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# Electronic Musician

June 1998

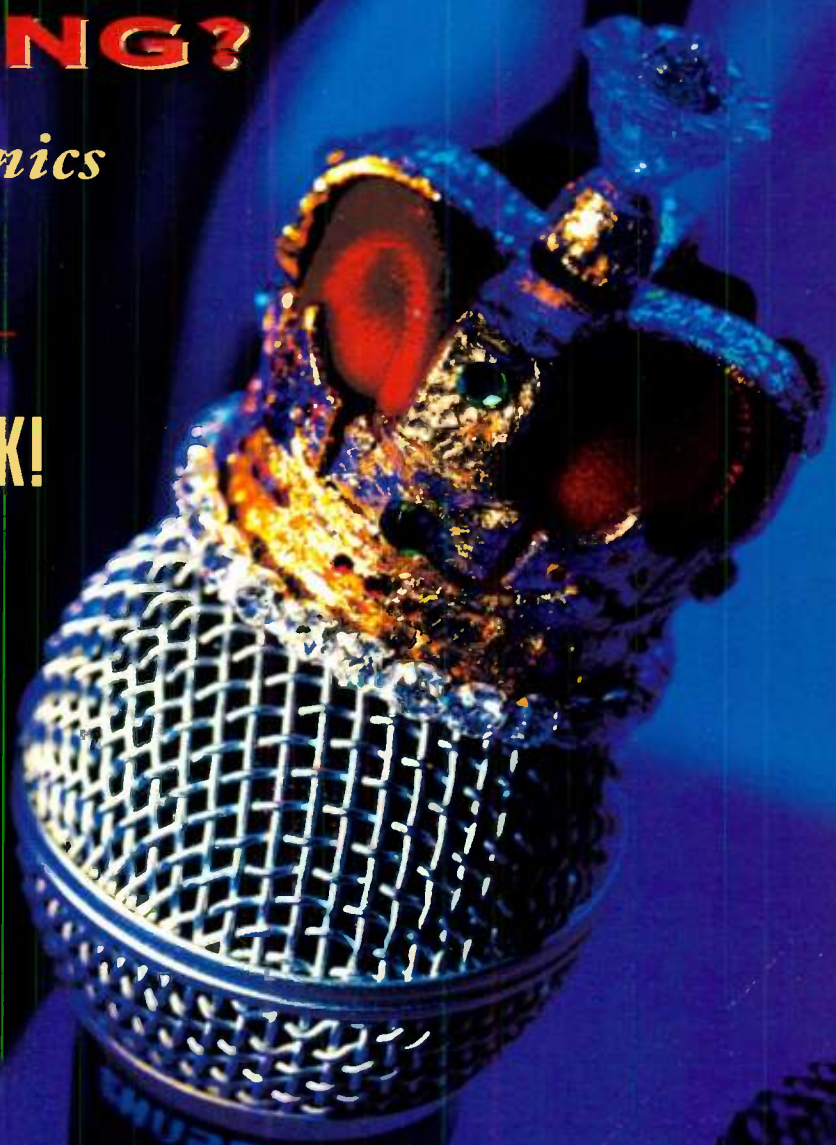
**IS THE SM58  
STILL KING?**

*7 new dynamic mics  
vie for the throne*

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songwriter's  
demo session*

*Unearth hidden  
gigs you never  
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**PLUS 9 REVIEWS**



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■ **Large, high-current internal power supply** lets us use VLZ® (Very Low Impedance) circuitry at critical points in the SR24•4 and SR32•4. VLZ® significantly reduces thermal noise and crosstalk by using extremely low resistor values in certain circuits. This innovative technique is normally only used in mega-expensive consoles, because it requires VERY high operating current. Which requires a robust, high-current power supply. Which is why we spent the extra money to build one into SR Series mixers. Live or in the studio, you'll hear the difference.

■ **All inputs and outputs are balanced\*** to eliminate hum and allow extra-long cable runs (they can also be used with unbalanced connectors). Tight-gripping 1/4" jacks are solid metal; XLR's are genuine Neutrik®s with internal ferrite beads to reduce radio frequency interference. \* except RCA-type tape jacks and channel inserts.

■ **Low-noise, high-headroom discrete mic preamps.** It can be argued that the

preamps are the most important part of a mixer — whether you're recording in the studio or running a sound reinforcement system. They must be accurate and free from coloration...yet be able to handle screaming vocalists and close-miked kick drums without overloading. And, they have to be ultra-quiet. Nowadays, we're not the only ones to claim our mic preamps are "studio-grade." So we invite you to put us to the test. In the store, plug in a good, high-output microphone and a pair of

■ **Mix amplifier headroom.** The SR24•4's inside story.

Better mix amplifier design is why the SR24•4 can handle 24 simultaneous HOT inputs without distorting. The mix amplifier is where signals from all channels are combined. Some mixers sound OK with just a couple of inputs...but when you pour it on with lots of inputs — particularly signals from digital tape recorders, things start to sound pretty harsh. Backing off on the bus or main faders doesn't help, since the mix amp comes before these gain controls.

