.

## Audio Format Converters (cont'd)

MODEL	MSRP	INPUT FORMATS	OUTPUT FORMATS	# CHAN
MIDIMan S.A.M.	\$399.95	ADAT, S/PDIF	ADAT, S/PDIF	2
Otari FS-96	\$5,000	ADAT, AES/EBU	ADAT, AES/EBU	24
SEK'D ADDA 2496 DSP Rev.II	\$5,200	S/PDIF, AES/EBU	AES/EBU, S/PDIF	1
SEK'D ADDA 2496 S	\$999	S/PDIF, AES/EBU	AES/EBU, S/PDIF	1
Sonorus Audio AES/8	\$1,699	ADAT, AES/EBU, S/PDIF, TDIF	ADAT, AES/EBU, S/PDIF, TDIF	4 (8 opt.)

## Audio Patchbays

MODEL	MSRP	# INPUTS/TYPE	# OUTPUTS/TYPE
AP Audio APB 48-S	\$129.95	48/bal.	48/bal.
Behringer Ultrapatch Pro PX2000	\$59	24/ 1/4"	24/ 1/4"
dbx PB48	\$149.95	—   48/ 1/4"	bal., unbal.
Esoteric Sound SuperConnector	\$299	2/ 1/4", RCA	34/ 1/4", RCA
Fostex 3013 Patchbay	\$139	32/ —	32/ —
Friend-Chip America digi-ma'x 16 Digital Patchbay	\$399	16/ —	16/ —
Furman PB-48 Modular Patch Bay System	\$169	48/unbal., 1/4"	bal.   48/unbal., 1/4", bal.
Furman PB-48D Modular Patch Bay System	\$229	48/bal., unbal., 1/4"	6/unbal., bal., 1/4"
Hosa Technology PHB-265	\$179	48/unbal., 1/4"	48/unbal., 1/4"
Neutrik USA Easy Patch	\$900	96/TT/bantam	96/TT/bantam
Neutrik USA PatchLink SP-L	\$125	48/ 1/4"	48/ 1/4"
Samson Ultrapatch Pro PX2000	\$89.99	48/ —	48/ —
Signal Transport Project Patch PP-48-1	\$275	48/ 1/4", bal.	96/ 1/4", bal.
Signal Transport Project Patch PP-96-1	\$795	96 mini plugs/bal.	192 mini plugs/bal.
Signal Transport Studio Kits 48	\$1,900 and up	customizable/ 1/4"	bal.   customizable/ 1/4", bal.
Signal Transport Studio Kits 96	\$2,100 and up	customizable/TT/bantam, bal.	customizable/TT/bantam, bal.

**The RACKIT System 19** MSRP \$35 - \$295 DESCRIPTION desk and rack system

## POWERKEYS

**Logic Learning Kit** MSRP \$39.95 DESCRIPTION learning materials and keyboard overlay for Emagic Logic Audio

## PRO TEC

**Deluxe Keyboard Bags** MSRP \$69.50-\$115.00 DESCRIPTION soft bag for keyboards

**Pro Pac Cases** MSRP \$156-\$199 DESCRIPTION soft case for keyboards

## QUIK LOK

**A-200 Series** MSRP \$47.95/\$67.95/\$75.95 DESCRIPTION mic stands

**A-340/A-341** MSRP \$39.95/\$49.95 DESCRIPTION tripod mic stand

**A-342/A-343** MSRP \$64.95/\$69.95 DESCRIPTION round base mic stands

**BS-300** MSRP \$79.95 DESCRIPTION adjustable monitor stand

**BX-9/BX-10/BX-12** MSRP \$39.95 DESCRIPTION keyboard bench

**D-748** MSRP \$199.95 DESCRIPTION studio seat with back rest

**I-99P/I-99G** MSRP \$199.95/\$249.95 DESCRIPTION desk and rack system

**QL-400** MSRP \$179.95 DESCRIPTION adjustable locator stand for equipment from 14.5" to 21" wide

**QL-746** MSRP \$99.95 DESCRIPTION keyboard stand

**RS-10** MSRP \$44.95 DESCRIPTION desk and rack system



**RS-954** MSRP \$189.95  
DESCRIPTION 20-space rack equipment stand

**RS-958** MSRP \$169.95  
DESCRIPTION 14-space full-circle tilt-adjustable rack stand

**S-203/S-213** MSRP \$39.95/\$14.95  
DESCRIPTION Extension Poles For Subwoofer/Speaker Connections

**S-6** MSRP \$129.95 (black); \$119.95 (silver)  
DESCRIPTION Aluminum Speaker Stand

**T-8** MSRP \$59.95 DESCRIPTION keyboard stand

**T-reX Series Keyboard X Stands**  
MSRP \$49.95/\$59.95 DESCRIPTION keyboard stand

**Z-250** MSRP \$319.95 DESCRIPTION triple shelf workstation

## RIP TIE

**Rip-Tie CableWrap** MSRP \$23.95 and up  
DESCRIPTION hooks and loop cable wrap

## SIGNAL TRANSPORT

**Swing Rack** MSRP \$1,400 to \$3,200  
DESCRIPTION configurable modular rack systems

## SLIDER PRODUCTS

**Piano Barre** MSRP \$189.95 to \$234.95 DESCRIPTION horizontal microphone support for acoustic and grand piano

## SOUND CONSTRUCTION AND SUPPLY

**ISOB - ISO Box Sound Isolation Box**  
MSRP \$750 and up DESCRIPTION isolation Box

**MB 24 + 24E - 2 Custom Console** MSRP \$2,350  
DESCRIPTION For Mackie 8-Bus Series mixers

**SG24 + 24EX Custom Console** MSRP \$2,350  
DESCRIPTION for Soundcraft Ghost

**SS36 Speaker Stand** MSRP \$250 - \$275  
DESCRIPTION speaker stand

**Y02R1 - 2 Custom Console** MSRP \$1,895  
DESCRIPTION for Yamaha O2R digital mixers

## ULTIMATE SUPPORT SYSTEMS

**GS-100 Genesis Guitar Stand** MSRP \$39.99  
DESCRIPTION guitar stand

**IQ-3000 Keyboard X-stand** MSRP \$130  
DESCRIPTION keyboard stand

**MC-07B Microphone Stand** MSRP \$36  
DESCRIPTION mic stand

**TS-70B** MSRP \$64.99  
DESCRIPTION speaker stand with weight capacity of 100 lbs

## WIREWOKS

**MusiLUX** MSRP \$225 DESCRIPTION full-sized, 100% shielded mic cable for professional use. 500 ft. spool

## Z RIGHT STUFF

**Z-BAR** MSRP \$17.95 DESCRIPTION amplifier miking bracket



Omnirax Force 12 Maple

## Acoustic Treatment Materials

### ACOUSTIC SCIENCES

**ATTACK Wall** MSRP \$4,000 - \$10,000 DESCRIPTION consists of studio traps and monitor stands; isolates the listening position from the room.

**Monitor Stand Bass Trap** MSRP \$248 - \$374  
DESCRIPTION monitor stand and bass trap combined

**Quick Sound Field (QSF)** MSRP \$2,498 DESCRIPTION consists of 8 or more studio traps to isolate signal from room

**Studio Trap** MSRP \$315 DESCRIPTION bass trap and main building block of the ATTACK Wall and QFS Systems

**Tube Trap** MSRP \$182 - \$798 DESCRIPTION bass trap

### ACOUSTICAL SOLUTIONS

**Alpha Pyramid Acoustical Foam** MSRP call DESCRIPTION sound absorption rating: NRC .70 to 1.05. Open cell polyurethane foam. Colors: charcoal, blue, brown, and beige

**Alpha Wedge Acoustical Foam** MSRP call DESCRIPTION sound absorption rating: NRC .80 to 1.25. Open cell polyurethane foam. Sold by the sheet. Colors: charcoal, blue, brown, and beige.

**AlphaSorb Fabric Wrapped Acoustical Wall Panels** MSRP varies DESCRIPTION acoustic materials

**AlphaTec Ceiling Tiles** MSRP \$167 per box of 6  
DESCRIPTION Sound absorption rating: NRC .75. Sound transmission loss rating: STC 21

**AudioSeal Sound Barrier** MSRP \$472 per roll; \$2.25 per square ft. DESCRIPTION wall, floor, and ceiling noise barrier

**Sonex Acoustical Foam** MSRP call DESCRIPTION polyurethane

**Soundtex Acoustical Fabric Wall Covering** MSRP \$850 per bolt DESCRIPTION Sound absorption rating: NRC .25. Twelve colors. Sold by the bolt or by the yard. Installs like wallpaper

### ACOUSTICS FIRST

**Double Duty Diffuser/Bass Trap** MSRP \$120 - \$790 DESCRIPTION polycylindrical diffuser for control of low bass and scattering of upper frequencies

### AURALEX ACOUSTICS

**LENRD Bass Traps** MSRP \$259 per box of 8 DESCRIPTION for corner or wall/ceiling placement

**MAX-Wall** MSRP \$349 to \$999 DESCRIPTION modular, expandable, and highly mobile absorbent wall system

**Roominators Acoustical Control Kits** MSRP \$319 to \$999 DESCRIPTION complete kits prepackaged with everything needed to improve the acoustics in your room

**SheetBlok Sound Barrier** MSRP \$139.99 to \$359.99 per roll DESCRIPTION a dense (1lb/sq. ft) limp-mass vinyl material that acts as a thin sound barrier layer in walls, ceilings, or floors

## Acoustics First®

### Materials To Control Sound And Eliminate Noise

Model W

Model C

## The Art Diffuser®

The original, patented, extended range "binary array". Exclusive angled tops scatter upper spectral reflections. Increases the apparent acoustic space and controls flutter. Class "A", thermoformed models are now available from stock. Traditional wood versions are built to order.

Toll Free 1-888-765-2900

Web: <http://www.acousticsfirst.com>

# Studio Essentials

**Studiofoam Metro** MSRP \$229 per box **DESCRIPTION** for use in rooms where a more professional or architectural look is desired

**Studiofoam Pyramids** MSRP \$279.99 per box **DESCRIPTION** pyramids introduce a bit more diffusion and "air" to the room due to their 4-sided shape

**Studiofoam Wedges** MSRP \$209 to \$385 per box **DESCRIPTION** the specialized anechoic wedge cut of Studiofoam Wedges offers excellent absorption and a high-tech look

**T'fusor Diffusor** MSRP \$279.96 per box of four **DESCRIPTION** easily wall-mounted and will even drop into suspended ceiling grids

**U-Boats Floor Beam Float Channels** MSRP Call for pricing **DESCRIPTION** used to support framing members and isolate (decouple or float) them from the surrounding structure

## CABLETEK ELECTRONICS

**PrimAcoustic** MSRP \$65-\$900 **DESCRIPTION** easy to install acoustic improvement materials



Omnirax Synergy



Omnirax Force 24

## CLEARSONIC

**Clearsonic Panels** MSRP contact manufacturer **DESCRIPTION** acoustic materials

## NETWELL NOISE CONTROL

**Pyramids** MSRP \$2-\$9 per sq. ft. **DESC.** acoustic materials

## RPG DIFFUSOR SYSTEMS

**Abflector** MSRP \$135.45 per panel; \$541.80 for a box of 4 **DESCRIPTION** acoustic materials

**Corner Bass Trap** MSRP \$538.00 for 2 **DESCRIPTION** acoustic materials

**Flatfusor** MSRP \$59.00 per panel **DESCRIPTION** acoustic materials

**ProFoam** MSRP Range **DESCRIPTION** acoustic materials

**SkyLine** MSRP \$270.90 for a box of 2 **DESCRIPTION** acoustic materials

## SYSTEMS DEVELOPMENT GROUP

**Art Diffusor Model C** MSRP \$130 Class A fire rating; \$90 non-Class A fire rating **DESCRIPTION** acoustic materials

**Art Diffusor Model F** MSRP \$130 Class A fire rating; \$90 non-Class A fire rating **DESCRIPTION** acoustic materials

**Bass Eraser** MSRP contact manufacturer **DESCRIPTION** acoustic material

**Cutting Wedge 2000** MSRP start @ 2.63 per sq.ft. **DESCRIPTION** acoustic materials

**Cutting Wedge 2000 ARLX** MSRP \$TBA **DESCRIPTION** acoustic materials

## WHISPERROOM

**WhisperRoom SE Series** MSRP \$2,195 and up **DESCRIPTION** portable isolation enclosures with ventilation system and cable passages

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## Power Conditioners & Distribution

MODEL	MSRP	DESCRIPTION   POWER RATING
<b>Crate Pro Audio L55-PCL</b>	\$99.99	power conditioner with dual spike surge protection   —
<b>Crate Pro Audio L56-PCLV</b>	\$159.99	Same as L55-PCL with voltage meter readout   —
<b>Equitech ET10R</b>	\$4,389	rackmount stand-alone bal. power system   100 amps bal. AC power
<b>Equitech ET3R</b>	\$1,889	rackmount stand-alone bal. power system   30 amps bal. AC power
<b>Equitech ET4R</b>	\$2,389	rackmount stand-alone bal. power system   40 amps bal. AC power
<b>Equitech ET5R</b>	\$2,889	rackmount stand-alone bal. power system   50 amps bal. AC power
<b>Equitech ET7.5R</b>	\$3,689	rackmount stand-alone bal. power system   75 amps bal. AC power
<b>Equitech Model ET1R</b>	\$879	rackmount stand-alone bal. power system   10 amps bal. AC power
<b>Equitech Model ET2R</b>	\$1,389	rackmount stand-alone bal. power system   20 amps bal. AC power
<b>ETA Systems PD10VRS</b>	\$990	powered AC line regulator and distributor   20 amp
<b>ETA Systems PD11LV5P</b>	\$650	sequential AC audio-conditioned power distributor   20 amps, 2,400W
<b>ETA Systems PD11P/VP/LP/LVP</b>	\$220 - \$380	AC-conditioned power distributor   20 amp, 2,400W
<b>ETA Systems PD11SP</b>	\$490	sequential AC audio-conditioned power distributor   20 amps, 2,400W
<b>ETA Systems PD11S5</b>	\$390	sequential AC audio-conditioned power distributor   15 amps, 1,800W
<b>ETA Systems PD320VS</b>	\$1,000	sequential AC audio-conditioned power distributor   60 amps, 7,200W
<b>ETA Systems PD6</b>	\$650	audio power distributor   140 amps
<b>ETA Systems PD8</b>	\$79	AC audio-conditioned power distributor   15 amps, 1,800W
<b>ETA Systems PD8L</b>	\$99	AC audio-conditioned power distributor   15 amps, 1,800W
<b>ETA Systems PD9L/9LV</b>	\$160 - \$240	AC audio-conditioned power distributor   15 amps, 1,800W
<b>Furman Sound AR-1215</b>	\$599	AC line voltage regulator   15 amps
<b>Furman Sound AR-PRO</b>	\$2,295	AC line voltage regulator   30 amps
<b>Furman Sound BP-1000</b>	\$1,479	on-line uninterruptible power supply   700W, 115 volts
<b>Furman Sound IT-1210</b>	\$899	bal. power isolation transformer   10 amps
<b>Furman Sound IT-1220</b>	\$1,579	bal. power isolation transformer   20 amps
<b>Furman Sound IT-1230</b>	\$1,879	bal. power isolation transformer   30 amps
<b>Furman Sound PL-8</b>	\$159	rackmount power conditioner and light module, spike/surge protector, RF filter   15 amps with circuit break protection
<b>Furman Sound PL-Plus</b>	\$229	power conditioner/light module/FRI filter   15 amps with circuit breaker protection
<b>Furman Sound PL-Pro</b>	\$399	power conditioner/light module   20 amps, 2,400W
<b>Furman Sound PL-Tuner</b>	\$279	power conditioner/light module/tuner   15 amps with circuit breaker
<b>Furman Sound PLH-15</b>	\$389	power conditioner/power sequencer/light module   15 amps with circuit breaker
<b>Furman Sound PM-8</b>	\$279	power conditioner/monitor   15 amps with circuit breaker
<b>Furman Sound PM-PRO</b>	\$359	power conditioner/monitor   20 amps, 2,400W
<b>Furman Sound PS-8</b>	\$359	power conditioner/sequencer   15 amps with circuit breaker
<b>Furman Sound PS-8R</b>	\$359	power conditioner/sequencer   15 amps
<b>Furman Sound PS-PRO</b>	\$359	power conditioner/sequencer   20 amps, 2,400W
<b>Gemini PD-8</b>	\$49.95	power distributor   5A resetable circuit breaker
<b>Gemini PL-101</b>	\$89.95	power conditioner/light module   15 amps
<b>Gemini PL-101</b>	\$99	power conditioner/light module   15 amps
<b>Juice Goose JG8.OL</b>	\$120	rackmount power distributor   15 amps
<b>Juice Goose JG8.OLM</b>	\$179	rackmount power distributor   15 amps
<b>Juice Goose JG8.0</b>	\$85	rackmount power distributor   15 amps
<b>Music Interface Technologies Z-ISO Duo</b>	\$1,495	AC power line isolator   130W max per duplex, 260W total
<b>Samson PB 9 PowerBrite</b>	\$139.99	power distribution system   —
<b>Samson Pro 7 PowerBrite Pro</b>	\$179.99	rackmount power distributor/meter/light module   —
<b>Samson PS9 PowerStrip</b>	\$69.99	rackmount power distributor   —
<b>Topaz Enterprises Light Master</b>	\$269	MIDI-controlled dimmer   15 amps, 1,800W

# Manufacturer Index and Contacts

## **Aardvark**

[www.aardvark-pro.com](http://www.aardvark-pro.com)

See Signal Processors, page 107. See Computer Software & Hardware, page 120. See Signal Processors, page 107. See Studio Essentials, page 147.

## **Acoustic**

626-964-4700

See Monitoring & Amplifiers, page 79.

## **Acoustic Sciences**

800-782-5742

See Studio Essentials, page 147.

## **Acoustical Solutions, Inc.**

[www.acousticalsolutions.com](http://www.acousticalsolutions.com)

See Studio Essentials, page 147.

## **Acoustics First**

### **Corporation**

See Studio Essentials, page 147.

## **Adam**

[www.mbtinternational.com](http://www.mbtinternational.com)

See Studio Essentials, page 147.

## **Adaptec, Inc.**

[www.adaptec.com](http://www.adaptec.com)

See Computer Software & Hardware, page 120.

## **Agular Amplification**

[www.aguilaramp.com](http://www.aguilaramp.com)

See Monitoring & Amplifiers, page 79.

## **Akai Musical Instrument Corporation**

[www.akai.com/akaipro/](http://www.akai.com/akaipro/)

See Keyboards, Synths & Samplers, page 9. See Hardware Recorders, page 74.