The SR24•4 and SR32•4 use Mackie's innovative negative

gain mix amplifier architecture. Instead of mixing at unity gain where headroom is quickly used up, our mix amps operate at -6dB. At this negative gain level, SR Series mixers are capable of summing **FOUR TIMES** the number of channels before clipping. That nets out at **DOUBLE** the amount of mix amplifier headroom compared to any competitive mixer. It's a critical difference that you can plainly hear.

headphones and decide for yourself whose preamps have the most headroom, the least noise and the best sound.

The mix amp funnels multiple channel inputs into a single bus.

headphones and decide for yourself whose preamps have the most headroom, the least noise and the best sound.

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■ **Dual headphone outputs** with enough level to satisfy even most drummers. And a separate input for a talkback mic (so you don't tie up a mixer channel).

■ **Inserts on all mono channels.** Plus submix and main stereo mix inserts, separate control room outputs, extra RCA-type tape inputs and outputs, both 1/4" and XLR stereo outputs, and XLR mono output with its own rear panel level control.

■ **The SR Series in a proverbial nutshell.**

	24•4	32•4
Total Channels	24	32
Mono Channels	20	28
Stereo Line Inputs	2	2
Mic Preamps	20	28
Submix Buses	4	4
EQ (mono chs.)	12kHz HF	80Hz LF
	100-8kHz	Swept Mid
	18dB/octave low-cut filter	
EQ (stereo chs.)	12kHz HF	80Hz LF
	800Hz Lo Mid	3kHz Hi Mid
Aux Sends/Ch.	6	6
Stereo Aux Returns	4	4
Tape Outputs	8	8
Channel Inserts	20	28
Width (inches)	31.0	39.25

■ **Below:** A few of the 500+ folks who build the SR Series, our other mixers, amps and studio monitors at Mackie Designs in Woodinville, Washington, 20 miles northeast of Seattle.

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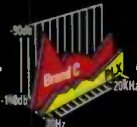
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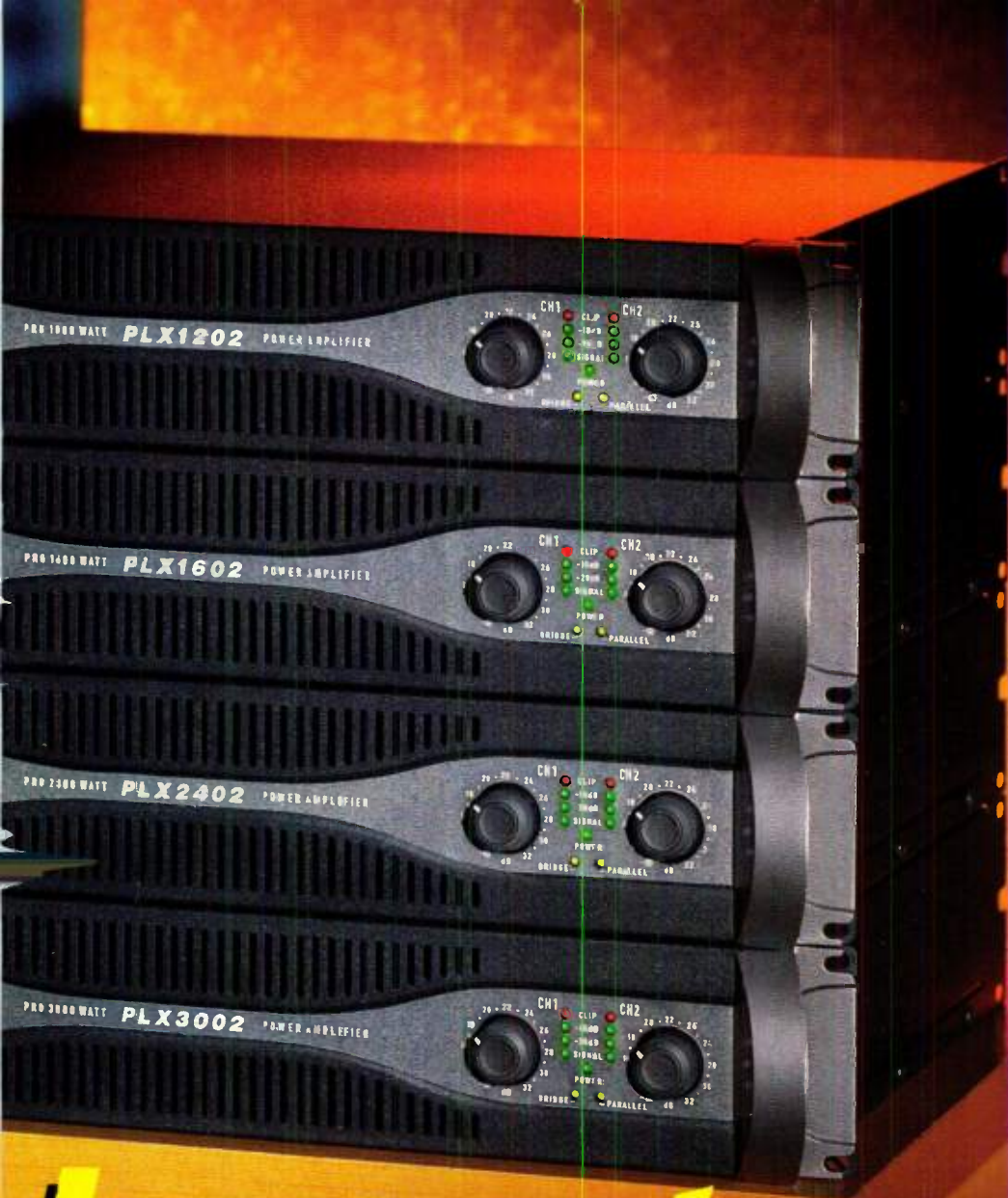
20Hz-20kHz, 1% THD, 1:1



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# I N S I

## FEATURES

### 34 COVER STORY: IS THE SM58 STILL KING?

Seven new microphones challenge the Shure SM58—acknowledged king of the low-cost dynamics—for bragging rights. We field-test the AKG D 880, Audix OM-2, Electro-Voice N/D267, Peavey PVM 22, Samson Q2, Sennheiser E835, and Stedman LD23 and compare them to the reigning monarch in both studio and stage applications.

*By Brian Knave*

### 54 ALL TOGETHER NOW

Forget those boring, static choirs, brass trios, and string sections built by layering solo samples! Our sampling guru shows you how to sample real ensembles.

*By Jim Miller*

### 62 A DAY IN THE LIFE: DIARY OF A SONG SESSION

Follow songwriter Linda Kriss, child artist Kelsey Laudi, and EM's favorite in-house recording engineer, hour by hour and step by step, as they record "Dear Mickey" from start to finish in a single day.

*By Brian Knave*

### 75 JAM: THE EM GUIDE TO GIGGING

Get in tune with *JAM!* This month we examine a revolutionary guitar-tuning system, explore the nuances of the human voice, riff on guitar and bass intonation, and reveal tricks for snaring a great snare sound. And of course, Tech columnist Bean does her thing with a look at Laetitia Sonami's gestural control glove.



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Cover: Photography by Eric Harger.  
Special thanks to Shure Brothers, Inc.

## A Knave Judges a King

Uneasy lies the mic that wears the crown.

**A**s Larry the O pointed out in last month's "Final Mix" column, speakers and microphones are the only devices in the studio that deal with sound. All the rest—mixers, signal processors, synths, recording devices, and so on—deal with electrons and/or bits. If you want to capture sound, you need a mic.

When top-flight audio quality is paramount, engineers generally turn to condenser mics. There's no doubt these devices capture sound with more accuracy than dynamics. In the past, however, condensers were prohibitively expensive and somewhat fragile, so dynamic mics were the usual choice of stage musicians and home recordists.

Today, condenser mics have come way down in price, and most are fairly sturdy. However, dynamic mics are also better than ever, and they still offer many of the same advantages they always have: they're less expensive and tougher. Furthermore, the sound quality of many modern dynamic mics is impressive.

Can dynamic mics really take more stress than condensers? You bet! When I interviewed pioneer electronic musician and bioacoustician Bernie Krause for a story in the May 1989 *EM* ("Making Music with Nature: Bernie Krause Samples Life"), he related the following story.

Krause generally preferred condenser mics when recording natural sounds in the field. So when planning a trip to record mountain gorillas in Rwanda's mountain rainforests for his album *Gorillas in the Mix*, he first considered using his beloved Schoeps 541 hypercardioid condensers. Concerned about the high Rwandan humidity, he decided to test the Schoeps in a steam-filled bathroom. The condenser mics failed within three minutes! So Krause opted for a pair of Beyerdynamic M700N(C) hypercardioid dynamics, which not only handled the steam test but easily survived three to four hours of sitting in the rain.

Krause mounted the mics atop his head with an elaborate rig so that the wires wouldn't entangle his body. At one point, he had to dive headfirst into the underbrush to evade a charging gorilla; the mics took the full impact and never failed. As Krause remarked, "That's a rock 'n' roll mic; it takes a lot more than a gorilla to destroy them."

Obviously, then, dynamic mics are more likely than condenser mics to survive the punishment meted out by the stage gorillas on some of his encounters on tour. This is not to say one shouldn't take condensers on tour; just that when push comes to shove, the lower-cost dynamic can take a lot more pushing and shoving.

In this issue's cover story ("Is the SM58 Still King?" on p. 34), Associate Editor Brian Knave field-tests seven recent-vintage, low-cost dynamic mics and compares them to Shure's SM58, the acknowledged best-selling "king" of handheld dynamics. He didn't test higher-priced dynamics because we wanted to find out what you could buy for \$100 to \$200, the traditional realm of the SM58. Although Knave didn't face a charging gorilla, he displayed courage in undertaking the daunting task of comparing these mics. You could say that *EM*'s "Knave of Arts" judged a king and lived to tell about it.