## **AKG Acoustics**

615-367-9046

See Microphones & Preamps, page 93.

## **Alesis Corporation**

[www.alesis.com](http://www.alesis.com)

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## **Allen & Heath**

801-568-7660

See Mixers, page 61.

## **Altec Lansing Technologies, Inc.**

[www.altecm.com](http://www.altecm.com)

See Monitoring & Amplifiers, page 79.

## **AlterMedia**

[www.studiosuite.com](http://www.studiosuite.com)

See Computer Software & Hardware, page 120.

## **Alternate Mode Inc./KAT**

[www.KATpercussion.com](http://www.KATpercussion.com)

See Groove & Rhythm, page 57.

## **Ambiance Acoustics**

[www.calcube.com](http://www.calcube.com)

See Monitoring & Amplifiers, page 79.

## **Analogue Solutions**

[www.drummy.com](http://www.drummy.com)

See Soundware, page 31.

## **Antares Audio Technologies**

[www.antarestech.com](http://www.antarestech.com)

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## **Antex Electronics Corporation**

[www.antex.com](http://www.antex.com)

## **Anthon**

[www.netguard.net/anthion](http://www.netguard.net/anthion)

See Computer Software & Hardware, page 120.

## **AP Audio**

(ACE Products Group)

[www.aceproducts.com](http://www.aceproducts.com)

## **API**

[apiaudio.com](http://apiaudio.com)

See Mixers, page 61.

## **Aquila Systems**

800-386-4554

## **Arboretum Systems, Inc.**

[www.arboretum.com](http://www.arboretum.com)

See Computer Software & Hardware, page 120.

## **Argosy Console, Inc.**

[www.argosyconsole.com](http://www.argosyconsole.com)

See Studio Essentials, page 147.

## **Armadillo Enterprises**

[www.armadilloent.com](http://www.armadilloent.com)

See Keyboards, Synths & Samplers, page 9.

## **Ars Nova Software**

425-889-0927

See Computer Software & Hardware, page 120.

## **ART (Applied Research and Technology, Inc.)**

[www.artroch.com](http://www.artroch.com)

See Microphones & Preamps, page 93. See Signal Processors, page 107.

## **ASA Case**

[www.asacase.com](http://www.asacase.com)

See Studio Essentials, page 147.

## **Ashly Audio, Inc**

[www.ashly.com](http://www.ashly.com)

See Mixers, page 61. See Monitoring & Amplifiers, page 79. See Signal Processors, page 107.

## **ATC Studio Monitors**

207-773-2424

See Monitoring & Amplifiers, page 79.

## **ATS Sequences**

516-256-3545

See Computer Software & Hardware, page 120.

## **Audio Engineering Associates**

626-798-9128

See Microphones & Preamps, page 93. See Studio Essentials, page 147.

## **Audio Software Ltd**

[www.audioarchitect.com](http://www.audioarchitect.com)

See Keyboards, Synths & Samplers, page 9.

## **Audio Upgrades**

[home.earthlink.net/~jwilliams3/](http://home.earthlink.net/~jwilliams3/)

See Microphones & Preamps, page 93.

## **Audio-Technica US, Inc.**

[www.audio-technica.com](http://www.audio-technica.com)

See Microphones & Preamps, page 93.

## **Audio2000'S**

[www.audio2000s.com](http://www.audio2000s.com)

See Microphones & Preamps, page 93.

## **AudioControl Industrial**

[www.audiocontrol.com](http://www.audiocontrol.com)

See Signal Processors, page 107.

## **Audix**

[www.audixusa.com](http://www.audixusa.com)

See Microphones & Preamps, page 93.

## **Auralex Acoustics, Inc.**

[www.auralex.com](http://www.auralex.com)

See Studio Essentials, page 147.

## **Auricle Control Systems**

[www.auricle.com](http://www.auricle.com)

See Computer Software & Hardware, page 120.

## **Axman**

[www.musiciansfriend.com](http://www.musiciansfriend.com)

## **Azden Corporation**

[www.azdencorp.com](http://www.azdencorp.com)

## **B&W Loudspeakers**

[www.bwspeakers.com](http://www.bwspeakers.com)

See Monitoring & Amplifiers, page 79.

## **Bag End Loudspeakers**

[www.bagend.com](http://www.bagend.com)

See Monitoring & Amplifiers, page 79.

## **Baldwin Piano & Organ Company**

[www.baldwinpiano.com](http://www.baldwinpiano.com)

See Keyboards, Synths & Samplers, page 9.

## **Barbetta Electronics**

[www.barbetta.com](http://www.barbetta.com)

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## **Barcus-Berry**

[www.mbtinternational.com](http://www.mbtinternational.com)

## **BBE Sound, Inc.**

[www.bbesound.com](http://www.bbesound.com)

See Microphones & Preamps, page 93. See Signal Processors, page 107.

## **Beatboy Drum Sequences**

[www.beatboy.com](http://www.beatboy.com)

See Soundware, page 31. See Computer Software & Hardware, page 120.

## **Behringer**

[www.behringer.com](http://www.behringer.com)

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## **Benchmark Media Systems, Inc.**

[www.benchmarkmedia.com](http://www.benchmarkmedia.com)

See Microphones & Preamps, page 93. See Studio Essentials, page 147.

## **Benson Audio Labs, Inc.**

412-914-0575

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## **Beyerdynamic, Inc.**

516-293-3200

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## **BIAS, Inc. (Berkley Integrated Audio Software)**

[www.bias-inc.com/](http://www.bias-inc.com/)

See Computer Software & Hardware, page 120.

## **Big Briar, Inc.**

[www.bigbriar.com](http://www.bigbriar.com)

See Keyboards, Synths & Samplers, page 9. See MIDI Controllers & Hardware, page 51. See Signal Processors, page 107.

## **Big Fish Audio**

[www.bigfishaudio.com](http://www.bigfishaudio.com)

See Soundware, page 31.

## **BitHeadz, Inc.**

[www.bitheadz.com](http://www.bitheadz.com)

See Keyboards, Synths & Samplers, page 9.

## **Blacet Research**

[www.blacet.com](http://www.blacet.com)

See Signal Processors, page 107.

## **Bolder Sounds**

[www.boldersounds.com](http://www.boldersounds.com)

See Soundware, page 31.

## **Bomb Factory**

[www.bombfactory.com](http://www.bombfactory.com)

See Computer Software & Hardware, page 120.

## **BPM Microphones**

[www.pmiaudio.com](http://www.pmiaudio.com)

See Microphones & Preamps, page 93.



**Brainstorm Electronics**  
323-845-1155

**Bruel and Kjaer**  
519-745-1158

**Cabletek**  
[www.radialeng.com](http://www.radialeng.com)  
See Studio Essentials, page 147.

**CAD Professional Microphones**  
[www.cadmics.com](http://www.cadmics.com)  
See Microphones & Preamps, page 93.

**CAIG Laboratories, Inc.**  
[www.caig.com](http://www.caig.com)  
See Studio Essentials, page 147.

**Cakewalk Music Software**  
[www.cakewalk.com](http://www.cakewalk.com)  
See Computer Software & Hardware, page 120.

**Calrec**  
207-773-2424  
See Microphones & Preamps, page 93.  
See Signal Processors, page 107.

**Canford Group PLC**  
[www.canford.co.uk](http://www.canford.co.uk)

**Carver Professional**  
[www.carverpro.com](http://www.carverpro.com)  
See Studio Essentials, page 147.

**Casio, Inc.**  
[www.casio.com](http://www.casio.com)  
See Keyboards, Synths & Samplers, page 9

**Catovah Arts**  
[www.catovah.com](http://www.catovah.com)  
See Computer Software & Hardware, page 120.

**Cedar Audio USA**  
207-828-0024  
See Signal Processors, page 107.

**Cesium Sound**  
[www.cesiumsound.com](http://www.cesiumsound.com)  
See Soundware, page 31. See Computer Software & Hardware, page 120.

**Chicago Case Company**  
[www.chicagocase.com](http://www.chicagocase.com)  
See Studio Essentials, page 147.

**Clavia**  
[www.clavia.se](http://www.clavia.se)  
See Keyboards, Synths & Samplers, page 9. See Groove & Rhythm, page 57.

**Clearsonic Manufacturing**  
[www.clearsonic.com](http://www.clearsonic.com)  
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**CLM Dynamics**  
[www.pmiaudio.com](http://www.pmiaudio.com)

**Coda Music Technology**  
[www.codamusic.com](http://www.codamusic.com)  
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**Coles Electroacoustics**  
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**Cool Stuff Labs, Inc.**  
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**Countryman Associates**  
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**Crate Pro Audio**  
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**CreamWare US, Inc.**  
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**Datasonics**  
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**DDA**  
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**Dianel Co.**  
[members.aol.com/hhonger](http://members.aol.com/hhonger)  
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**Diemer Musical Electronics**  
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**Digidesign**  
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**Digigram, Inc.**  
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**Digital Audio Labs**  
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**Digital Audio Research, Ltd.**  
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**Digital Designs**  
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**Digital Lab Studios**  
[www.digitallabs.com](http://www.digitallabs.com)

**Digital Music Corporation**  
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**Digitech**  
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**Dimension Arc**  
[www.dimensionarc.com](http://www.dimensionarc.com)

**Discovery Firm**  
[www.drummy.com](http://www.drummy.com)  
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**Dissidents**  
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**DOD Electronics**  
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**Doepfer Musikelektronik**  
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**DPA Microphones /TGI North America, Inc.**  
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**Drawmer**  
[www.transaudiogroup.com](http://www.transaudiogroup.com)

**Drum Machine Museum, LLC**  
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**Dsound America**  
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**DTS**  
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**DUY S.A.**  
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**Dynaudio Acoustics**  
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**E-mu / Ensoniq**  
[www.emu.com](http://www.emu.com)  
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**Earthworks, Inc.**  
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**Ebtech**  
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## **Encore Electronics**

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## **Ensoniq**

[www.ensoniq.com](http://www.ensoniq.com)  
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## **Equitech**

[www.equitech.com](http://www.equitech.com)

## **Erato Software**

801-328-0500  
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## **Esoteric Sound**

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## **ETA Systems**

330-425-3388

## **Event Electronics**

[www.event1.com](http://www.event1.com)  
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## **Eventide, Inc.**

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## **Eye & I Productions**

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## **Frontier Design Group, LLC**

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## **Furman Sound**

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## **HHB Communications**

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## **Jensen Transformers, Inc.**

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## **JKJ Electronics**

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## **Johnson Amplification**

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## **Kid Nepro Productions**

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## **Marshall Electronics**

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## **Martin Audio**

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## **McDSP**

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## **MD Report**

[www.pmiaudio.com](http://www.pmiaudio.com)

## **Mediatechnics Systems, Inc.**

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## **Mediatrix Peripherals, Inc.**

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## **Metalithic Systems**

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[www.metasonix.com](http://www.metasonix.com)

## **Metric Halo**

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## **Meyer Sound Laboratories, Inc.**

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## **MicroMat**

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## **MicroSound International**

[www.microsound.com](http://www.microsound.com)

## **Middle Atlantic Products**

[www.middleatlantic.com](http://www.middleatlantic.com)

## **MIDI Mark Prod.**

[www.midimark.com](http://www.midimark.com)  
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## **MIDI Solutions**

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## **MIDIMan**

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## **MIDISoft**

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## **Mike Norris**

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## **Miles Technology**

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## **Millenia Media**

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## **Minnetonka Audio Software**

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## **Modular Sound Systems, Inc.**

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## **Monolith Music**

[www.monolithmusic.com](http://www.monolithmusic.com)  
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## **Monster Cable**

[www.monstercable.com](http://www.monstercable.com)

## **Motion Sound**

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## **Music Industries**

[www.musicindustries.com](http://www.musicindustries.com)  
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## **Music Interface Technologies**

530-888-0394  
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## **Musicator**

[www.musicator.com](http://www.musicator.com)  
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## Musitek

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## Mutronics Ltd.

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## Mytek Digital

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## Native Instruments

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## Nearfield Multimedia

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## Neato

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## NHT Pro

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## Otari Corporation

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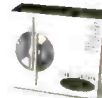
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**See Page 6**



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World Radio History



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## TALKBOX



### DOES "PAD" STAND FOR "PRO AUDIO DEVICE"?

So, which company had the biggest pro audio presence at NAMM—Roland? Yamaha? Presonus?

Answer: Apple. Yes, Apple, who didn't even have a booth, but whose iPad dominated the floor.

Presonus had a remote mixing app for their Studio-Live Mixer, Alesis showed a pro audio-oriented iPad dock, Yamaha was turning their Motif XF into a recording studio with their control surface app—and that's just the tip of a *very* large iceberg. It's almost enough to make you forget all the "What a stupid idea!" comments when Apple's tablet first appeared.

The single most glaring omission with many digital music products has been the control surface—whether the problem is paging through menus, mixing with a mouse, trying to access a zillion parameters via a teeny keypad, or watching a product's list price soar if a manufacturer decides to add physical controls. But just as the music software industry rode the coattails of the personal computer revolution, our next generation of music gear (for both studio and stage) will ride the coattails of tablet-based control surfaces.

There's a dark side, though: Technology changes so fast you just know there's going to be an iPad 2 any day now, and it's also clear that Android OS-oriented companies are not planning to sit this one out. As a result, software and applications might become even more ephemeral than they are now—all of us have run into situations where new computers simply don't accommodate our older hardware, or software was never revised for newer operating systems. Of course, if you're paying \$10 for an app, you're not going to get too upset if a couple years from now, you have to shell out \$10 for a newer version. What's more troubling is that much of what we do involves developing a skill set on our instrument, and when that instrument becomes obsolete, we have to re-learn that skill set all over again.

But we'll worry about that when the time comes. For now, the iPad is here—and the music industry has embraced it big-time. Well, actually . . . make that *huge*-time.

Craig Anderton, EQ Executive Editor

**We have exciting news! Starting next month, EQ magazine will become *Electronic Musician*. We're combining the best of both magazines to bring you more tools, more tips, and more techniques—everything you need to make better music, on stage and in the studio. Stay tuned! —The Editors**

## LETTER OF THE MONTH

### My Favorite Way To Mike Piano

Though I would not call it my favorite method . . . a surprisingly effective way to record a piano is with a Shure Beta 57 and a Beta 58!

First, have the piano at "full stick," then centrally place the two mics in an xy pattern about foot back and six inches up from the hammers. The beta 57 should be on the bottom of the pair pointing almost directly at the center-point of the bottom octave of the piano. The beta 58 should be directly above the 57 but directed at the upper-mid registers of the piano, airing to the high end. (When viewed from the keyboard, both mics should be aimed toward the hammers and directed slightly down from



the horizontal axis.) After recording, balance the two tracks and hard-pan the 57 left and the 58 right. Then pass both tracks through some gentle compression and EQ to taste. This method provides a punchy but brilliant piano sound. An example of a Steinway B recorded with this method can be heard at <http://lifeclock.bandcamp.com/track/jetaime>.

**Makoa**  
via email



# ASK EQ

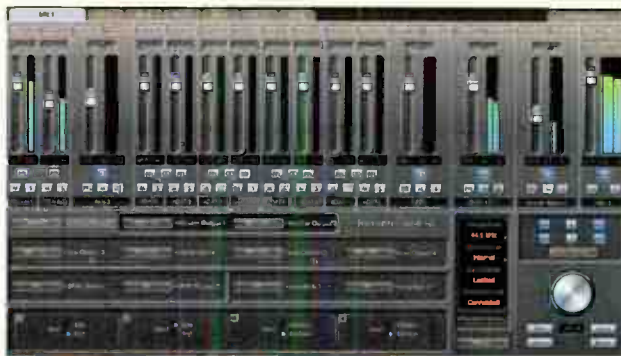
I see a lot of audio interfaces that advertise “zero-latency monitoring.” I thought there was always at least some amount of latency when using DAWs, so how do they pull this off? And why would anyone use other interfaces if some offer no latency when monitoring? I get different answers from different people, so I thought I’d indeed “ask EQ.”

Troy “TJ” Jeffers  
Las Vegas, NV  
via email

**EQ:** You’re correct, there’s always some degree of latency when using a DAW and monitoring through a computer, but understand this isn’t necessarily a constant amount, nor does it relate solely to the interface—a faster computer, simpler projects, and better drivers are just some factors that contribute to lowering overall latency.

Latency occurs because audio is a realtime process, but computers are constantly being distracted by other tasks—monitoring keystrokes, checking ports, etc. So, storing some audio in a memory buffer means that if the computer can’t deal with audio at any given moment, there’s some in reserve that can be streamed to keep the audio flow going. The amount of audio you put in reserve translates to the overall amount of latency.

Interfaces with zero-latency monitoring get around this problem by bypassing the computer altogether, typically through a bundled mixer application that allows patching the interface inputs directly to the outputs. However, the biggest disadvantage to zero-latency monitoring becomes clear if you need to hear the sonic effects that plug-ins impart to a sound, such as when



Focusrite's Pro 24 DSP is just one of many audio interfaces that includes a mixer application for zero-latency monitoring.

recording guitar with amp sims. With zero-latency monitoring, you’ll hear the guitar’s dry sound that feeds the input, not the sound processed through the amp sim. (Incidentally, zero-latency monitoring is seldom true zero-latency monitoring, as putting a signal through A/D and D/A conversion typically adds about 1.2ms of latency at 44.1kHz. But most would consider this negligible, because 1ms is roughly equivalent to moving a foot further away from your speakers.)

Some interfaces incorporate hardware DSP to provide effects that don’t require plug-ins. For example, if the interface includes reverb, then it’s usually possible to add reverb to the monitored signal so a vocalist can hear their voice with reverb—without having to use a reverb plug-in, or recording the voice with reverb.

Bottom line: Use zero-latency monitoring if you don’t need to hear the results of any processing applied by the computer; otherwise, do what you can to minimize latency, with the main improvement coming from (sorry about this) upgrading to a more powerful computer.

Ask EQ a technical audio-related question, and EQ will answer it. Send it to [EQeditor@musicplayer.com](mailto:EQeditor@musicplayer.com).

## EQ POLL Do you use outboard effects or emulations?

**49%**  
Both

**40%**  
Plug-ins: everything's  
in the box

**11%**  
All hardware,  
all the time

### Send EQ Your Stories, Win Gear!

Talk to us! Share your studio stories with EQ, and we'll print our favorites in an upcoming issue. And if we choose you as the “letter of the month,” you'll win sweet gear! This month, we're giving away a Glyph GT 050Q—a desktop hard drive that's purpose-built for audio storage, with FireWire 800 and 400, USB 2.0, and eSATA connectivity.