ANTHONY PIGEON

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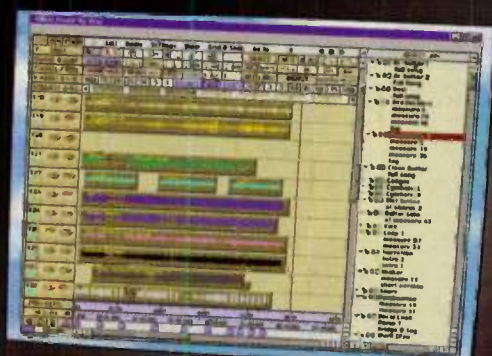
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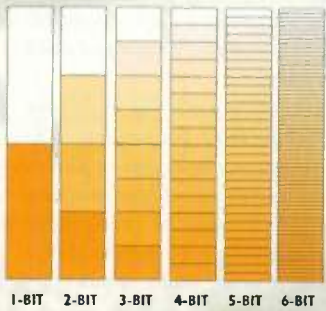
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## ALESIS



## RECORDING GOLD

I have waited a long time for an article like Jim Miller's "Wild Things" in *Electronic Musician's* March 1998 issue. One of my goals is to create an audio-enabled Web site containing "naturally Canadian" sounds to complement my site's book readings and author interviews.

As a rookie in this business, my first attempt at portable sound sampling during my vacation to the Klondike gold fields was pitiful. I don't know which was louder, the steel wheels of the old Alaskan Skagway train or the hiss and hum of my cheap tape recorder and microphone as I tried to record our host's tales of the old-timers who built this railroad during the gold rush. My first efforts were disappointing but enticing enough for me to dive into the difficult task of learning about sound and audio.

Jim Miller has advanced my understanding through his own experiences in ambient sound sampling. For this, I am thankful. With articles such as these in *EM* under my belt, perhaps my next trip to the Yukon will be rewarded with the guttural, sonic growl of an encounter with a grizzly bear or the clear, sonic euphoria of *Eureka!* when I find gold.

Edward Wedler  
booksfromcanada@  
ns.sympatico.ca

Edward—I suggest you also read Rudy Trubitt's "Playing the Field" (field-recording applications) and "Gear to Go" (products for field recording) in our November 1997 issue.—Steve O.

## CD RECORDERS

In "The CD-R Software Cook-Off" (March 1998), you mention that prices for CD-Rs have dropped below \$500. Could you tell me which brand names and models fall into this category? When I've been looking, they are still in the \$2,000 range.

Dave  
no address given

Dave—The types of drives we were referring to that are "under \$500" are those that connect directly to your computer (Mac or PC) and can be used to create Red Book audio CDs or to back up data. There are many makes and models in this price range, including units made by Yamaha, Sony, Phillips, and others. You can even find "consumer" brands, such as Smart and Friendly and Hewlett Packard, all under \$500. When you mention units in the \$2,000 price range, I believe you are thinking of free-standing CD recorders that accept a direct audio signal from another CD player or perhaps a DAT machine. Our reference was to models that install inside your computer or connect via a SCSI bus to the back of your PC (or Mac).—Dennis M.

## TURN THAT DOWN!

I recently bought a new Pentium II 300 MHz computer. Unfortunately, it is the noisiest computer I have ever owned. I would like to keep it, but I can't use it if I cannot solve this problem. Therefore, I wonder whether any manufacturers make quieter power supplies and processor fans for PIIs. I also wonder whether any computer suppliers cater to the needs of electronic musicians.

Scott Reed  
wsrguitar@aol.com

Scott—Computers are undeniably noisy beasts. Desktop musicians everywhere can

empathize with your plight as you attempt to reconcile what is essentially a piece of office equipment with the demands of a recording studio. Unfortunately, the two just don't get along very well.

Simply replacing the power supply in your computer may not solve the problem. The noise that a fan generates is due in part to such variables as the size, shape, and construction of the CPU case; the arrangement of the interior spaces; the location of the intake and exhaust vents; and various other design-related variables.

If you're up to the task, you can experiment by installing different power supplies and/or fans in your computer. There are a few companies, such as PC Power & Cooling, Inc. ([www.pcpowercooling.com](http://www.pcpowercooling.com)) that advertise quieter-than-normal, high-performance fans and power supplies. Furthermore, several companies offer rack-mountable computers, and these systems tend to be quieter (and much more expensive) than the average PC. For most people, however, these are not practical solutions.

Therefore, I suggest simply removing your CPU from the recording area. At my house, I put the CPU in a closet and set up my desktop studio near the closet door to keep cable runs as short as possible (approximately six feet). With the door closed, the noise level is reduced by about 70 percent. Inserting and removing floppies and CDs is a bit awkward, but the lower noise level is worth the inconvenience. (Be sure the closet is big enough or is ventilated to avoid heat build up.) Even better results can be obtained by lining the equipment-closet walls with sound-absorbent materials.

Another option is to put the CPU in another room altogether. That introduces some logistical problems, especially with SCSI cables, but it can be done. For an in-depth exploration of this topic, read the *Desktop Musician* column "Getting Away From It All" in the February 1997 *EM*. It offers several possible solutions to the noise problem and lists companies to contact for parts and supplies.—David R.

## HEAT WAVE

I am interested in purchasing the Event 20/20bas monitors. However, I have heard that many people

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"I cut<sup>my</sup> latest  
album 5  
entirely in  
Pro Tools...  
no tape!"

– Lenny Kravitz

Lenny Kravitz refuses to be limited by his creative tools.

"I turned to Pro Tools, because I felt like a kid who needed more crayons to play with. Now anything is possible. I record everything into Pro Tools and have this tremendous palette to work with. It's all album-quality, so I can piece songs together and mix them however I like. There are no boundaries."

Wait a minute: Isn't Lenny, like, an analog guy?

"I can still run sound through my old tube equipment or use Plug-Ins like flange or some weird little filter. Any color that I want, I can get with Pro Tools. It depends on the record I want to make. Pro Tools is the future."

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http://www.emusician.com



The debate is heating up in eMusician.com's "Perspectives" forum, where readers can share their opinions on the burning issues of modern music making. EM's online home also offers example files that let you hear what our authors are writing about. This month, we've got examples from Jim Miller's "All Together Now" feature on sampling ensem-

bles, Brian Knave's "Diary of a Song Session," and Dennis Miller's review of the Sonic Foundry *Acoustics Modeler* plug-in.

Of course, there's also "Re:Views," our monthly crop of CD reviews, and "The Biz," an exploration of the online music business. All this, and more, awaits your Web browser at [www.emusician.com](http://www.emusician.com).

regretted it), it's much more important to develop a strong sense of relative pitch, which lets you quickly and easily identify intervals. After all, music is really about the relationships between notes, not the absolute pitches of those notes.—Scott W.

**SOURCE SEARCH**

**W**here I can find Web-site information that can explain the basics of hard-disk recording and what requirements are good for my new PC?

**Bryan Mull**  
bryan@avantext.com

Bryan—One of the best sites I've seen for computer information is [www.iqsoft.com](http://www.iqsoft.com). This is the home page of Innovative Quality Software, maker of the SAW hard-disk editor for the PC. The site has a number of articles that answer important questions about buying a computer for audio work. In the Support area, for example, you'll find "11 Things to Ask Before Buying a Name Brand Computer," which you'll find very helpful. You can also read about recording and digital audio on another page at this site.

Also check the May 1998 issue of EM for "Desktop Musician: Back to School Online." This article discussed numerous Web sites where you can find good basic information about MIDI and digital audio. My favorite site is Electronic Music Interactive ([nmc.uoregon.edu/emi](http://nmc.uoregon.edu/emi)), a Shockwave-based page that is very thorough.—Dennis M.

**ERROR LOG**

April 1998, "What's New," p. 28: SoftSat is TC Electronic's proprietary tube/tape-saturation emulation algorithm and is in no way associated with Lexicon. Also, the correct retail price of TC Native EQ Works is \$449.

April 1998, "Workhorse Workstations," p. 64: In the "Comparative Figures" table, the Kawai K5000W features six simultaneous Effects Processors (four multi-effects, one reverb effect, and one graphic EQ). Effect Types also include rotary, overdrive, and ensemble effects.

**WE WELCOME YOUR FEEDBACK.**

Address correspondence and e-mail to "Letters," Electronic Musician, 6400 Hollis St., Suite 12, Emeryville, CA 94608 or [emeditorial@intertec.com](mailto:emeditorial@intertec.com). Published letters may be edited for space and clarity.

who bought them are now starting to worry about the massive amount of heat generated by these monitors (not simply warm, they mean hot). They fear (and since I'm about to purchase them, I fear too) that in the long run, the heat may cause serious problems to the cabinet and to the speakers. One guy returned them to get the unpowered version of the 20/20s with a Hafler 3000 to drive them. That's how uncomfortable he was with the situation.

Is there a reason to be alarmed?

**Denis Brochu**  
d.brochu@saq.qc.ca

Denis—Any power amp generates heat during normal operation, and that heat has to be radiated into the air somehow. In the Event 20/20bas, the back plate is being used as the 200W biampifier's heat sink, although it lacks the traditional heat sink's radiation fins. The backplate essentially is a very thick piece of heat-conducting aluminum designed to transfer heat away from the amplifier's power semiconductors and radiate it into the air. As you have noted, it can get pretty hot.

Speaker-design and testing ace Jack Hildley at Menlo Scientific advises us that the heat probably won't hurt the drivers or the cabinet; his main concern would normally be the long-term life of the internal electronics. But Event's Frank Kelly assures us that the temperature of all internal components remains well within safe operating limits. The speakers have been in widespread use for two years now, and I have heard no reports of heat-related failures.