#### Question:

**What's your most creative trick with an iPad audio app?**

Send your answers to [EQeditor@musicplayer.com](mailto:EQeditor@musicplayer.com).





## HOORAY FOR EARTH

### Accidentally, On Purpose

"We had zero money and we had no plans. There was no label attached to it, and we just wanted to make something as awesome as we could."

Hooray For Earth's Noel Heroux is talking about the humble beginnings of *Momo*, he and drummer Josh Ascalon's breakout EP released this past summer. The quote could easily be attributed to any of today's talented and resourceful indie bands, most of which forego dedicated studios for nimble laptop setups. At times, however, that kind of finished product can end up sounding a bit sterile. Not the case with Heroux. Hooray For Earth's new album, *True Loves*, is a depth charge of tweaked samples, pedal-infused guitars, and hefty drums that mixes unhinged experimentation with just the right amount of DAW know-how.

"A Roland Juno-6 was used on occasion, but most of the album's synth-sounding melodies were played out on a low-tuned Japanese Fender Mustang re-issue run through pedals like the DOD Thrash Master and Stereo Chorus, along with an Electro-Harmonix Holy Grail for reverb," explains Heroux. "Samples are torn apart and rebuilt using [Sony] Sound Forge, then cobbled together using [Cakewalk] Sonar 3.

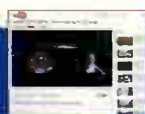
"People are like, 'What's wrong with you?'" says Heroux, referencing the eight-year-old version of his preferred software. "But it's comfortable for me, and I never use a grid. I know it's not the most time-saving method, but I enjoy editing. A lot of people use Ableton, and I know it works great, but it gets under my skin when everything is hitting perfectly all the time."

Nowhere is this more relevant than with the drums, which were recorded on a rooftop using a Shure Beta Kick, an SM57 for the overhead, and an old MiniDisc recorder "to grab some stereo audio." By blending the rooftop tracks with overdubs, percussion samples, and staccato bass, the songs take on a hybrid feel that sounds truly three-dimensional. These unconventional tactics are nothing new to Heroux. The crunchy drums on *Momo*'s "Surrounded By Your Friends" were recorded using a Fostex 8-track with a busted preamp. In fact, the old, brittle preamps on the Yamaha PM1000 that *Momo* was recorded through gave the entire EP a blown-out feel. Subtle melodies in ambient wind noise from the outdoor drum sessions provided the foundation for one of Heroux's favorite songs on *True Loves*, though he won't reveal which one.

"I'd prefer to keep that one to guessing," he says, smiling. "Everything on this album is straight from my head and straight into the computer. I wouldn't call that song an accident, but it was definitely not planned at the time of tracking!" Richard Thomas



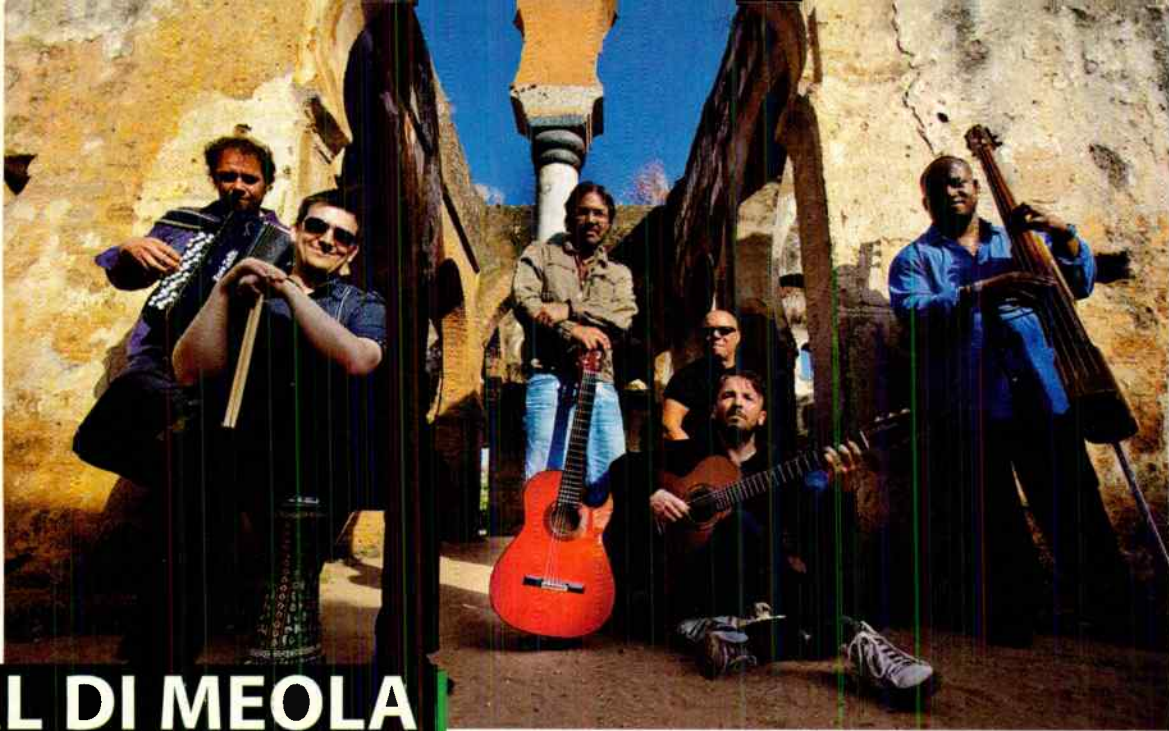
Interview extras with  
Noel Heroux.



Check out  
"Surrounded By  
Your Friends."

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## AL DI MEOLA

### Soars on *Radical Rhapsody*

Guitar titan Al Di Meola has been astonishing music fans since the mid-'70s, first as a member of fusion pioneers Return to Forever, and since, over the course of about 30 solo albums. His playing has only got richer through the years, as he's incorporated more influences in his music, including Latin, North African, his Italian roots, Argentine tango, heavy rock; you name it. His newest album, *Radical Rhapsody*, gives a great snapshot of where he is today, with nearly all those influences present over the course of 13 originals, mostly featuring his five-piece World Sinfonia touring band, and then two wonderful covers—"Somewhere Over the Rainbow" and a fantastic "Strawberry Fields Forever."

This latest project began at Di Meola's Florida writing retreat (his main home and studio is in New Jersey), writing on nylon or steel-string acoustic guitar, then employing a Roland VS-880 digital studio workstation, which he calls "the perfect writing tool—I've probably had it for 14 years." He'll write parts for his band by putting pencil to paper: "I write everything out and then I record them first [using keyboard voices for the non-guitar parts] to see how it sounds before I do any actual recording. I'll work with someone like Barry Miles to lay everything out and see how it sounds, and then make minor adjustments in the actual written parts."

In the case of the new album, five of the songs are ones he had been playing live for some time with his group, so cutting the basics at Avatar Studios in NYC with producer/engineer Frank Filipetti

was relatively straight-forward. The other tunes required more arrangement work at Di Meola's Churchill Studio, as well as sessions at the Hit Factory in NYC and Henson Studios in L.A. with engineer Katsuhiko Naito, who has worked on and off with Di Meola for a decade. Naito comments, "His songs are pieces of art—there's so much going on in them and he's always trying new parts and new ideas, like a painter, so the songs sort of grow on their own."

In the studio, Di Meola usually plays his Spanish-made Conde Hermanos nylon string guitar, captured with a Schoeps CMC 64 stereo pair "X-Y, pretty close to the guitar," Naito says. "He has a nice-sounding guitar booth in his studio that was designed for that guitar, with a wood floor and some ambience."

Di Meola also uses a Roland VG-88 guitar synth on his axe "for places within the composition where I need to soar," the guitarist notes. "At that point, my nylon guitar has a pickup that enables me to access different sounds, one of them being a Les Paul through a Marshall. It really cuts through when the music gets thick. Then I can back off the pedal and go back to pure acoustic. But at no point do I eliminate the acoustic sound, so it's usually a blend of both." **Jack Britton**



Read extras with Al and engineer Katsuhiko Naito.



Download Di Meola's "Siberiana."

**More Online!** [eqmag.com/april2011](http://eqmag.com/april2011)



## HEARTS REVOLUTION

### A Riot Grrrl-Led Hip-Hop Dance Rock Blitz

Some artists have lofty goals. And some, like NYC dance punk duo Hearts Revolution, want to change the world. "I want to make something new," says singer/rebel Leyla "Lo" Safari. "I want a revolution."

Inside Gigantic Studios, where Lo and her musical other half, Ben Pollack, have been working on their debut full-length, *Ride or Die*, with producer Chris Zane, there is an air of anything being possible.

"Imagine back in the era of *American Bandstand*, when kids were listening to rock-and-roll for the first time and figuring out how to dance and express themselves, it's *that* kind of dance music," says Lo of the *Ride or Die* sound. "A hip-hop inspired rock-and-roll dance record . . . if Ad Rock and Kathleen Hanna finally made their love child, it would be born of *Ride or Die* essence."

The album began in typical Hearts Revolution fashion—Ben producing the beats and synth-based dance music in Ableton Live, and recording Lo's riot-grrl-style vocals and other out-of-the-box sounds via a cheap audio interface. Then they hit the studio with Zane.

"Our demos are like pencil drawings," says Ben, "and I wanted a producer to take these pencil drawings and render them in 3D."

Of late, Zane has worked with a number of electro- and synth-based artists including Passion Pit and The Hundred In The Hands, and he's rooted in post-punk and indie-rock, as demonstrated on records with Les Savy Fav, The Walkmen, and Tokyo

Police Club. Sonically, Hearts Revolution lives where those worlds collide, applying the DIY punk aesthetic and ethos to dance music, and dipping it in florescent pink.

"So much of the presentation of this music *is* the sonic character," says Zane. "It's all built-in." That is: "everything in the red in Ableton. A compressor on the master fader—everything just clamped down, super compressed."

The challenge for Zane was to keep this sonic character that's inherent to the songwriting, but elevate the sonic quality with better equipment. They replaced soft synths with analog synths, recorded guitars, supplemented drum parts with samples from Zane's library, and recorded live crashes.

Lo's vocals were largely re-recorded in the studio, though a few tracks that she recorded in the bathtub via the stock iPhone hands-free mic made the cut. In the studio, the vocal chain was consistently "an AKG C12 destroyed through a preamp destroyed through an 1176 destroyed through a Distressor."

Mixing *Ride or Die*, Zane applied some unorthodox techniques to approximate that "clamped down" Hearts Revolution sound. "I'm compressing the hell out of the stereo bus with the Alesis 3630 that Daft Punk is famous for using. That 3630 is doing at a minimum of 6dB of gain reduction on the whole mix."

"I always do a lot of layered compression and usually get some very drastic sounds, but with this record, everything is pushed way too far and then brought back over the edge a tiny bit," Zane describes. "It's the loudest record I've ever mixed. We're printing back into Pro Tools at like -1. Crazy loud. But that's just what we're going for." **Janice Brown**



Read our extended feature on Hearts Revolution.



Learn about the pink Hearts Revolution truck.

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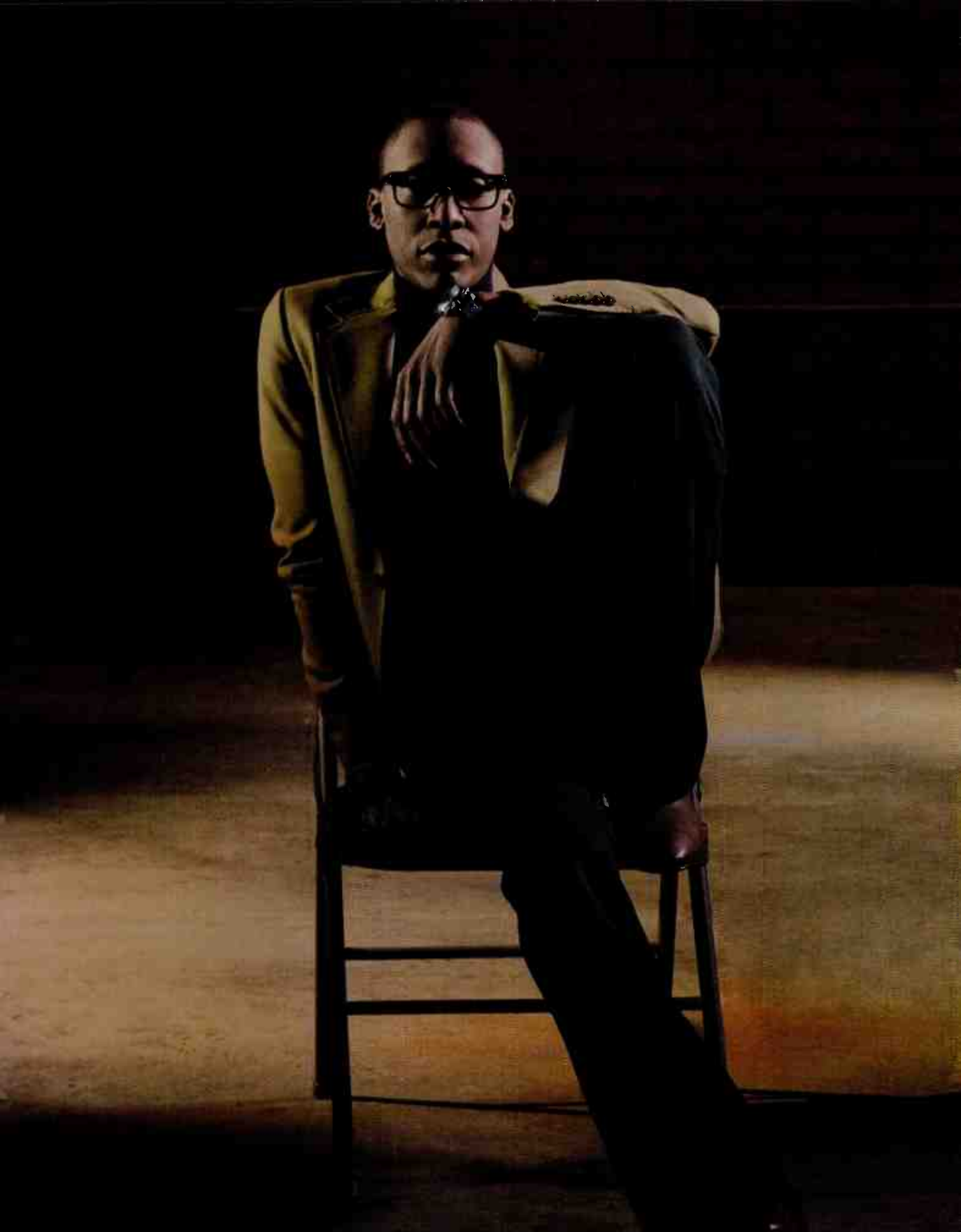
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# A

# Modern Throwback

**On *Stone Rollin'*, Raphael Saadiq moves away from a Motown sound to pay homage to broad influences ranging from Sly Stone to Johnny Cash**

**by Jack Britton**

Singer/songwriter/multi-instrumentalist/producer Raphael Saadiq is living a pretty good life right now. On a cold Thursday night in January, we find Saadiq and his quintet (guitar, bass, drums, two singers) sitting on stools under a dimly lit crystal chandelier in a spacious suite on the 16th floor of San Francisco's classy Clift Hotel, breezily running through a few tunes from his new album, *Stone Rollin'*. If you've ever seen clips from Hugh Hefner's late-'60s TV series *Playboy After Dark*, which was shot on a set made to look like a swinging bachelor's penthouse apartment, that's what this room looks like. And by the time Saadiq casually kicks into the album's first tune—"Heart Attack," which he admits is

a nod to one of his idols, Sly Stone—the crowd of about 75 local writers, music biz types, and a few friends from his days across the bay in Oakland, is well-lubricated and in a good mood. Just like Saadiq. Handsome, relaxed, dressed head to toe in black (including his trademark black-framed glasses), and cradling a Telecaster on his lap, Saadiq tells stories about his new songs and even takes questions from the audience. The handful of tunes he performs run the gamut from the rockabilly shuffle "Daydreams" (inspired by Ray Charles and Johnny Cash, he says) to traditional soul-flavored tunes more reminiscent of his hugely popular 2008 album *The Way I See It*.

Engineer Charles Brungardt and Raphael Saadiq at Ocean Way Recording in Hollywood.



That disc, with its uncanny extrapolations on the traditional mid-'60s Motown sound, created quite a sensation and brought Saadiq a whole new audience—mostly young, mostly white folks who frankly were unaware of his long and illustrious history dating back to the smash late '80s, early '90s Oakland soul and new jack swing group Tony! Toni! Toné!; the short-lived R&B supergroup Lucy Pearl (Saadiq, En Vogue's Dawn Morrison, and A Tribe Called Quest's Ali Shaheed Muhammad); and his solo albums. No doubt many of the audiences who saw him play huge festivals such as Bonnaroo, Outside Lands, and Bumbershoot (he's playing Coachella and South By Southwest this year) thought he was a new artist who'd just stepped off a bus from Detroit in 1965. The crowds ate it up—loved the tight-fitting yellow suit he often wore, loved the Temptations dance moves, loved that smooth, elastic voice that moves so easily into Marvin Gaye/Eddie Kendricks territory but still sounds original—and Europe and Japan both fell in love with him, as well.

Of course the easy thing for an artist who is clearly cresting and in-demand—when I interviewed him a few days after the Clift event, our conversation was interrupted by a call from Mick Jagger!—would be to offer audiences more of the same sound they love. But on *Stone Rollin'*, Saadiq has moved away from the hard-core Motown sound and embraced a whole new set of influences, like the ones mentioned above, and also the more expansive orchestral sound of post-Detroit Motown recordings and the great Philadelphia soul records of the '70s. It's a more eclectic album all the way around, but in the scope of Saadiq's whole career, just another synthesis of his roots and current fascinations. After all, he first tackled Motown-style songwriting with "The Tonys" (as he calls them), and his first solo album was called *Instant Vintage*. In short, this is what he's been doing all along, or as he puts it with a laugh, "You could say my whole career is paying homage to everybody . . . but I've still always got *my* sound."