I'm not giving guarantees, of course, but I'd say if you like the speakers, you should buy them. Given the amount of heat radiating from the rear, however, I recommend you not position the 20/20bas too close to a

wall; allow a reasonable amount of space for ventilation. This is normal procedure for any powered system.—Steve O.

**THE PERFECT C**

**I**s there any software from which I can learn perfect pitch?

**Henry Poon**  
henrypro@hkabc.net

Henry—To my knowledge, there is no computer software designed to help you learn perfect pitch. The only related product I know of is David Burge's Perfect Pitch SuperCourse, which is marketed by American Educational Music (tel. 515/472-3100; fax 515/472-2700). This package includes several audio cassettes and a book. I haven't looked at this product; it was reviewed back in the June 1991 EM and didn't fare well, but it may have been improved since then, and as the saying goes, your "mileage" may differ.

There is a lot of debate as to whether or not perfect pitch can be taught; some believe it's an innate, genetically determined ability that cannot be learned. On the other hand, there is some evidence that even animals can be taught perfect pitch. However, even if it can be learned, there is no evidence that having perfect pitch is an indicator of musical talent.

Some musicians even consider it to be a detriment. For example, it's much harder to transpose vocal music at sight if you have perfect pitch, because the information from your eyes (the printed music) does not agree with the information from your ears (the notes you hear). This also applies to reading music for transposing instruments, such as saxophone, clarinet, trumpet, and French horn.

According to composer and musicologist Norman Cazden (who had perfect pitch and

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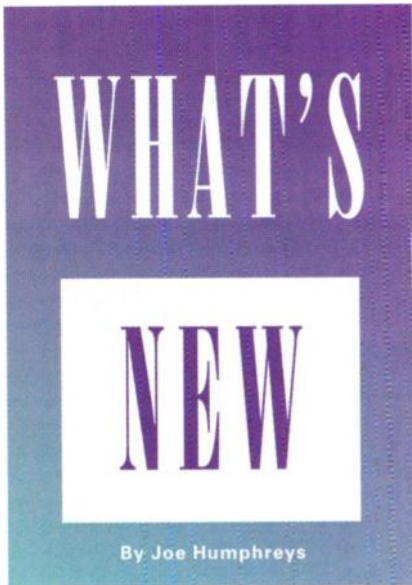
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*Software shown is Steinberg Cubase VST. Tria subwoofer not shown. CPU, cables, and mouse not shown.  
Gina is designed and manufactured in the U.S. by Echo Corp., an Event Strategic Partner.*

circle #507 on reader service card  
World Radio History



► **TELEX COBALT SE60**

**R**uggedly designed to meet the rigors of stage and studio use, Telex's new SE60 (\$175) is a no-frills electret-condenser microphone that's priced like a dynamic. This cardioid-pattern mic runs on batteries or phantom power; it weighs in at nine ounces and sports a cobalt-blue finish.

Telex rates the SE60's frequency response at 30 Hz to 19 kHz ( $\pm 1$  dB), with a signal-to-noise ratio of  $>70$  dB. The mic can handle up to 140 dB SPL. Telex Communications, Inc.; tel. (612) 884-4051; fax (612) 884-0043; Web [www.telex.com](http://www.telex.com).

Circle #401 on Reader Service Card



► **YAMAHA 01V**

**T**he digital revolution marches on with the release of Yamaha's 01V digital mixer (\$1,999). This 24-channel, 6-bus relative of the company's 02R and 03D boards offers onboard

dynamics, parametric EQ, and effects processing; snapshot and dynamic automation; motorized faders; and expandable digital I/O.

Channels 1 to 16 offer balanced  $\frac{1}{4}$ -inch inputs, gain pots, 4-band parametric EQ, compressor/limiter/gate, and a 250 ms delay line. Channels 1 to 12 also have balanced XLR ins with mic preamps and 48V phantom power. There are six aux sends and two stereo returns.

Channels 17 to 24 are available via a card slot, which lets you add an 8-channel digital interface (\$299) that provides your choice of Alesis optical, TASCAM TDIF, or AES/EBU digital I/O. These channels have 2-band parametric EQ and four aux sends and can be assigned to buses 1 to 4 and the stereo bus. Signals from the card slot can also be individually switched to appear on channels 1 to 8, and the outputs can be used as direct channel outs. Cards for analog input (eight balanced  $\frac{1}{4}$ -inch) and output (four balanced XLRs) are under development.

In addition to the main stereo outs (on balanced XLRs) there are four analog Omni outs on balanced  $\frac{1}{4}$ -inch jacks that



can serve as aux, bus, or duplicate main outs or as direct outs for four channels. There is also stereo, 24-bit, AES/EBU digital I/O on RCA (coax) connectors. (Yes, it really is AES/EBU format, but on a nonspecification connector.)