For the past several years, Saadiq's principal sonic partner has been an engineer named Chuck Brungardt. Originally from Modesto, in California's Central Valley, Brungardt got a degree in computer science from the University of San Francisco but fell into the recording world. Working at a software company by day, he also interned at Moulton Studios in San Francisco for a period and eventually "caught the ear of the producers Jake and the Phatman [Glenn Standridge and Bobby Ozuma], and they worked with Raphael a lot," Brungardt explains. "I ended up working with them for six months to a year, and eventually, when I graduated college, those guys were in L.A. a lot working on stuff with Raphael at his studio. It was right when he finished



**Steve Stevens**

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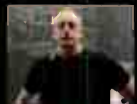
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**Dave Natale**

FOH engineer Tina Turner world tour 09



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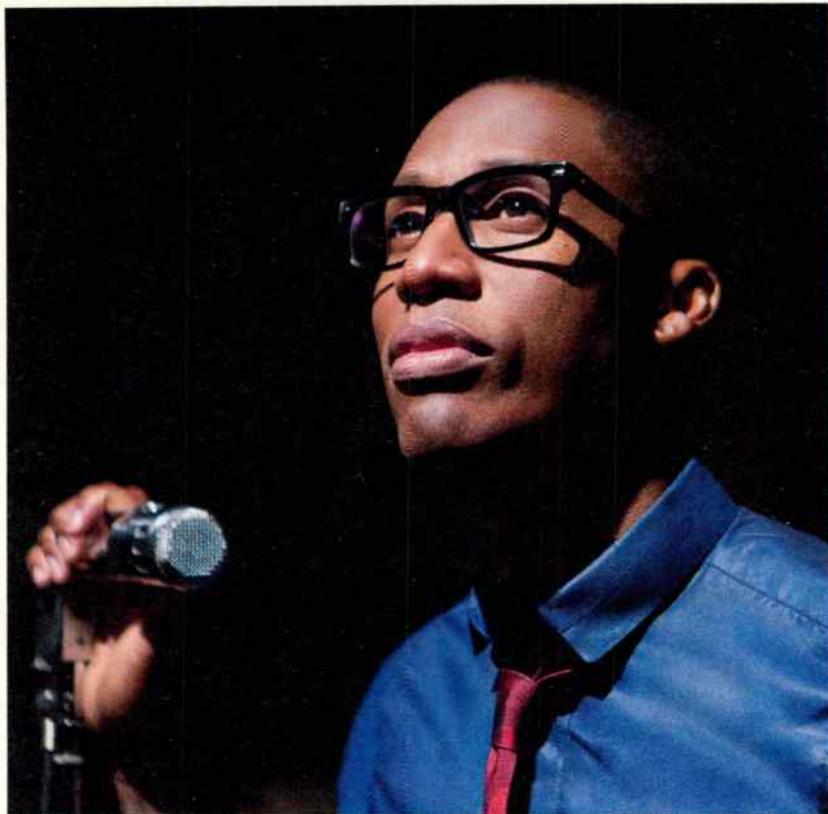


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by HARMAN



“You could say my whole career is paying homage to everybody... but I’ve still always got my sound.”

—Raphael Saadiq

the *Ray Ray* album [in 2004].”

Brungardt interned at Saadiq’s Blakeslee Studio in North Hollywood and learned more about engineering there from Standridge and Danny Romero. When Standridge moved in to more of a business role in his partnership with Ozuma (who was mainly a writer/producer), Brungardt started engineering more, and by 2007 Saadiq had brought him onboard to help engineer and mix the *Introducing Joss Stone* album, which Saadiq produced. (Saadiq has a long production history, too, having presided over his own albums since *The Tonys*, and helming tracks by The Roots, Mary J. Blige, The Isley Brothers, Macy Gray, Snoop Dogg, D’Angelo, and many, many others; Brungardt worked on a few of those, too.)

Saadiq and Brungardt obviously connect strongly on a work level—Saadiq likes to layer multiple instruments himself; he and Brungardt have spent countless hours together in the studio, and temperamentally, they are clearly suited to each other. But another bond they share is their love of collecting gear and musical instruments, and a fascination with historic recording techniques. “I was always into collecting gear on eBay, even back in San Francisco,” Brungardt comments, “so we started buying things like [Telefunken] V72 preamps and old Ampex tape machines—we’d take the preamps out of those and rack them up. Those kinds of things helped us get closer to the sound we liked, and we also studied the *Recording the Beatles*

book, which was awesome. Those engineers really knew what every piece of gear could do.”

“I love gear!” Saadiq adds. “Old keyboards, like [Hohner] D6 clavichords, Hammond B-3s and tricked-out Leslies, old mics . . . I’m still collecting. I never stop collecting. Guitars, basses . . . that’s part of what keeps you making records. You have to have the tools you need.”

“Before we did Joss’ album,” Brungardt notes, “we are already playing with doing Raphael’s *The Way I See It*, and the idea was, ‘Let’s buy old equipment and make samples, and also let’s try to make live playing *sound* like samples; maybe we’ll put drum machine programming over it. Because real players are more interesting and dynamic than an 8-bar or 16-bar loop. After we’d worked on Joss’ album and we got back to Raphael’s, we wanted to take it in an ‘older’ direction, it became almost like a bet with some of the guys who were saying, ‘You can’t really re-create this old-sounding stuff because the power-flow back then was different, or the way this worked or that worked was different.’ So Raphael and I just locked ourselves in the studio and tried *everything*, from bouncing tracks to a cassette tape to get that noise—trying get it to sound dirty and old—to distorting vocals in various ways, because they didn’t have the compressors that we have now; they had slower attacks. So that became part of the sound. We had Motown books and we’d see pictures of the guys in the studio and how their drums were set up, how the mics were placed. So we started out copying that, but as the process went on, we sort of found our own sound within that: ‘Let’s try to re-create that sound, but also modernize it by making the bass heavier and the kick drums pretty slammin’. It was a fun, experimental project.”

But it was not something they were interested in repeating exactly on *Stone Rollin’*. “That last album was a lot of fun to make,” Saadiq agrees. “Being in the studio and miking things up in certain ways, and studying up on the Motown EQs and all that, figuring out exactly the right tone for that rhythm guitar part. We spent *hours* on that stuff, and not just trying to make it sound ‘old,’ but to put our stamp on it. Chuck really goes to the wall for me when I’m dreaming all this stuff up. He’s there going, ‘We can do this! We can do this!’” he laughs.

Saadiq says that though *The Way I See It* strongly reflects the Motown aesthetic, *Stone Rollin’* is more in keeping with his other projects that have drawn from more influences: “I’ve never shut my ears to anything, really. It’s not like I’m always looking for things, either, but I can’t close my ears to any music. Any guitar, any drums, any rhythm section—I’ve always been open to those things, trying to



understand what makes them work in a song."

Brungardt reveals that the move away from the Motown sound "was kind of an accident. The first time we recorded 'Heart Attack' was maybe six months after *The Way I See It*, when he was taking a break from touring. Originally it sounded more like that record—it was more of a Motown shuffle. We always loved the vocals, but we weren't so set on the music. At the same time, we started listening back to the few songs we had when we went full-steam into this project and we both felt it wasn't the direction we wanted the next album to go. We wanted to evolve the songs, and I wanted to evolve the engineering, as well. On *The Way I See It*, everything was pretty much tube pre's and tube compressors. On this one, I wanted to play around with some of the more solid-state gear, like using some Neve pre's and EQs [1037s and 1272s] and some Scully pre's.

"Later, we revisited 'Heart Attack' and a lot of the music we were listening to at that time was indie rock—groups like Spoon and MGMT," Brungardt continues. "I loved the sound of those. In so much R&B, people want it up-in-your-face and polished, whereas indie rock was going the other direction. They were looking back at some of the same records Raphael was inspired by—Howlin' Wolf and Sly, and all that—and taking elements from them and using them in different ways. So I was trying to push Raphael to be a little more gritty with guitars and use a little more distortion."

"Heart Attack" is one of several songs on *Stone Rollin'* that feature Saadiq playing nearly all of the instruments. "I feel pretty comfortable playing whatever's in front of me," he comments, "though live, I guess I'm most comfortable playing bass [his main instrument for many years] or guitar. On 'Heart Attack,' the drums came first, then I'd do guitar, lay the bass, one part at a time." In the case of that tune, everything but the original vocal and some of the drums were stripped when Saadiq decided to take the song in a different direction, and then he rebuilt the parts.

Since he's often recording one instrument at a time, Brungardt is able to use one or both of his beloved Neumann U47s on almost everything. "I use it

as a mono overhead, I use it on guitar; if we did a bass amp, I'd use a 47 as well," he says. The process of layering to create a basic track can be quite fast—literally just a few minutes per part—or take several hours. More complicated parts and solos generally take more time and involve greater experimentation. Saadiq likes to record his vocals alone in the control room, and uses a dynamic mic, usually Shures. "This was something Gerry Brown pushed him to use back in the *Instant Vintage* and Tonys days," says Brungardt. "His voice benefits from a dynamic mic because it tends to give him more bottom and presence. Plus dynamic mics can sound a little older when pushed."

Among Brungardt's other favorite techniques to get Saadiq's characteristic sound is cranking the gain on a Fender Twin to get more distortion. "One of my favorite plug-ins is Tapehead [by Massey], and I'll use that on a lot of things to get a little more grit," he adds. "It thickens stuff up nicely if you record something that's a little too bright. I usually go a lot for darker tones when recording and mixing. Another thing we like to do is re-amp guitar parts. He'll go through one of those Avalon DIs, and we'll take that signal and re-amp it through a '67 Twin, or on some songs we've used an older Vox AC-30. Some of the songs even used Amp Farm: He might use that if he's just trying to get an idea down quickly. Then, if it's something he really likes, we'll go back and clean it up and re-amp it."

On the new album, Brungardt used a McDSP FilterBank plug-in to deal with excessive high end in spots, as well as the Waves Renaissance EQ, and though he is a fan of the Line 6 Echo Farm, for this

"I can't close my ears to any music. Any guitar, any drums, any rhythm section—I've always been open to those things, trying to understand what makes them work in a song."

—Raphael Saadiq



project, he turned to an Echoplex clone. He also utilized a Roland Space Echo during mixing, which was done on the SSL 9000 in Blakeslee's "C" room. (The album was cut to Pro Tools in Blakeslee Studio A, using the SSL 4000 Series desk mostly for monitoring.)

One of the most striking features of *Stone Rollin'* is the lush orchestrations that appear on several songs. Saadiq has always had a fondness for strings, but rarely have they been featured so prominently. "Instead of just having a string section off in the background," he explains, "I wanted on certain songs for the strings to be more expressive, so I talked to [arranger] Paul Riser about the titles and what I was going for in the songs. I'd say, 'For *this* word, I want it to be orchestrated *this* way. When I listen to the song "Go to Hell," I want to hear the winds in the valley rushing into me."

What are his orchestral influences? "Just music; music of all kinds. There are a lot of orchestral arrangements in dance music. And also from

watching cartoons! There are a lot of orchestras in animation. I just thought [the orchestrations] would fit well with some of the new songs I was doing."

The orchestral dates took place at Ocean Way Studio B in L.A., with Gerry "The Governor" Brown engineering—Brown has worked with Saadiq on projects dating back to The Tonys, and Brungardt volunteers that he has learned much from him through the years. Brown also did some tracking with Saadiq at Blakeslee when Brungardt was off doing work for the videogame company he and Saadiq run, called Illfonic (whose games include *Ghetto Golf* and the first-person shooter *Nexuiz*). The horns were mostly done at Blakeslee, too.

A few tracks feature musicians from Saadiq's band, such as drummer Lemar Carter, bassist Calvin Turner, and guitarist Rob Bacon. And there are also a few guests, such as steel-guitar wizard Robert Randolph, former George Clinton associate "Amp" Fiddler (the song "Go to Hell" began with one of his Mellotron ideas), guitarist Wah-Wah Watson, and Earth, Wind & Fire keyboardist Larry Dunn.

But mostly, it's the versatile Saadiq, layin' every part down with authority and finesse. "I know I'm lucky," he says. "I get to dream and create things and work in the studio, and then I get to go out and watch people enjoy it." 🎧



Chuck Brungardt elaborates on studio sessions.



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# "I did it myself... ...Primacoustic made it easy!"

## A conversation with jazz/blues guitar legend Scott Henderson

(Tribal Tech, Chick Corea, Jean Luc Ponty, Joe Zawinul, Jeff Berlin, Victor Wooten)

### Scott, tell us about your studio.

It's a two room overdub studio - a control room and a room to mic guitar cabs, horn players, singers, etc...

### What do you do there as opposed to in commercial studios?

I use commercial studios when there's a drummer involved, but I get the best guitar tones at home.

### What were some of the problems you noticed with the acoustics?

Actually I never thought there were any problems, until I A/B'd the Primacoustic Broadway panels with what I was using before.

### What type of panels did you have?

I had a popular brand of foam and I needed to take it down because after 3 years it started to crumble and fall apart.

### Did you do the set up yourself?

I did it all myself. Primacoustic made it easy and fast. Believe me, if I can do it, anyone can. All you need is a drill, screws and a level.

### How did you configure the panels?

In the control room, because there's a lot of gear to work around, I just put them where they fit. The mic'ing room was just bare walls so it required planning. I configured them randomly to cover about 30% of the walls.

### What improvements did you hear?

A big difference! Tighter low end with more of it, plus a sweeter top end and a clearer, open sound.

### How would you compare it to foam?

The foam gave the guitar a bit of a nasal sound - more emphasis on mid frequencies, and not good ones in my case.

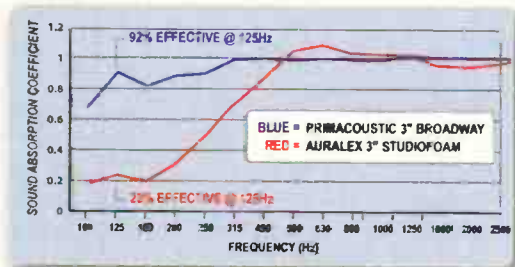
### What would you tell someone thinking about acoustic treatment?

Whatever you do, don't use foam, especially attached with glue. The foam turns into dust after a while and is a total mess. Even worse is trying to get the glue residue off your walls. Mine had to be completely sanded and re-painted. Plus foam doesn't sound nearly as good as the Broadway acoustic panels.



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# Mastering Mastering Mastering Mastering

## Understand Your Mix's

They're mysterious, they're straightforward. Their work is ubiquitous, but their credit is overdue. Their job comes after recording and mixing, but they're often expected to fix past mistakes. Their gear is esoteric, and though their exact role is often misunderstood, it's an essential component to every record ever made, from *Meet The Beatles* to *The Fame*. The mastering engineer is the final link in the recording chain and the first stop for mass production, but what exactly does he or she do?

To answer that question (and a few more), *EQ* spoke with four prominent mastering engineers: Gavin Lurssen of Lurssen Mastering, Michael Romanowski of Michael Romanowski Mastering, Andrew Mendelson of Georgetown Masters, and Joe Palmaccio of The Place. . . For Mastering. They don't agree on everything, but their goals are the same—to make each master all it can be. But questions remain. Like, what exactly is the role of the mastering engineer?

"Mastering is the final step in the artistic process of making a record, and the first step of the manufacturing phase," Michael Romanowski explains. "You're taking sounds, which are songs, and listening to them in an extremely tuned room; listening for frequency, level, how the sounds sound within the song, and how they sound with the songs when

they go together. Mastering is the final check for quality control in the sonic presentation. It takes years of ear training and listening and focus to get to where you're paying attention to the bigger-picture details and not the smaller-picture content."

Andrew Mendelson relays the nuts and bolts. "We are taking the completed mix, and using tools not too different in principle from the tone controls on a radio or playback device," he says, "and trying to fix any issues, and present the mixes in the best possible way. We're ensuring that the mixes translate well to all listening environments. Then we work on the final master, which is delivered to the pressing plant, download service, or label production department."

"When working with an established client, my role is that of a trusted and objective listener," adds Joe Palmaccio. "Established mixers and producers who have long-standing work relationships with me trust my judgment. Another role occurs when working with first-time clients—both first time for mastering and perhaps the first time making a finished recording. Today it is common for a first-time client to meet with me before they've recorded a note of music. My job includes becoming a trusted advisor to the overall production in addition to carrying out the traditional mastering duties I perform with



# Matters Matters Matters Matters

## Essential Final Step

established clients."

But with Pro Tools, plug-ins, and in-the-box recording, who really needs a mastering engineer? Sure, superstars can afford the ultimate finished touches on their recordings, but for Joe Average in his bedroom studio, cost is anything but no object.

"A mastering engineer offers a specialty position, a lot of human experience; he or she can advise the artist on the tonal structure of the music," Gavin Lurssen explains. "The mastering engineer offers gear that goes much deeper than a piece of software. We use very intricately and carefully designed tools to dig into the audio that go far beyond what any software can do. Until the industry is further developed, automated software designs generally emulate the craft best performed by a human.

"Technically, you don't need a dedicated mastering engineer," Andrew Mendelson adds. "The essential part of the process is the creation of the deliverable master. People can do that at home, but when we create a master it goes through a rigorous quality-control process that ensures the client that everything is being done properly. People tend to think of mastering as just the processing stage, but it's the attention to detail and creating the deliverable master that is truly

the fundamental part of the job."

"Producers and mixers can lose their objectivity," Palmaccio says. "The most important reason they seek out a mastering engineer is to have someone to objectively comment on the good and bad, catch potential problems and offer solutions to fix those problems before they release their music. It's true that there are tools one can use for mastering inside Logic and Pro Tools, but without experience, the tools are limited to the skill of the user."

With their specialized experience and specialty gear, mastering engineers are truly deep listeners. But what are they listening for? Romanowski listens to "get an overall feel for presentation. Is it too loud, too quiet, too bright, too boomy? Is the frequency response from low to high well-represented?" Mendelson also has a well-honed laundry list, perking his ears for "Tonal balance, sibilance, apparent levels, mouth noises, broadband noise, level and balance between songs."

"I want to see if the recording elicits any sort of

by  
**Ken  
Micallef**



Learn how Lurssen mastered Elvis Costello's *National Ransom*.



Read more about the albums mastered by the engineers here.

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emotional response," Palmaccio says "Then I listen to the actual mechanics—what is the instrumentation, and how is that affecting the musicality of the song itself? Enhancing or correcting a mix includes adjusting equalization, applying compression or limiting, adjusting the stereo spread, and adjusting the level of the entire song or certain parts of the song."

We've all seen the mighty toys of the professional recording studio, but the mastering room is a decidedly more foreign place to most of us. Its rig in total is typically minimal, its gear purpose-built.

"The mastering engineer's chain is a very intricate look at EQ and limiting and it also takes into account the gain structure of the audio going through that gear," Lurssen explains. "And because we deal with digital mixes, the gain structure coming out of the digital-to-analog converter into our gear and getting reconverted back from analog to digital is a big deal. Each mastering engineer generally designs their own gear for true transparency; Lurssen Mastering's equipment chain is all customized with emphasis on a combination of tube and solid-state analog processing gear. When you're working with two-track final mixes, you are working with something that has already gone through a digital or an analog summing bus," says



Lurssen. "An analog summing bus usually provides a more palatable or three-dimensional sound but these days there is a lot of mixing within a workstation, which leads to digital summing. When it comes through the console at our studio it will all be processed analog and all of these details need to be taken into account."

"Most recording engineers work with small nearfield monitors, Palmaccio says. "Most mastering engineers use larger full-range systems. Another difference is the number of channels that mastering engineers work with. Recording and mix engineers are working with lots of channels, but most of the time I am working with two channels: left and right. Cable runs between gear are short and minimal because I want to maintain as high-quality a signal path as possible. Much of my processing gear is mastering-specific from the manufacturers. This includes features like easy reset ability and L/R channels matched to exacting tolerances."

Tracks come into mastering in every incarnation imaginable. Lurssen says he "gets every file type available, including stems [grouped tracks]. Stems do offer flexibility in the ability to make fine-tune adjustments to the mix, but it is important to maintain the notion that the mixes should not be altered in the mastering room if at all possible," he says. "Mix choices being made before mastering generally keep everybody focused in the right areas."

Romanowski prefers to get AIFF (.aif), Wave (.wav), broadcast Wave, and FLAC; Mendelson has received "half-inch, quarter-inch, CD, DAT, VHS tape, even cassette," he says. "Sometimes we're pulling something off vinyl for a movie soundtrack. But it's primarily PCM files, followed by DSD files and tape."

Another ubiquitous bit of business is the constant call to "make it louder!" How do mastering engineers preserve musical dynamics while meeting the needs of clients who seek out ultra-compressed, "competitive" mixes?

"I tell people that I've never in all the years I've done this heard of a consumer returning a disc or a download because it wasn't loud enough," Lurssen says. "We maximize the level at which we print a mix while retaining the musicality every time. If someone wants to go louder, it's not advisable. But some music *can* be super loud; it's part of the vibe. We're just aware of it and we're responsible with it."

"With no dynamic range, it's very fatiguing to the ears," Romanowski plainly states. "A really loud record means you will listen to it less often. People think loud means better MP3s, but they're actually worse because there is no low-level information. You can automatically gain-match your playback; iTunes's Soundcheck will do that. But people are



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Andrew Mendelson.

starting to pull back as they understand the ramifications of over-compressing your music."

Palmaccio takes a pragmatic approach to the loudness quandary. "There's an optimum point where loudness and musical impact meet. Once you push loudness beyond a certain point, you lose the musical impact. The mix, in effect, sounds smaller and sometimes downright unpleasant. Sometimes clients just want it really loud at the expense of everything else. By simply showing them two approaches—one maxed out and one not—they hear a loss of musicality and often go for the second approach. Ultimately, it is the artists' decision as to how they want their music presented."

Beyond loudness debates, mastering engineers face a variety of challenging situations in the studio. "I usually have one of my assistants go through and manually de-ess each 's,'" Mendelson explains. "Maybe they didn't have the tools to properly mix, or maybe the mix was dull to begin with, so that by the time we got the mix sounding good, the 's's sound too bright. We're always going through and taking out some kind of mouth noise or cable noise. I would rather do that manually than use some broadband processor which will inevitably remove stuff you don't want taken out."

"The hardest mastering sessions are those when the artist and/or producer didn't really get what they wanted in the recording or production process and are hoping mastering can save their artistic vision, Palmaccio confides. "Unfortunately, it just doesn't work like that. Most of the time it requires an honest conversation. Not the most fun day, but honesty is a very important part of being on a creative team."

No matter the experience and talent of the mastering engineer, some mix issues simply cannot be resolved in the mastering process. "Mastering is not a fix, although we are being relied on more to fix people's mixes," Romanowski says. A lot of people who are making records shouldn't be making records. There are a lot of demos being released and they're relying on the mastering engineer to fix it."

"Phase issues are often difficult to deal with," Mendelson says. "For example, when you have two instruments in the same frequency range that are panned

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Joe Palmaccio.




the same way; if you have a dull vocal and a bright vocal, that will be trouble. If a mix is balanced, it doesn't bother me, but if you have issues you want them to be consistent across the mix."

Near the end of their job, or even at the beginning, the mastering engineer addresses the format that the music will be released on. Some mastering engineers take a consistent approach, regardless of release format; some see each format as requiring a unique creative process. But at the end of the day, whether it's for vinyl, CD, or a download, the priority is to perfect sonic issues in the mix.

"If [the mix] sounds good on one format, it should translate to the others," Mendelson says. "Sometimes you have a severely compressed CD that is going to be cut to vinyl and we will back off on the limiting a little bit. And sometimes there is a different mix for radio, and you will do what that mix warrants. I mastered a single yesterday and there were six different versions—same song, different remixes, and they all sound drastically different."

Joe Palmaccio sums it up. "I will master slightly differently when I know the final product will be vinyl. Vinyl by its nature has some limitation with regard to frequency response and loudness. There are three main components that change for me when mastering for vinyl as opposed to CD or digital release. The overall disc level is not as hot; the bass content has to be controlled with either filtering or elliptical EQ, and high-frequency limiting is used if there is an inordinate amount of treble content in the mix."

But at the end of the day, whether the music is released on vinyl, CD, or as an MP3, mastering engineers strive to make the final product sound as good as it can, whenever the mix is under their control. "Somebody needs to take a stand somewhere in order to get the fans something palatable to listen to," says Lurssen. "If we start changing what we do to accommodate new technologies, it's all going to fall apart. We just do what sounds good in the studio. Someone has to take a stand, and it's important that it's the person at the last stage of the process. Sure, you'll make minute adjustments here and there for vinyl or other specific applications, but generally speaking, you set boundaries. It's all about having confidence in what you do." 



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# Punch and Presence

**On *Electric Love*, Dirty Vegas concentrates on intricate loops, complex effects, and a big bottom end**

by Tony Ware

South London house trio Dirty Vegas drove full-speed into the public consciousness in 2002 when the band's Grammy-winning debut single "Days Go By" was featured in a Mitsubishi commercial. The song rode an aqueous melody, directed by an electrohaus thump and persistent five-note bassline. A seemingly simple formula, perhaps, but the balance of elegiac and driving proved an immense hit. The band would then go on to release a self-titled full-length debut, with several charting singles, as well as a second full-length in 2004, before parting to pursue solo efforts in 2005. In 2009, however, Dirty Vegas reformed, and now Steve Smith, Ben Harris, and Paul Harris (no relation) have completed a third album, *Electric Love*—a 10-track record "marrying song structure with a dancefloor-oriented sound as

well . . . concentrating on melody, harmony, vocals and chordal work, but with a prominent low-end punch," says Ben Harris.

Dirty Vegas may have taken a hiatus, but technology kept right on evolving. So in the interim between 2004's *One* and the writing process for *Electric Love*, the band transitioned its demoing process away from sequencing analog synths routed through outboard processors and an analog desk into a Mac tower, and instead packed sessions into a MacBook



Watch "Dirty Love."



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Pro running Ableton Live Suite 8 rewired into the Logic Pro 9 mixer alongside additional soft synths. Having each member in possession of a portable, standardized set-up allowed the group to sketch while on the road, as Dirty Vegas giggled heavily to support the self-funded recording sessions, and to float ideas to one another when they weren't together—Smith lived in Boston and Ben Harris and Paul Harris were spread out across London.

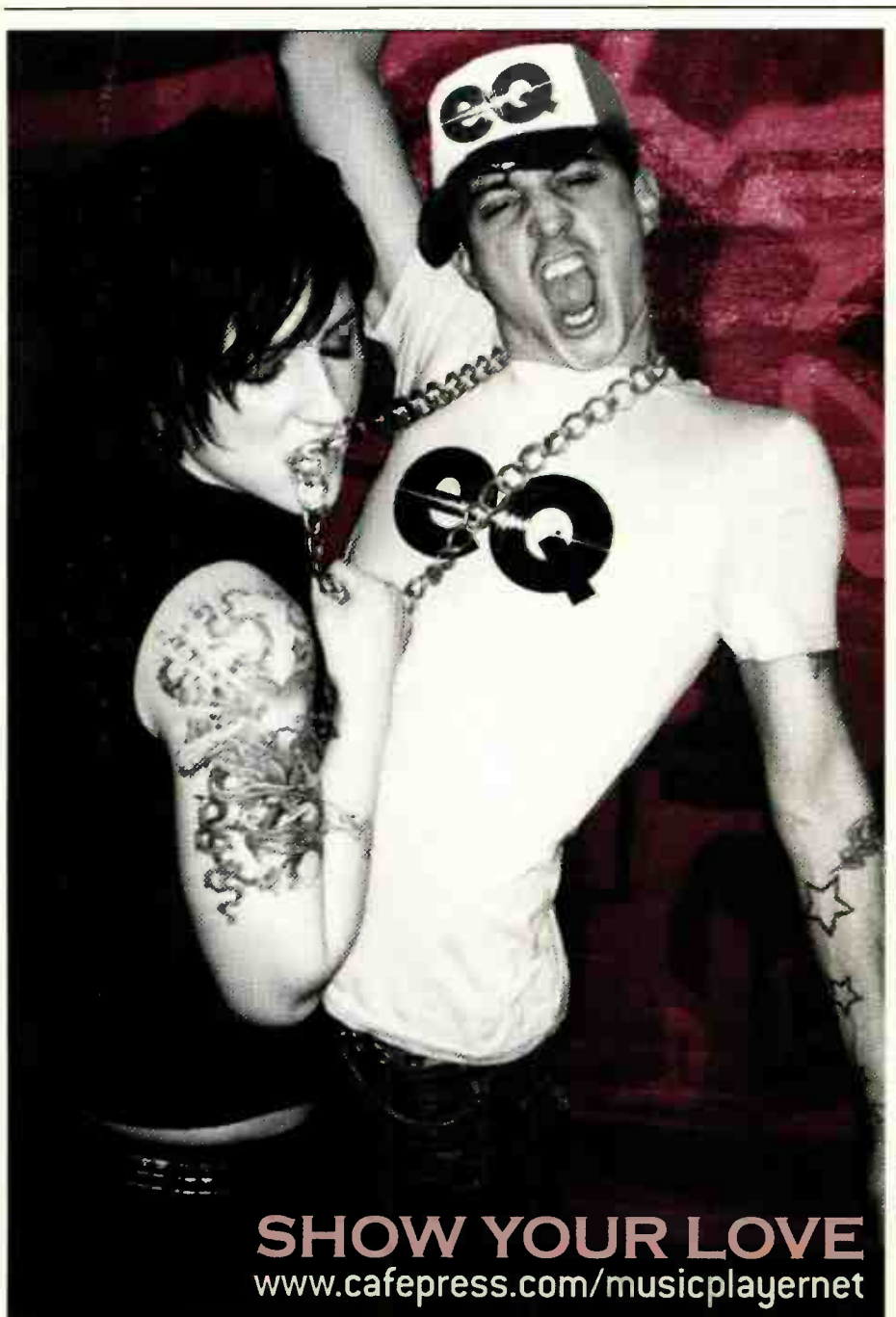
Long a performance tool for the group, Ableton Live has also proved to be an

essential studio component, and not only for jamming out ideas. While an initial use of the program was for in-time auditioning of loops and to establish rough arrangements, it was the program's ability to draw on the clip envelope that had the most tangible effect on the final album. For example, on lead single "Electric Love," there is a rising, sliding pitch effect on the guitars in the chorus, and that was established through Ableton's automation. Logic, meanwhile, allowed the group to put aside its Akai hardware samplers and have a hub for comping and further processing.

Once initial demos were complete, Dirty Vegas set up a tracking session at Fish Factory Studios in Willesden, Northwest London, to take advantage of its 32-channel API Legacy Plus console. Smith, the group's vocalist and drummer, was recorded on a full kit freestyling over the virtual percussion, and these recordings were mined for loops and one-bar phrases that could be further warped in Ableton Live and through Logic's Flex-time. Additionally, Ben Harris' guitars were recorded both amped in the live room and through a DI box to balance grit and definition. While most overdrive processing was left for the DAW, certain synths were put through pedals, including the warm, diffusing Lovetone Big Cheese fuzz, in order to craft eight-bar loops that would easily be able to stand on their own in the mix (heard in songs such as "Never Enough").

Vocals were demoed in hotel rooms with a Neumann TLM 103 through an Apogee Duet, and when the time came to replace the guide takes at the Fish Factory, Steve used a Neumann U47 through a Telefunken preamp. Paul Harris and Julian Peak, another production partner, maintain a studio in Chelsea with a collection of analog synths, such as a Roland Juno 106 and Jupiter 8, and these were captured to augment their digital counterparts.

With all the materials compiled, the band set out to develop its sonic real estate. With *Electric Love* intended as a more forward album with greater bass presence than previous projects, Dirty Vegas had a lot of high-frequency energy to take into consideration. On a track such as "Little White Doves," which has a very full midrange with vocal, guitar, snare, weighty keyboard parts, etc., sidechaining with a compressor slide allowed elements to duck each other's volume a dB or two, tightening the mix up. Hard-panning with a short delay created a nice whip to help guitar and synth parts separate, while sharp EQ filters with large slopes provided the abrupt cut-off points needed to carve kicks to stand out, especially on smaller speakers. Sound-Toys' Decapitator Analog Saturation Modeler, Nomad Factory's Blue Tube valve driver, and Ohm Force Ohmicide were





extensively used to (re)contour edges when certain sounds were fighting for their seating.

"Analog-style distortion is a great way to get some separation, because it adds harmonics generated from within the sound itself, so it can further highlight difference between the competing sounds," says Ben Harris. "You can use tricks to compensate for a lot. But I think ultimately, it's about getting the best recording of something that's integral to the song, and also understanding arrangement rather than trying to scoop things out and boost things up with EQ for hours."

Simon Duffy, who handled the mixdown of *Electric Love* in Logic and Ableton on an eight-core Mac Pro with external compressor over the mix out, agrees to an extent. While he certainly appreciates and celebrates the contribution of plug-ins such as the Sonnox Oxford EQ and Dynamics, and he recommends creative use of SoundToys' EchoBoy for slow LFO and random filter detuning on bass synth to fill things out with personality (especially effective in the song "Today"), Duffy feels that Dirty Vegas established tones that really cut through the mix even prior to his involvement, especially on the vocal front.


"I've always thought what made Moog basses great was the constant weight of the sound...it gave you the ability to put it 10dB up or down in the mix, and it'd always sound right and never lose its weight...and Steve's voice has the same quality," Duffy says. "I did compress him a lot—I love hearing all the breaths and movement in a vocal—but apart from adding a slight shelf from 8k up, I didn't really have to worry too much."

That doesn't mean a boost can't be a good thing, however. "Another very useful technique for Steve's vocals was pushing the knee on Vintage Warmer without pushing the gain," says Duffy. "As the last bit of processing on his lead, this would give him a uniformity of presence throughout the mix that made riding vocals an absolute pleasure later in the mixdown...a great presence without that awful over-compressed sound anything else would give you. It's also great for bringing the sound of the room it was

recorded in right up. This is really apparent in 'Emma,' which has a lovely, dry vocal sound that keeps all the inflections and emotions of the performance without covering it in sugar."

As for the main instrumentals, Duffy mixes with a lot of high-pass filters engaged, to allow for the sensation of a full, fat sound without a bloated bottom end, allowing for the final placement of "a real meaty bass drum and bass with no interference from anything else." He then puts the mix through at least one trip out of the box and back before bouncing a

mix, in order to "round out the wave."

"In most cases, the songs were built like jigsaw puzzles, so you wouldn't get a complete picture until the last synth had been locked into place...the guys' arrangements are very clever in this respect," summarizes Duffy. "Everything that was in there was exactly what was needed to make the song stand up, and if you took any one piece away, it would all fall down! So my job was mostly to get the punch and pressure in to the songs and thicken things up where it was needed." 



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## Frequency and Mic Polar Patterns

Despite the seemingly impenetrable set of numbers on a mic's data sheet, there is a wealth of information that even casual users can understand and that will increase their intuitive awareness of what the transducer can offer. It all starts by spending a little time staring at the frequency-response and polar-pattern charts.

Typically, the information from these two diagrams is derived from sound captured at a distance of a meter from the mic element. However, anyone who has placed a directional mic—one with a cardioid or figure-8 pattern, for example—closer than three feet from a subject knows that you get a boost in the bass frequencies as a result of the proximity effect. So even though the frequency response chart only represents a mic's potential sound reproduction at a specific distance, it nonetheless gives you a gestalt of that transducer's behavior that you will measure against your experience.

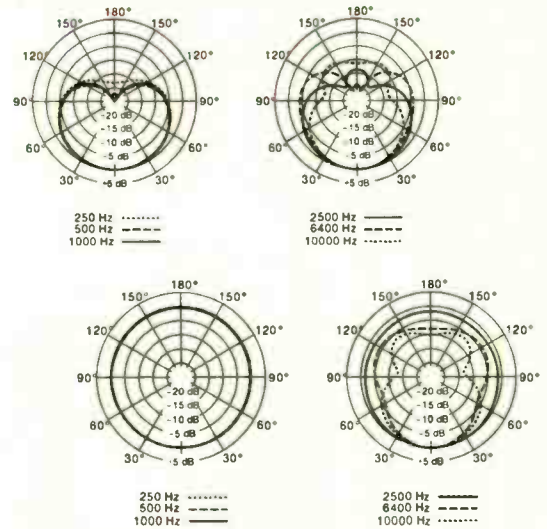
But there is another side to the frequency response that you'll want to pay attention to: how it affects the pickup pattern.

### Top of the Charts

Like the frequency response chart, a polar plot tells only part of a microphone's story. The directionality of the majority of mics these days isn't consistent throughout the frequency spectrum: The polar pattern changes based on the wavelength it's picking up, as well as the size and shape of the mic element and housing. Typically, a mic's pattern will become more directional when it is capturing higher frequencies, which have shorter wavelengths, and less directional with lower frequencies, which have longer wavelengths.

This is clearly visible if a plot of the products' performance across the spectrum is provided with the mic. Because Shure provides this information, I've selected two charts from its new Beta 181 line—the omni and cardioid plots. Keep in mind that the Beta 181 uses interchangeable capsules that are small and side-address; a mic's physical design plays a big role in how the pickup pattern changes with frequency.

The nominal measurement you'll see for most microphones is based on a tone, or set of tones, played at some distance from the mic—typically 1kHz at a distance of 1 meter. As you can see in Figure 1, the Beta 181 cardioid capsule gives you a near-perfect cardioid pattern at 1kHz, with the strongest output at 0 degrees (directly in front of the mic) and a gradual decrease in level as you approach 90 degrees off-axis. By the time you get 180 degrees off-axis, the output has decreased by more than



**Fig. 1. Top, cardioid pattern; bottom, omni pattern.**

20dB, which is very significant. However, it's worth noticing that the rear pick-up is not completely zero, and it rarely is with studio mics. Although, theoretically, the null point at 180 degrees of a typical cardioid mic has no output, there is indeed signal present, though it is made up primarily of low frequencies at very low levels. But for practical purposes, the drop of 20dB in the rear results in a recognizable cardioid pattern.