Two onboard 32-bit stereo effects processors offer the sonic performance of Yamaha's ProR3 reverb. The mixing surface has fifteen motorized faders, solo buttons for channels 1 to 16, and three pots for EQ and pan adjustments. The display is a 320 x 8-dot graphic LCD, and there are two 12-step LED meters.

The board can store snapshots in 99 scene memories. There are separate libraries for storing EQ, dynamics, and effects settings. In addition, mixes can be automated via MIDI using either standard MIDI I/O or a serial computer connection.

The 01V uses 20-bit, 128x oversampling delta-sigma A/D converters and 20-bit, 8x oversampling delta-sigma DACs. The internal processing uses the same 32-bit DSP engine as the Yamaha 02R. Yamaha rates the unit's frequency response at 20 Hz to 20 kHz ( $+1/-3$  dB), dynamic range at 105 dB typical (channel in to stereo out), and THD at  $<0.1\%$  ( $+14$  dB into 600 $\Omega$ ). Yamaha Corporation of America; tel. (714) 522-9011; fax (714) 522-9522; e-mail [info@yamaha.com](mailto:info@yamaha.com); Web [www.yamaha.com](http://www.yamaha.com).

Circle #402 on Reader Service Card

► **AUDIO-TECHNICA 30 SERIES**

**A**imed at both studio and stage, Audio-Technica's new 30 series currently comprises three low-priced condenser mics: the AT3525 (\$399), AT3527 (\$299), and AT3528 (\$299). These mics use a vapor-deposited gold diaphragm and can handle up to 146 to 148 dB SPL. They have a switchable 10 dB pad and a switchable bass rolloff (80 Hz; 12 dB/octave). Audio-Technica cites a frequency response of 30 Hz to 20 kHz.

The AT3525 is a side-address, cardioid-pattern mic intended for vocals, guitar cabinets, drum overheads, and acoustic piano. It comes with a shock mount. The AT3527 and AT3528 are small-diaphragm, general-purpose instrument mics; the former has an omnidirectional polar pattern, and the latter has a cardioid pattern. Both come with snap-in clamps. Audio-Technica U.S., Inc.; tel. (330) 686-2600; fax (330) 686-0719; e-mail [pro@atus.com](mailto:pro@atus.com); Web [www.audio-technica.com](http://www.audio-technica.com).



Circle #403 on Reader Service Card



## ▼ DOEPFER REGELWERK

If you find virtual faders virtually impossible to use, you might want to check out Doepfer's Regelwerk MIDI fader box (\$850), which provides no less than 24 faders, each with two associated buttons and two LEDs. It also includes an 8-track pattern sequencer.

Any MIDI data type can be assigned to the 60 mm faders, including System Exclusive messages of up to 30 bytes. You can set minimum, maximum, and catch (entry) values for the faders, and the LEDs' blinking frequency shows the distance from a stored value. You can also set the faders to modify incoming messages, and you can set up fader groups.



The buttons can be set to perform different actions on press and release, such as mute, solo, and send MIDI data of any type, including System Exclusive

(up to 30 bytes). You can copy parameters from one fader or button to another. In addition, there are 64 memory locations that store all fader/button assign-

ments and 128 snapshot memories.

Regelwerk's sequencer records 16-step patterns on eight tracks. (Only one track can be edited at a time.) In sequence mode, the faders control such parameters as note number, Velocity, or length. The sequencer syncs to MIDI Clock or Roland-style sync and can simultaneously transmit MIDI data and control voltages via eight CV and eight Gate outputs. You can use the fader box's features with eight of the faders (and their associated buttons and LEDs) while using the other sixteen to control the sequencer. Enport (distributor); tel. (402) 398-0198; fax (402) 398-0012; Web [www.doepferusa.com](http://www.doepferusa.com).

Circle #404 on Reader Service Card

## ▼ SUNDHOLM MONITORS

Sundholm Acoustics' new line of near-field reference monitors offers three systems to meet different studios' price and performance needs. The SL6.5e (\$795/pair) features a 1-inch, silk-dome tweeter with double rear chamber, mounted on a diffraction-reducing faceplate. Its 6½-inch, mineral-filled polypropylene cone with rubber surround is set in a die-cast magnesium frame.

The monitor's passive, second-order crossover is set at 2.5 kHz and uses silver-plated, oxygen-free wiring and silver solder throughout. The speakers are mounted off-center in a medium-density fiberboard enclosure with triangular cross-bracing to reduce cabinet resonance. The SL6.5e can handle up to 120W (peak) into 4Ω and produces up to 104 dB SPL (@ 1m). Sundholm rates its frequency response at 38 Hz to 20 kHz (±3 dB) and sensitivity at 88 dB (1W @ 1m).