Next, note how the pattern changes at two octaves below 1kHz. The resulting increase in output at 180 degrees creates more of a subcardioid pattern, while the levels at the front and side remain consistent.

The biggest surprise for me when I first saw this plot was how the pattern transformed at higher frequencies. At 2.5kHz, the shape begins to move toward hypercardioid, then reverts back to cardioid at 6.5kHz before changing into a hybrid shape at 10kHz that approaches a figure-8.

Now let's examine the omnidirectional capsule. The omni shape remains completely stable at frequencies below 1kHz and very close to its intended shape at 2.5kHz. By the time it gets to 10kHz, however, the output from the sides decreases well over 10dB, with slightly less decrease in output at the rear, yielding a shape similar to the cardioid at 10kHz.

Although these changes in shape look dramatic when plotted, they aren't inherently bad; a mic's response is part of what lends the transducer its character. But by understanding, say, the polar response of the omni capsule at all frequencies, you can judge whether it's the right mic for a given situation. **ea**



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## For a Mix That Delivers, Fine-Tune Your Arrangement



**Fig. 1.** In Celemony Melodyne Editor's GUI, individual notes of a melody can be dragged up or down graphically to change their pitch.

Killer music productions start with great arrangements. On the other hand, if you find yourself struggling to improve a seemingly unmanageable mix, the song's arrangement is probably the culprit. No amount of mixing will fix a broken arrangement—but that doesn't necessarily mean you have to dump the whole thing and start over from scratch. A little nip and tuck can give your mix a fresh coat of paint. Try these six arranging tips.

### Kill Your Sacred Cows

You may love the five intertwining guitar parts you labored so hard to record, but do they all really help your song? Generally speaking, having more than two melody parts (including the lead vocal) voicing at once is a recipe for sonic confusion. Remember that most listeners focus on the lead vocal on a recording. Anything that distracts attention away from that "money track" weakens your mix, so make sure every part supports it and makes the song stronger. No matter how much you may love a particular track, you must remain objective about how it contributes to—or detracts from—the entire arrangement. Ferret out musically unimportant tracks and be ruthless with their mute buttons.

### Breakdown Here

A good place to get fast and loose with muting tracks is during a musical break or on a verse of your song. Try paring down the tracks to just drums, vocals, and either bass or guitar, even if only for a few strategic bars. Alternatively, take the drums completely out of the mix until the next section of the song hits. This arranging technique is called a *breakdown*, and it's very effective in creating a contrast between song sections and providing a respite from a constant wall of sound. Nashville-based session players refer to a breakdown as "clearing out" the song section, and it's an apt colloquialism—sometimes having too many tracks play at once can muddy a song's waters and lessen its impact.

### Double Up

It might sound too wimpy to have a single guitar part accompany bass, drums, and vocals, but that also might be all that the song's arrangement needs. Resist the temptation to clutter the production with additional tracks simply to make it sound more full. Instead, make the single guitar part sound bigger by doubling it. You can do this by setting up a Haas effect with a modulating delay (see last month's Techniques



article "Use Psychoacoustics to Craft a Huge-Sounding Mix" for more details), but you'll get an even bigger sound by playing the same guitar part again and recording it onto a new track. Make sure your timing for both tracks is pretty much *locked* as much as possible; very slight differences in articulation are okay. Hard-pan the two guitar tracks left and right, respectively, for a huge, double-tracked sound.

### Use Chord Stacks


An alternative to double-tracking is playing chord stacks. Instead of having one rhythm guitar play all the notes in each chord, divide and conquer: Play the root and fifth, for example, on low strings on one guitar track and the fifth and third on higher strings on a second guitar track. Hard-pan the two guitars opposite each other. The effect will sound like your head is placed midway between lower and higher groups of guitar strings—big and wide! By splitting a sole vamp into two halves this way, you retain your arrangement's laser-focus simplicity without sacrificing size and power.

### Turn it Upside Down

If your piano part, for instance, clashes with the lead vocal at a specific point in your song, but you know it's

playing the right chord there, try inverting the piano's chord. For example, say the lead vocal sings a C note where the piano plays a *Cmaj9* chord. If the *B* and *D* notes in *Cmaj9* are played in the same octave as the lead vocal's C note, dissonant minor and major 2nd intervals will form between the piano and vocal tracks. Unless you like the dissonance, use a different inversion for the *Cmaj9* chord that places the *B* and *D* notes at least a 7th interval away from the vocal's C note. Look for similar dissonances throughout your song, and fix them by using different chord inversions where necessary. Smart chord inversions are the key to a harmonious arrangement.

### Tweak the Melody

In the 11th hour of mixdown, you realize for the first time that the lead vocalist sang an *F#* against a *G7* guitar chord. Yikes! Don't bother re-recording the vocal track, though. Use Celemony Melodyne Editor plug-in (see Figure 1) during mixdown to transparently shift the pitch of the *F#* note up or down a semitone to fit the guitar chord. MOTU Digital Performer users can enlist that DAW's outstanding pitch-automation function to do the same thing. 

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## Improve Your Session With Better Headphone Mixes

The quality of a headphone mix can make or break a recording session. No amount of amazing microphones, preamps, or compressors will change that. A bad headphone mix will leave the client wanting and you with holes in your studio calendar.

The purpose of the headphone mix is to give the musician everything he or she needs to give their best performance while recording a track. It's a delicate balancing act: If the mix is for a vocalist, for example, there needs to be a strong pitch reference in the mix; if it's for a bass player, then rhythmic elements are important in the mix.

### Common Problems to Avoid

What defines a bad headphone mix? Mostly, a lack of clarity. Some of this quality is in the ear of the beholder, and depends on the recording context: When you're recording basic tracks, the mix battle is between the live instruments in the room and their representation in the performers' headphones; during overdubs, the battle is between live instruments and recorded tracks. That said, here's a general list of mix pitfalls to avoid at any time:

- Unclear basic pitch or rhythm elements.
- Lack of clarity of performers' own parts.
- Weak signals that cannot be made louder than the actual live performance.
- Distorted signals that cause pain to the performer.

### Mix Send Configuration

I send my mixes from Pro Tools into an Oz Audio HM6 QMix Headphone Amplifier and Mixer, which has six headphone out channels and four aux inputs, as well as stereo main input and effects sends. (Hear Technologies' Hear Back Four Pack and the Furman HDS-6/HR-6 are comparable units.) This configuration allows me quite a bit of flexibility in sending out my mixes—I can set up four mono sends or two stereo sends. I then take one of two basic send approaches:

**The "Whole Shebang":** In this case, I premix the signal in Pro Tools and send out a stereo send to the QMix. This means that any mix tweaks that performers

want need to be made by me. I almost always exclude a huge amount of information in this mix: I don't add effects (unless they are pertinent to either the song or singer). I omit stacks of guitars in favor of featuring one that provides the most harmonic and rhythmic information. I leave as much room in the mix as possible so the performers can focus on what they are doing in the moment and they aren't confused or distracted by what they are hearing.

**The "Matrix":** Here, I send four mono instrument sends and let the musicians adjust the levels themselves: Typically, I send the drums and bass on input one, guitars and keyboards on two, vocals on three, and whatever is being performed live on four. I usually set up a preliminary mix to give the musicians a point of reference to start from.

### Recording Scenarios

**Basics:** This is the initial recording session, when all of the musicians come in to record their original tracks. This scenario is the hardest to create mixes for because of the sheer volume of the live instruments compared to the headphone mixes. Also, in basics, getting a great drum track is key, so the mix is almost always skewed toward the drummer. At this point, I like to run The Matrix. I find that the more control the band has over the sound of the headphones, the happier they are. The mixes tend to be cleaner, and only the musicians who want a loud click track or a drummer in their ears have it.

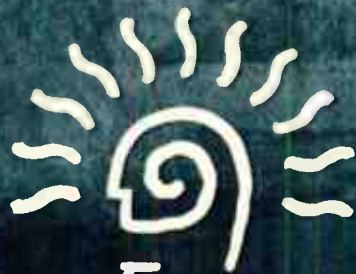
**Overdubs:** Here, I generally like to send the musicians a stereo mix from the board so I can control the individual mix elements. During this recording phase, there is a whole lot more information in the mix, which needs to be controlled with a firmer hand so mud is not sent to the headphones. Secondly, I can send effects into the mix without it gumming up the works.

All in all, providing a great headphone mix in the studio will give your musicians the ability to move beyond the technical morass of the recording process and get to the heart of the matter faster, and have more fun while they're at it! **EQ**



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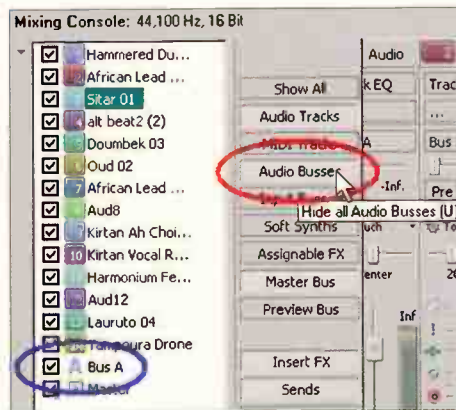
## Use buses to expand your mixing options

**OBJECTIVE:** Route tracks to buses to create submixes.

**BACKGROUND:** Buses are often used to route the audio from various channels to send effects, but they can also serve as *submix* buses so the bus's level control could, for example, raise or lower the level of multiple tracks simultaneously. A default Acid Pro project routes all tracks to the master bus, so to create submixes, you need to assign track outputs to buses instead. Here's how to do this.

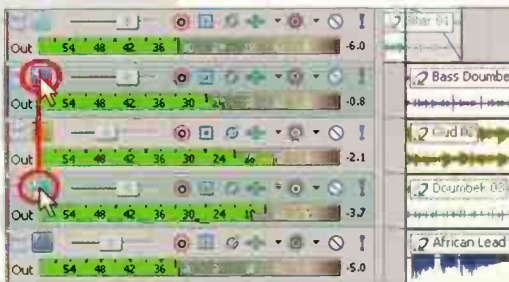


**1** In the toolbar at the top of the Mixing Console, click on the Insert Bus button.



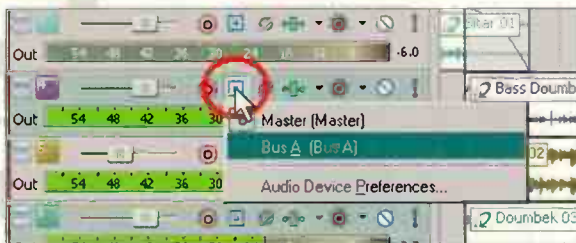
**2**

In the Mixer View Pane, click on Audio Buses (outlined in red) to display buses in the console. You'll also see any buses in the Channel List pane (outlined in blue).



**3**

For tracks that you want to assign to a submix bus instead of directly to the master bus, ctrl-click on the track number in each track's header. The track headers become highlighted; here, tracks 4 and 6 are selected.



**4**

Click on the Bus icon for any of the selected tracks, then choose the desired bus destination (in this example, Bus A).

**5**

Assuming I/O is selected in the Mixer View Pane, check that the submix bus output is assigned to Master so that the bus output can be mixed in with the other, individual tracks.



## Tips

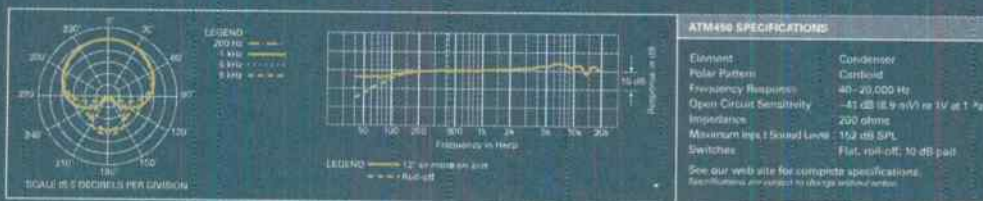
- To name the bus, double-click on the name at the bottom of the bus in the mixing console, then type in a new name.
- To add automation to a bus, go *Views > Show Bus Tracks*. You can add Volume, Pan, Mute, and FX automation to a bus track as you would to a conventional audio track.



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## Automate Live's tempo based on clip tempo

**OBJECTIVE:** Adapt Live's tempo to the native tempo of designated clips.

**BACKGROUND:** There are several ways to adjust tempo in Ableton, but one is automatic, and works only in Arrangement view: Defining a clip as a *Master* clip turns off warping for that clip, but causes all other clips to warp to its tempo.



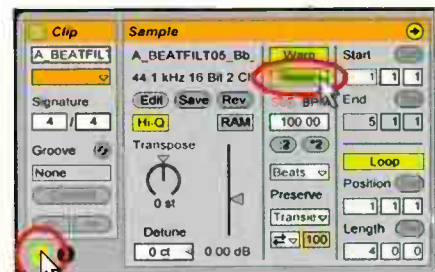
**1** Click on Arrangement view—you can't set clips to Master mode in Session view.



**2** Make sure EXT sync is disabled, or this technique won't work. If necessary, set a default tempo for when no master clip is playing.



**3** Select the clip whose native tempo should serve as the project's tempo while the clip is playing, then click on the Clip Overview tab.



**4** Click on the Show/Hide Sample Box button to show the Sample Box. Below the Warp button, click on Slave so it indicates Master.



**5**

With multiple Master clips, tempo will be set by the currently-playing, lowest-placed Master clip in the Arrangement view. In this screen shot, the clip on the left is not a master clip, so it will play at the default tempo. When playback hits the blue Master clip, the tempo will change to 133.33 bpm. When playback reaches the orange Master clip, the tempo will shift to 100 bpm because the orange clip will then be the lowest, currently-playing Master clip. When the orange clip finishes playing, the blue Master clip will again set the tempo.

### Tips

- Step 4: Warp must be enabled.
- Step 5: Note the small red square in the tempo field's upper left, which indicates that tempo is being automated.



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# THE BEATS GENERATION

## VERSION 2011

### NOT JUST FOR DJS ANY MORE

BY CRAIG ANDERTON

Music and motion have always had a very close relationship, whether you're talking classical ballet, '50s/'60s "dance craze" rock (like the Twist, the Swim, and the Hully-Gully), the Sufi trance masters of Joujouka, or for that matter, the trance masters of today's club scene in Berlin. And what gets your body up and moving is *beats*—whether it's the pounding of drums, the steps of an arpeggiator, or even a rhythmic wah-wah applied to a bass line.

The four products in this issue's roundup are all about beats, but each adds a novel twist to the subject. Roger Linn's AdrenaLinn Sync translates his hardware Adrenalinn into a virtual world, Drumagog 5 goes beyond drum replacement to drum enhancement, while iZotope's Stutter Edit is a truly novel processor . . . or maybe it's an instrument . . . or both . . . whatever . . . you'll have to decide for yourself. And SONIVOX's Pulse, while not a radical re-thinking of the MPC concept, nonetheless brings along several interesting

new twists—one of which is a very attractive price.

What's more, all of these made their "official trade show debut" at the 2011 Winter NAMM show (actually, AdrenaLinn Sync came out over the summer but didn't make it to the 2010 Summer NAMM show). Unfortunately, we ran out of room before we could review some other hot new products, like FXpansion's Geist (the "spiritual successor" to their Guru software), the latest MIDI and audio expansion packs for Toontrack's superb Superior Drummer 2, and M-Audio's Venom—yes, it's a keyboard, albeit one that includes an audio interface and has a heavy beats/electronic orientation. We'll be covering these in the not-too-distant future, but meanwhile, you can get more information on them in our NAMM show report on page 54.

Ready to get off your butt and move? If these kinds of musical tools won't do it, you'd better check your pulse just to make sure you're still alive.



Roger Linn Design

# AdrenaLinn Sync 2.0



The uncluttered, straightforward interface both encourages and simplifies tweaking.

**Why this relates to beats:** The AdrenaLinn stomp box is my favorite hardware guitar effect—so much so that I once did a sample library based entirely on sounds created with the original AdrenaLinn. When doing dance music gigs in Europe, it's the only box I take; what with amp simulation, delay, dynamics, filtering, and other effects—all controllable with synced LFO and stepped modulation—it's a complete effects setup for beats-oriented music. AdrenaLinn Sync 2.0 is a VST/AU/RTAS plug-in that provides most of these functions, as well as some the hardware box doesn't have.

**First contact:** AdrenaLinn Sync's readable, clean interface is stellar. The signal flow is presented unambiguously (in true 3D), and the color choices make it easy to parse settings. The window takes up a fair amount of screen space, but there are lots of parameters, and it's still legible with high res monitors.

The plug-in concept makes sense. One of the biggest problems with any rhythmic hardware device is that if it's not receiving a MIDI clock, it's difficult to sync precisely to tempo. The plug-in doesn't have this issue, as it can sync to the host DAW's tempo (and even track tempo changes).

**Digging deeper:** The AdrenaLinn Sync's heart is arguably the filter (which offers highpass/lowpass/bandpass/flanger/phaser responses), coupled with a 32-step sequencer that provides modulation. The pair produces the pulsing, distinctive AdrenaLinn sound that imparts motion and rhythm to guitar parts.

However, level and panning can tie to the sequencer too, as well as to a very complete LFO (six waveforms with range and phase controls) that can also modulate the filter, level, or pan. Furthermore, three types of synchronized delay offer yet another rhythmic element.

The sequencer incorporates two distinct modulation sources: a series of steps with adjustable levels that can repeat over two bars, and an envelope at each step with adjustable attack and decay (global for all envelopes). Step size choices are 1/8-note, 1/8-note triplet, 1/16-note, 1/16-note half-swing, and 1/16-note full swing; the 1/16-note options use all 32 sequencer steps, the 1/8-note options use every other step, and the 1/8-triplet options use the first three of each group of four steps. LFO and sequencer modulation sources are available simultaneously for all destinations.

One very cool feature is the ability to snap the signal controlling the filter to any of 14 scales. With resonant filter settings, this adds a "pitched" quality, although you need to specify the scale—AdrenaLinn Sync doesn't figure out the key automatically.

Note that you won't find the multiple amp models or drum machine from the hardware box, because the

plug-in is all about the beat-synced effects—the assumption is that most musicians who use a computer will have amp sims, reverb, a drum instrument, etc. Nonetheless, the Distortion section lets you dial in many satisfying distortion sounds. There are also several improvements over the AdrenaLinn III's beat-synced effects: analog-modeled lowpass filter from Way Out Ware's ARP 2600 emulation (as well as analog-modeled bandpass and highpass variations), added phaser, stereo signal path, eight-measure stereo ping-pong delay, LFO phase adjust, random LFO peak level, random sequence levels and envelope probability both in real time or writing to sequence, and limiter attack/release times.

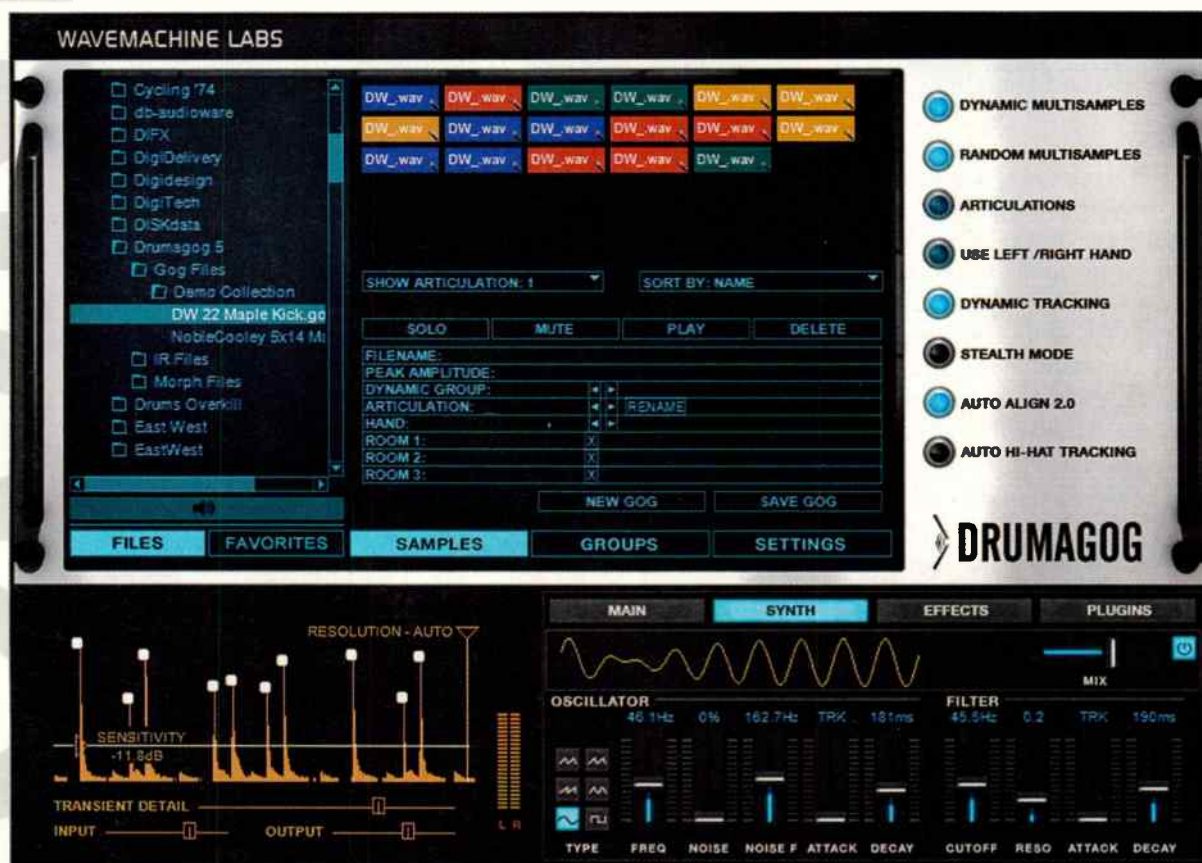
**The bottom line:** AdrenaLinn isn't for everyone. Guitarists can be pretty conservative, and this is definitely not a Tube Screamer: It's a sophisticated, yet easy-to-use, marriage of synthesizer control/processing and organic guitar audio. However, one reason I'm an AdrenaLinn fan is that it fits the kind of music I play like a glove—in fact, a lot of AdrenaLinn's functions duplicate (and improve upon!) hardware units I put together back in the '80s because I wanted these kinds of sounds.

You may think you're not into rhythmic guitar warpage, but play with the free trial—you might find yourself becoming addicted to the exceptional creative possibilities that AdrenaLinn offers. Often, just playing through it is enough to give you compositional ideas.

**Price:** \$99

**Availability:** Download from [www.rogerlinndesign.com](http://www.rogerlinndesign.com).

## Wave Machine Labs Drumagog 5



**Version 5 isn't just about a new interface—especially with the Platinum version, which offers some ground-breaking features.**

**Why this relates to beats:** Not all recorded drum sounds are wonderful, what with problems from bad tuning, to bad miking, to bad timing. Drumagog is a drum-replacement plug-in (AU, VST, RTAS; 32/64-bit operating systems; 64-bit hosts require a 32-bit bridge) that analyzes a track, identifies drum hits, then lets



you replace those hits with other drum samples. However, it's not just about fixing bad drum parts. For example, for dance music, you can take a drum part played by a human drummer and replace the drums with samples from a drum machine or the internal drum synthesizer—get the “politically correct drum sound” for dance music, but the human playing of a real drummer.

Drumagog works on individual drum tracks; don't expect to pull a tom out of a mixed drum track, although with some of the program's onboard trigger filtering options, and depending on how the drums are mixed, you may be able to do something like pull out a kick or snare drum sound.

**First contact:** There are three different versions—Basic, Pro, and Platinum. Pro will handle most people's needs, but Platinum's hi-hat tracking, morphing effects engine, built-in convolution reverb, and plug-in hosting are very useful features. The Basic version is indeed basic, but does fundamental replacement at a reasonable price. Copy protection is your choice of iLok or challenge/response.

If you've worked with Drumagog, you might be shocked by the new user interface; it's a big visual improvement, but also gives a more “pro” vibe. When inserted on drum tracks, the default settings worked perfectly for me—within minutes I was replacing parts from the Discrete Drums library with TR-909 samples.

**Digging deeper:** Some of the new features are highly compelling. Platinum's hi-hat detection algorithm is surprisingly effective, as it recognizes different hi-hat articulations (e.g., closed, open, half-open) and triggers appropriate samples if you load a suitable hi-hat Gog file. The second-gen Auto-Align function is also improved to the point of sample-accurate drum alignment. This was easy to confirm by using the blend control to mix the original and replaced sounds together: Even with tough replacement situations, I didn't hear flammings or other issues due to misaligned attacks. I also really like the Synth option, which allows replacing or augmenting drums with analog drum machine-type sounds. This is welcome for dance and hip-hop tracks.

Platinum's VSTi hosting means you can load a program like Kontakt with drum sounds, then trigger them directly from within the program. While not essential, this is an important convenience feature. On the other hand, the Morphing Engine effects processor is unlike anything I've ever heard—it adds an electronic overlay to drum sounds that varies with the drum dynamics, and while I wouldn't expect to use it with rock music, for electronica I feel this feature alone justifies the extra bucks for Platinum.

**The bottom line:** Although Drumagog always had a well-deserved reputation for excellence in drum replacement, Version 5 ups the ante considerably. But also remember that Drumagog does drum *enhancement* as well as replacement—sometimes adding a drum sample to an existing drum sample gives exactly the sound you need, especially when you toss in the Morphing option. I've also used Drumagog to lock bass guitar samples to drums. And while we can't go into all the features due to space considerations (besides, you can try it out for yourself), all the outstanding features from previous versions (like “Stealth” mode for isolating one part from a track with more than one sound, the tight dynamic tracking, and clever triggering of multi-sample replacements) remain in equal or better form.

Drumagog 5 gets a major thumbs-up—not just because it does what it says it does, but because it does considerably more.

**Price:** Basic \$149, Pro \$289, Platinum \$379

**Availability:** Download from [www.drumagog.com](http://www.drumagog.com); also available from retail stores.

iZotope

## Stutter Edit

**Why this relates to beats:** The ability to chop, slice, and process samples is a fundamental aspect of creating beat-oriented music. However, much of this is done on an *ad hoc* basis, where you cobble together different capabilities of different programs to assemble the sound you want. Now iZotope, in conjunction with beatmeister/composer BT, has created a program designed specifically to streamline this process with samples. It's possible to mutate samples in tons of different ways, and in the process, you can also make sure that anything you do syncs to the project tempo.

That's a brief technical description. The musical description is “Wow, this is really cool!”

**First contact:** Stutter Edit isn't a trivial plug-in; it's a deep and complex program that, while easy (and fun) to use on a “dial-up-a-preset” basis, takes some effort to master. First off, it's an audio processor that

RECORDING



No, this isn't a synthesizer—it's an effects processor. Actually, scratch that; in a way it's both, and in any event, it's something entirely new and different.

you play like an instrument since optimally, you'll trigger its effects from a MIDI keyboard (or at least from MIDI notes in your host's sequencer). In fact, because both audio and MIDI tracks need to be in play, the documentation devotes several pages to info on how to instantiate Stutter Edit with Live, Logic, Pro Tools, Sonar, Reaper, FL Studio, Digital Performer, Studio One, and Cubase/Nuendo.

There's no question that Stutter Edit is initially daunting. But not unlike an analog mixer, once you figure out how to control one processor, you can pretty much have the key on how to control them all.

**Digging deeper:** You know how a DJ will suspend a loop for a measure and put in some amazing breakbeat before crashing back into the loop? Well, Stutter Edit would consider that breakbeat a "gesture," in that it adds a variation—simple or complex—to what you're doing. But Stutter Edit can place extremely complex processing gestures on a single key, which you trigger by hitting the key. The gesture could be as simple as repeating a section of audio like a stuck CD, to adding complex delay, lo-fi mangling, and even generated noise to create transitions or sweeps.

If you're not coming from a DJ background, then think of this as a sort of *musique concrète* generator that messes with the sound the same way that tape composers chopped up tape and put it back together again. Granted, I'm not explaining it that well, but no matter—try out the demo, and you'll see why it's not easy to explain.

A gesture can be as short as a 16th note or as long as two bars, and sets an overall range over which effects settings change or sweep. If you're familiar with Live, you can quantize the initiation of a gesture the way you can quantize a loop in Live's Session view. Gestures can play as long as you hold down a key, end at a specific time, have quantized duration, or be triggered and then play all the way through.

Effects that you can use to mutate the sound include gate, delay, pan, bit reduction, lo-fi, filtering, etc. You can specify a range over which parameter changes occur—for example, changing the amount of delay feedback over the course of doing the gesture—as well as determine whether these changes occur over a linear, logarithmic, or exponential curve. You can also specify which portion of sampled audio will be "stuttered," and even repeat audio at a high enough rate that it turns into discernible, pitched notes—even create musical scales. And don't overlook the Generator, which is mostly about injecting a variety of controlled noise options into your music.

**The bottom line:** I give extra credit for products that avoid the "me-too" syndrome, which means Stutter Edit gets a ton of credit. Like the AdrenaLinn Sync, this isn't for everyone; DJs reading this will probably "get" immediately why this is so cool (if I owned a music store, I'd sell a bundle of this and Ableton Live), but if you're a Tele-and-tubes kind of musician, your reaction to Stutter Edit might well be "why?" Well, here's why: because Stutter Edit streamlines the process of combining multiple processors, MIDI control, and playability into a single, fun, innovative plug-in. I don't know how much I'll use this in the months ahead, but I do know two things: I will definitely use it, and when I do, nothing else will do the job as cleverly and efficiently.

**Price:** \$249

**Availability:** Download from [www.izotope.com](http://www.izotope.com); also available from retail outlets.



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**Pulse**



Of course Pulse gives you 16 virtual pads (actually 64, as there are four banks) ... but also note the browser toward the left, the step sequencer at the top, and the modulation/effects sections toward the lower right.

**Why this relates to beats:** Roger Linn's MPC series of beat-oriented instruments set the standard for hip-hop, rap, a variety of dance music styles, and more. Pulse virtualizes an MPC-style instrument that supports VST/AU/RTAS plug-in formats (as well as stand-alone mode), Windows XP/Vista/7, and Intel Macs running 10.4.1 or higher; but being software, Pulse has a few additional tricks up its sleeve.

**First contact:** Pulse is as much about the 5.5GB library as it is about the instrument, and SONIVOX is at an advantage—the company has been involved in sound design for years. However, you're not restricted to using Pulse's sounds, as you can load multiple file formats—MPC 60/11/3000/2000/2000XL/1000/2500/500/5000/4000 and AIFF/WAV/Broadcast WAV/ACID/MP3 files (but no Apple Loops). Although Pulse can't import REX files, you can divide a sample into up to 16 slices (with editable slice boundaries), then map the slices to the pads. You can also carve out a longer slice than needed and use a pad's waveform editor to trim it to size, create a shorter slice from a longer waveform, and assign multiple samples to the same pad.

Most of the main elements—pads, a waveform editor, effects, and the like—will be





familiar, but Pulse takes some creative detours. There's a modulation section (global or per-pad) with AHDSR amplitude envelope, filter with 10 different responses, AHDSR filter envelope, and three LFOs (assigned to amplitude, filter, and pitch). With four separate pad banks, you have a total of 64 pads.

**Digging deeper:** The deeper you dig, the more you find sampler-type functionality. First of all, unlike some "virtual samplers," it can actually sample, not just play back. What's more, each pad has "round-robin" capability where successive pad triggers cycle through the samples loaded into the pad in one of four different ways: forward,

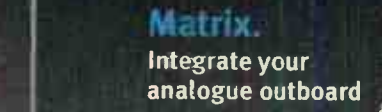
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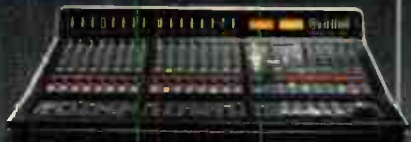
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backward, bidirectional, and random—crucial for avoiding the “machine gun” effect of retriggering the same sound repeatedly. You can assign pads to “choke” groups (e.g., hitting a closed hi-hat “chokes” any open hi-hat assigned to the same group), as well as set pads to retrigger at a specific resolution, quantize the input as you play, add swing, etc.

One unusual, yet very helpful, feature is what Pulse calls “auto pitch map.” You start with an empty instrument, drop a sample on a pad, and then hit auto map to “auto pitch” the sample across the pads.

There are global effects, but the roster is minimal (EQ, stereo delay, and reverb). The delay offers tempo sync or manual delay time for each channel, but sync choices are limited to standard note values except for a 1/12th-note option—for example, there’s no dotted half-note delay, which is a very popular choice for dance music. However, you can run 16 multiple outputs in multi-output mode, which makes it easy to add “external” plug-in effects.

The waveform editor is basic as well, offering sample start and end, root key, pan, pitch, and volume—no normalize, pitch envelope, or similarly advanced features. Presumably, you would do more complex edits on the samples before loading them into Pulse, or do some with the modulation (e.g., using the amplitude envelope to add a fadein or fadeout).

One of the coolest features is a step sequencer with variable step resolution (up to 32nd notes) and number of steps (up to 32). Triggering pads from the step sequencer is a hoot; it’s realtime, fluid, and musically useful. My only complaint is that if you want to play with more than 18 steps at a time, the display scrolls—making it difficult to do changes on the fly. Then again, the archetypal step sequencer is limited to 16 steps, and in that case, you can see and edit all steps at once. I also really like the way you can store up to seven step sequencer presets, select them in real time, and have patterns change seamlessly.

**The bottom line:** Pulse has plenty of competition—not just from products like Native Instruments Maschine and MOTU BPM, but also samplers (e.g., Kontakt) and bundled instruments like Sonar’s BeatScape. But where Pulse stakes its claim is by offering a comprehensive sound library, straightforward playback engine, solid workflow, and some novel features, at a budget price. Overall, Pulse is about bang-for-the-buck—which is exactly what it delivers.

**Price:** \$199.99

**Availability:** Download from [www.sonivoxmi.com](http://www.sonivoxmi.com); also available from retail outlets. 

## More Online!

**Check out videos of Stutter Edit at**

[www.izotope.com/products/audio/stutteredit](http://www.izotope.com/products/audio/stutteredit), and download a free 10-day trial version from [www.izotope.com/products/audio/stutteredit/download.asp](http://www.izotope.com/products/audio/stutteredit/download.asp).

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[www.rogerlinndesign.com/products/adrenalinnsync/index.html#download\\_demo](http://www.rogerlinndesign.com/products/adrenalinnsync/index.html#download_demo).

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## IT WAS THE HOTTEST, MOST "UP" NAMM SHOW IN YEARS—READ THIS, AND YOU'LL KNOW WHY

BY CRAIG ANDERTON AND SARAH JONES



TASCAM TA-1VP

The annual Winter NAMM Show in Anaheim, CA, is the second-largest music trade show in our solar system, attracting music and technology manufacturers, retailers, musicians, and hardcore tech groupies from around the world seeking to network, conduct business, jam, enjoy a tax-deductible trip away from winter weather, and play "shipping date betting pool." The mammoth exhibition sprawls across five exhibit halls and an arena, with each booth revealing just a little more of the totality that is NAMM until nothing is left to the imagination . . . except, of course, for the occasional imaginary shipping dates, specifications, and sometimes, even the products themselves.

Concerts run practically 24-7, with wall-to-wall music filling the Anaheim Convention Center and surrounding hotels, in performance venues throughout Anaheim, and in the artificially surreal town center that is Downtown Disney. Indeed, NAMM provides a fifth, unofficial theme park—Hypeland—to complement Tomorrowland, Fantasyland, Frontierland, and Adventureland.

You're reading an article written in February, about a trade show that took place in January, published in an issue that says April and appears in March. That kind of insanity is a perfect counterpart to the insanity that is NAMM, what with a lizard man playing keyboards, decibel levels capable of killing rodents (well, you didn't see any mice on the show floor, did you?), food that could survive a tactical nuclear weapons device, mohawks that required lights on the tips to warn low-flying airplanes, and of course, the twin bars at the Marriott and Hilton hotels, where deals are made,

partnerships are forged, and livers are damaged—often all at the same time. And we haven't even mentioned Hall E, the basement space where newcomers are initiated, karaoke systems and Chinese PAs co-exist with beautifully-made acoustic guitars and weird (yet cool) effects like the "Cube of Destiny," and there are more mad scientists per square foot than at a Gyro Gearloose cartoon festival.

Okay, now that we've set the stage, let's look at the gear—but let's also go beyond the gear, and give some meaning to the trends that will influence us for years to come.

### I THINK, THEREFORE iPad

By now, we all know that iPad apps were huge. Allen & Heath showed the iTweak iPad controller for their iLive mixer; PreSonus' SL Remote lets you control their Virtual StudioLive software from an iPad (custom monitor mixes done by musicians, anyone?), Yamaha was tweaking parameters on a Motif XF, and IK Multimedia showed their iRig voice processor, which features a unidirectional electret-condenser microphone capsule. Alesis scored a major hit with the StudioDock, which provides pro audio shelter for homeless iPads (balanced I/O, video out, a sturdy frame to hold it in place, and more), while Akai showed the SynthStation 49—slide your iPad into this keyboard controller's dock, and you're good to go, whether you want to play Way Out Ware's SynthX iPad synth from a real keyboard, or practice scales to an iPad piano method.

Don't like 49 keys? Then head over to StudioLogic's 88-key equivalent, the Acuna 88. There



was even an iPad app for a slide trombone you could “play” on the touchscreen. TASCAM ported the PortaStudio over to the iPad, complete with a virtual moving cassette transport. It’s cute, fun, and might help get a new generation into recording—just like the original PortaStudio.

And let’s not forget MOTU’s free DP Control, which gives iPad-based virtual control over Digital Performer. Guitar players weren’t left out, either: Agile Partners, the company behind Peavey’s AmpLink software for the iPhone, showed their Ampkit iPad app.

But we would be shirking our journalistic duties if we did not consider the Dark Side of the iForce, as alluded to in Talkbox. Think about it: We are now dependent on a piece of consumer electronics that was designed more for grandma to read e-books than to be a serious musical instrument. It’s a good thing apps are cheap, because we’ve now entered Disposableland. Think about that Motif XF: You’ll be able to get years and years of use out of it, but will you be able to say the same for the iPad controlling it?

Still, the music industry has always ridden the coattails of the real world—that computer you’re using to host your DAW wasn’t designed with musicians in mind, unless you’re still running an Atari 1040ST. So let’s just say, “Thank you, Apple” for creating the iPad (and devaluing software, but hey, it’s just lines of code, right?), and marvel at all the cool stuff you can do with it. If you didn’t want an iPad going into NAMM, you probably wanted one on the way out.

## DAWS AND PLUGS

Avid made their big splash with Pro Tools 9 at AES, and the stampede from Cakewalk fans to upgrade to Sonar X1 was already straining Cakewalk’s servers before NAMM started. There was no new Logic, and Ableton wasn’t at the show—but don’t think they’re sleeping.

This meant Steinberg rose way above the noise with their introduction of Cubase 6 (and Cubase 6 Artist for the economically-challenged), which zooms in on workflow improvement and does so very elegantly. And Acoustica, whose Mixcraft is getting the attention it deserves, showed a pro version (Mixcraft Pro Studio 5) with new plugs and new instruments, including a bitchin’ CS-80 emulation. It remains highly cost-effective. We like.

While it’s not exactly a DAW, we were floored by FXpansion’s Geist, a beat-maker/sampler’s dream come true. The “spiritual successor” to their Guru software, Geist makes it easy to take samples, rip them apart, put them back together again, and mutate them in ways both strange and wonderful



**Alesis StudioDock**

(and possibly illegal in some states—check with your local law enforcement agencies). They have what they call a “free demo” online, but really, it’s just a sneaky way to get you addicted.

Of course, you need an interface for your DAW, and Roland’s Octa-Capture has a lot going for it aside from the reasonable price: eight very sweet mic pres, and onboard DSP—so yes, you can control dynamic range on the way in to avoid blowing a take, or use equalization to get rid of those nasty subsonics and room rumble. It’s even compact and cute. However, when it comes to looks, the Akai EIE interface (EIE I/O, geddit?) wins the Cool-Looking Steam Punk award, what with its beveled corners, analog VU meters, and general Captain Nemo vibe. Fortunately, it’s a more than just a pretty face.

Loud Technologies followed up their Onyx Blackjack interface (whose specs would still be very impressive—we measured them ourselves—even if the price wasn’t as low as it is) with the Onyx Blackbird, which is like a bigger Blackjack but retains the Onyx preamps and user-friendly ergonomics. And while we’re talking Loud, we just have to slip in that their Ampeg division re-released a limited quantity Ampeg B-15 bass amp. If you know what we’re talking about, we understand completely if this brings tears of joy to your eyes.

As to plug-ins, Softube raised a few eyebrows with their TSAR-1 algorithmic reverb and mixing/mastering-oriented Mix Bundle Studio Collection plug-ins. Waves showed an emulation



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### Mackie Onyx Blackbird

of the original, rent-by-the-minute Aphex Aural Exciter and yes, it does give *that* sound. And, have you heard? Waves has slashed prices across its entire line. And if you're in the mood to emulate vintage consoles, check out what Slate Digital is up to with their Virtual Console Collection.

Waldorf had the NAMM debut of their PPG 3.V soft synth, which can emulate all the PPG variants from the original 8-bit grunge monster that birthed serious wavetable synthesis to the state-of-the-art 2011 version. Focusrite, whose plug-ins are sometimes overlooked because people are too busy lust-ing after their hardware, introduced the Midnight plug-in suite with Compressor and EQ (and there's good news for fans of Focusrite's Virtual Reference Monitoring technology that makes mixing on headphones sound like speakers: the technology is now available in a separate VRM Box hardware, not just in their Pro 24 DSP interface).

Electronica fans and DJs will be pulling out credit cards around the world to get iZotope's Stutter Edit, designed in conjunction with beatmeister BT. It's s-s-s-so cool to be able to warrrrp and tweeeeeeeeeeeak sss-sss-sss-sounds to where everything is a potential breakbeat. Get it now, before it's on a million commercials—and check out the review (along with reviews of the AdrenaLinn Sync plug-in, the outstanding Drumagog 5 drum replacement software, and SONIVOX's Pulse, all of which made their Winter NAMM debut) in this very issue you're holding in your hands.

Mastering engineers, listen up: Sonnox introduced a Fraunhofer codec plug-in. You can tweak it in real time, which is just what the Data Compression Doctor ordered.

One major piece of plug-in news was actually a "plug-out"—Universal Audio launched their Satellite, a DSP farm that's not a card, but connects to your Mac (sorry, Windows fans) via Firewire 400/800. It's basically like having a UAD-2 Dual or Quad card, but without needing a PCIe slot. Cool.



Samson Meteor USB mic

### PAGING MR. MICROPHONE

On the mic front, we're seeing a continuation of the more-for-your money trend, which frees up some bucks for luxuries like, y'know, food.

Audio-Technica's AT2022 features two condenser capsules in an X/Y pattern, and a 3-pin XLR out. The Blue Reactor multipattern condenser lets you select pickup patterns by adjusting a swiveling capsule head, and it looks so cool that you could always treat it as an *objet d'art* when not in use. Fans of the venerable EV RE20 will dig the Electro-Voice RE320, which is modeled after the RE20 but adds a switchable EQ curve with a setting optimized for kick drum. The MK4 condenser is Sennheiser's first large-diaphragm, side-address mic. And DPA's 2000 Series mics are the company's first models coming in below \$1,000. Meanwhile, Telefunken (we love that name—it's soooo Kraftwerk meets James Brown) had two new mics at NAMM: the CU-29 "Copperhead" condenser mic with vintage NOS tube, and the M80-WH wireless microphone capsule head.

But NAMM also showed some mic accessory love, with one favorite being the JZ Mics pop filter. You can blow through it, and not see a Kleenex on the other side move. Impressed? No? You say your mic pop filter is almost as good? Then go to their website, where they do the same thing with a blast of compressed air. 'Nuff said.

Of course, you could find USB mics as well. Blue's Yeti Pro is a high-resolution mic (24-bit, 192kHz) with USB and XLR outs, so you're covered whether you're with Team Digital or Team Analog. For those enamored of 1950s sci-fi flicks, Samson's Meteor USB mic looks totally cool. If this had been around when the original "Star Trek" was being made, it would have made it on to the set . . . guaranteed.

And the Cloudlifter, from Cloud Microphones, is one of those "so obvious no one ever thought of it before" ideas. It inserts between a ribbon or dynamic mic, and uses phantom power to provide 25dB of extra gain. So it not only protects the mic from accidental phantom power invasions, but it has what plants crave—it has electrolytes. Ooops, wrong movie . . . it has what ribbons crave—it has extra gain.

### MR. SPEAKER

No, not John Boehner . . . but the cool speakers that bring higher performance at lower cost. Granted, some of these were introduced at AES, but they still were a big deal at NAMM: ADAM Audio's compact AX Series features the same X-ART ribbon tweeter design as the company's costlier brethren, and the entire series has garnered rave reviews. Focal showed the SM9, also introduced at AES but still very noteworthy for being switchable between 2-way and 3-way operation. Sonodyne presented the SM50Ak, which is the newest, most compact monitor in the Sonodyne family, and Neumann proved



### ADAM AX-Series Speakers



you weren't hallucinating at AES by having their new monitor speakers at NAMM as well. sE Electronics showed The Egg, a radical new monitor design. Guess what it's shaped like. . . .

Let's not forget headphones, either. JH Audio,

formed by the founder of Ultimate Ears, introduced a bunch of very high-end in-ear monitors, starting at \$399. Meanwhile, Shure had their SRH940 headphones, which, perhaps not surprisingly to those who know how to count, are a step up from their SRH840 phones and cost around \$300.

### GUITAR PLAYER

There were several interesting guitar developments at NAMM. The Kemper Profiling Amp analyzes the sound of your amp, then transfers those settings into a power amp that mimics the sound. They did an A-B demo, and yes, it was impressive. And speaking of impressive, Avid Eleven Rack fans can rejoice over the \$99 upgrade that adds multiple amp models and other goodies to the surprise hit of 2010.

Sonus introduced the G2M2, a second-generation of their inexpensive monophonic guitar-to-MIDI converter, as well as the i2M, a small audio interface/converter. We all know MIDI guitar will never replace "real" guitar, but now guitarists can step into the MIDI world without huge complexity or cost.

### BATTLE OF THE BOARDS

Recording isn't just about mixing boards (although we were rather impressed by the MIDAS Venice series for live or studio use), but keyboards too. One

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**Dave Smith Instruments Tempest**

of the coolest and most bizarre is the OMG-1, designed by Eric Persing. It's one of a kind—literally—and you can't buy it: It will be the grand prize in a contest Spectrasonics will be running to benefit the Bob Moog Foundation. The OMG-

1 combines a Moog Little Phatty analog synth, Spectrasonics' Omnisphere software synth, a Mac Mini, dual iPads (or is that "dueling iPads"? We must seek clarification), dual iPods, and Spectrasonics' new Omni TR Omnisphere iPad app, all in a curvy maple cabinet.

But that's not all—the most-hyped keyboard event would have to be Korg's Kronos. Think of it this way: You know that computer you have that runs a bunch of soft synths? And has Gigabytes of samples, iLoks, a dependency on whatever Microsoft or Apple says we should like, and crashes at inopportune moments? Well, imagine putting that technology into a real keyboard, with a solid-state drive for instant loading and no noise, multiple synth engines, and no reliance on

computer operating systems—that's the Kronos in a nutshell. Think of it as porting studio technology over to live performance, which you can then take back to the studio.

Nord had their Nord Stage 2, and we like Nord keyboards because they come from Sweden, they look great, and they have lots of knobs that impress the heck out of people. Oh yes, and they sound really good.

Arturia continued their Analog Experience line with The Laboratory, a hardware/software combination with a tasty, aftertouch-toting 49-note keyboard, and 3,500 sounds you can edit on the GUI of the



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 A graphic for EQ magazine's Record Ready newsletter. It features a close-up of several orange and black audio cables plugged into a white patch panel. The EQ logo is visible in the top right and bottom left corners.
 

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instruments from which they came. Very nice.

The synth that got not only buzz, but a little head-scratching, was M-Audio's Venom synth. It's tailor-made for electronica, and delivers rhythm 'n' rudeness in spades. Want to get a dance floor moving? This is your baby. Want to drive your nosy neighbors insane? Just turn the volume up to 11. We think it's really cool, and it's under \$500. It also has an audio interface, along with a great software editor.

And while drum machines aren't really keyboards, they're hardware and have buttons, so let's go for it. The big show-stopper was Dave Smith Instruments' Tempest, designed in conjunction with Roger Linn. For many people, that's enough to get them communing with their bank account; for the rest, one good demo is all it takes to define the word "covet." It's great for realtime performance, with a killer workflow and great sounds. Not surprising, given the parents.

Speaking of drum machines, Arturia showed Spark, which is basically drum software with a hardware controller. As with Tempest, its strong point is workflow, but with the cost advantages of piggy-backing on to a computer.

### ALL KINDS OF AWESOME

NAMM is about more than new gear; it's also about *crazy/genius* new gear. TASCAM's solar-powered tuners were darling little multi-colored affairs that looked like tuners Barbie would design, if she designed tuners and had an IQ above that of a banana slug. We were also totally rocked & shocked by the "hybrid" analog/electric cymbals in Zildjian's Gen 16 line. These perforated metal cymbals model all sorts of sounds through DSP, but we won't even try to describe it—check out the video at [www.eqmag.com](http://www.eqmag.com).

In terms of cool hardware, SSL showed us a new X-Rack goodie—a stereo dynamics module. TASCAM has collaborated with Antares to produce the TA-1VP, an Auto-Tune rackmount unit. Granted, Auto-Tune sales suffered terribly after the Spice Girls broke up, but with a new generation of singers discovering that they can do really weird stuff to their voice, Auto-Tune is riding a crest of popularity that seems unlikely to go away any time soon.

On a more utilitarian level, Radial Engineering bought Re-Amp. In case you hadn't noticed, Radial is really on a roll these days . . . and the Workhorse "lunchbox" module frame is just starting to ship, which is going to make them roll considerably faster. Good stuff.

If you're into wireless, Shure introduced both low-end and high-end systems. We were particularly intrigued by the Axient, which represents the apogee of their wireless technology; it looks like it

was meant to survive the most hostile possible stage conditions and come out alive. Also in wireless world, Lectrosanics introduced the Quadra digital wireless monitor (IEM) system, which consists of a belt-pack diversity receiver and half-rack transmitter. The system features digital RF modulation, two or four channels of 24-bit/48kHz digital audio, analog or digital inputs, and a mixing interface so users can create their own monitor mix.

We also dug the Olympus LS-7, their smallest and least-expensive portable recorder yet. It records (in WAV/MP3/WMA formats, with up to 24-bit/96kHz resolution) to 4GB of internal memory (expandable with a microSD card), and incorporates three mics: two condenser stereo mics and a center, omnidirectional mic that can capture bass down to 20Hz. Yes, 20Hz.

So, did we cover everything? *Are you insane?* NAMM lasts 1,860 minutes, and there were more than 1,400 manufacturers to check out. Assuming an average of at least five relevant new products per booth, that would give us a little under 15 seconds to check out each product, assuming that we didn't eat, never went to the bathroom, and could teleport ourselves instantly from one booth to another. Then again, we hear that Ableton is working on a teleportation module for Live that will be introduced at Musikmesse . . . so maybe next year, this will be doable. Wait—were we under NDA? Not sure . . . NAMM haze, and all that. Oh well.

Meanwhile, two things are obvious from this year's NAMM show. The music industry never got the memo that there's a recession going on, probably because even in good times, the music industry is in a perpetual state of recession, so a little more recess won't make any real difference. The other is that the MI business is no longer in a holding pattern; some companies are making bold moves (like Avid dropping their "world's biggest dongle" requirement to run Pro Tools, and Cakewalk re-inventing Sonar) while exploiting technology to a level that borders on the magical. Stay tuned as we put these new products under the microscope in the months ahead.

Oh, and one last piece of advice: Pack your own lunch for NAMM. We're serious about this. Don't say we didn't warn you. ☘

### More Online!

Get links to all the manufacturers mentioned in this article, as well as links to the Sarah Jones Chronicles (her very own NAMM show blog), picture galleries, and some cool videos at [www.eqmag.com](http://www.eqmag.com).





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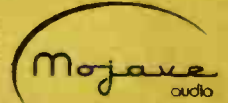
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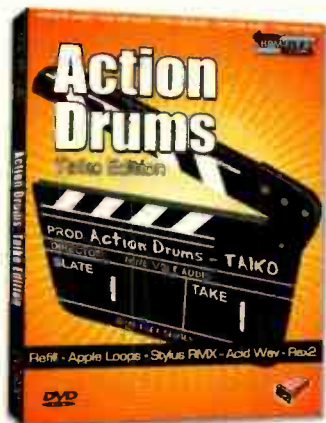
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# GREEN DAY

BY KEN MICALLEF



The following interview with Green Day's Billie Joe Armstrong and producer Butch Vig is excerpted from "A Simple Plan" (July 2009 EQ), a look at the studio sessions for *21<sup>st</sup> Century Breakdown*.

## Billie Joe Armstrong, on finding melody in the moment...

On our previous records, we were gathering experiences and allowing ourselves to write songs from exactly where we were at that moment. With this one, I really wanted to go deeper than I've ever gone before. This is the first time I've written songs at the piano, which allowed me a lot more freedom to use falsetto, and experiment with chord progressions I've never used before. I also wanted to hear melody—a line could be inspired by a musical or something Randy Newman would write. I love songs that are based in some tradition, from The Ramones to Simon & Garfunkel to the Beatles. My DNA is finding melody.

## Butch Vig, on pushing the band's creativity...


After mega success, a band will often return to their roots to make a stripped-down record. I was not into making that kind of record with Green Day. What I loved about *American Idiot* was that they were shooting for the stars. I

was trying to push them to go into areas that were almost uncomfortable for them, but still make it sound like Green Day. How wide of a palette can they paint on? Where can they go in terms of style and execution, but still make sure it felt like them as a band? They would record, I'd make suggestions, then they'd go and rehearse for hours, and then they'd record some more. This went on for weeks. By early summer, we had a good rapport.

## Vig, on his streamlined signal chain...

As high-tech as we are with current recording technology, we *did 21<sup>st</sup> Century Breakdown* as old-school as possible. We used signal paths with the least amount of EQ and processing involved so what was playing back sounded amazing. That is always a good step when you are starting to record an album—making sure everything sounds good dry with nothing done to it. As soon as you start over-processing, you will hit more problems down the line.

## Armstrong, on his vocal method:

I've always been quick at recording vocals. It's about warming up, getting my throat and chest in the right position, and then emotionally preparing to go for it. When you go through the demo process, you know what kind of emotion the song will need, and when to scream and when to whisper. This is why I like to take time and really get all the arrangements done and know what kind of vocal take I am going to end up doing before I start recording the album tracks. I sing about eight inches from the mic, and throw down around three takes. We'll comp performances if necessary, but, most of the time, it's all pretty much live takes. 



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