Next up are Sundholm's SL8.0 monitors (\$995/pair; shown at right), which use a 1-inch aluminum-dome tweeter for improved time coherency and high-end response. The woofer is a long-throw, 8-inch, mineral-filled

polypropylene cone set in a magnesium frame. The passive, second-order crossover is set at 2 kHz. The SL8.0's speakers are also mounted asymmetrically in a cross-braced MDF enclosure, and this system adds a phase-correction plate that brings the acoustic centers of the two speakers closer together. The SL8.0's power-handling capacity is listed as 120W (peak) into 8Ω, and its maximum SPL as 110 dB (@ 1m). Its fre-



quency response is rated at 40 Hz to 20 kHz (±3 dB), and its sensitivity is rated at 91 dB (1W @ 1m).

The SL6.5s is a subwoofer system (\$2,095/system). The cabinets for its stereo subwoofers serve as speaker stands for the mid/high cabinets and hold the 10-inch, long-throw woofer cone 25 inches off the floor to reduce floor-to-ceiling standing waves. The system uses the same tweeter and polypropylene cone employed by the SL6.5e and a phase-correction plate like the SL8.0's. The passive, second-order crossovers are set at 100 Hz and 2.5 kHz. The SL6.5s can take 200W (peak) into 4Ω and produce up to 106 dB (@ 1m). Sundholm rates the system's frequency response at 34 Hz to 20 kHz (±3 dB) and sensitivity at 88 dB (1W @ 1m).

All three systems can be wired with separate speaker wires running to each driver using biwiring and triwiring cables from Sundholm. The cables prevent high current flow at low frequencies from interfering with the highs and midrange. Sundholm Acoustics; tel. (503) 794-2661; fax (503) 786-1550; e-mail [love@teleport.com](mailto:love@teleport.com).

Circle #405 on Reader Service Card

# CREATIVITY WITHOUT COMPROMISE

"BUT WHAT REALLY BLEW ME AWAY  
— UNQUESTIONABLY THE BIGGEST  
BARGAIN OF THE SHOW —  
WAS AKAI'S DPS12."

Mix Magazine  
1997 AES Report

**The concept seems so obvious.** Combine a digital disk recorder and a digital mixer in one convenient box. Eliminate complex interfacing and keep everything in the digital domain. Add optional internal effects. **Creative heaven.** But **up until now,** buying anything that you could afford meant settling for **almost** enough

tracks to record your music. Or a compressed data format that sounded **almost** as good as CD quality. Or a user interface that you could **almost** make sense of. **Now, finally,** the concept of integrated digital recording and mixing lives up to its promise with Akai's **DPS12** Digital Personal Studio. Designed for those

unwilling to compromise their creative vision, the DPS12 combines a 12-track random-access digital recorder (with professional-quality uncompressed 16-bit sound and powerful non-linear editing) and a 20-channel MIDI-automatable digital mixer in one compact, incredibly easy-to-use package. All at a price that is nothing short of spectacular. It's **creativity without compromise.**

Since its founding in 1984, Akai Professional has consistently pushed the boundaries of affordable recording technology. From the original MG1212 12-track recorder/mixer, to the breakthrough A-DAM digital multitrack, to the DR4/8/16 professional disk recorders and the DD family of audio post-production tools, each Akai recording product has established new levels of performance and value.

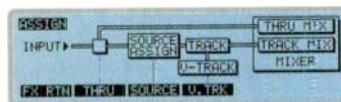
Now, with the DPS12, Akai builds on this experience to bring professional-quality digital recording and mixing to the personal and project studio at a price that's truly unexpected. (Not to prolong the suspense, it's \$1499 msrp.)

### More Is Better

At the heart of the DPS12 is a powerful random-access disk recorder capable of simultaneously playing 12 (that's twelve) tracks of uncompressed 16-bit linear audio from convenient removable JAZ cartridges or SCSI hard disks. More tracks for more recording flexibility. More control of individual parts. Less need for track bouncing.



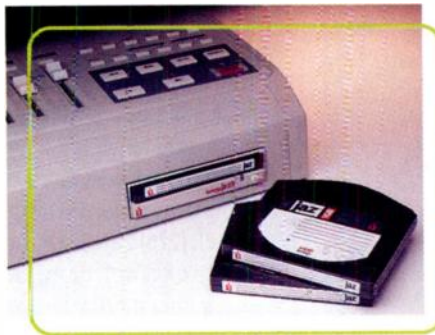
And speaking of more tracks, the DPS12 also lets you record a whopping 250 virtual tracks. At mixdown, you can assign any virtual track to any of the twelve physical tracks for playback. This gives you the freedom to compare multiple takes, experiment with alternative arrangements, even combine parts of different virtual tracks on a single track.



At the front end, the DPS12 lets you record on up to 8 tracks simultaneously through six high-quality balanced analog inputs and a S/PDIF stereo digital input at sampling rates of 48kHz, 44.1kHz or 32kHz.

### The Wait Is Over

Since the DPS12 is a random-access recorder, waiting for tape to wind is a thing of the past. The DPS12's locating functions let you move instantly to any of 12 quick-locate points and 100 stack memory points. The stack points can even be named, so you can identify locations by the part of the song (FIRST VERSE, CHORUS, etc.) or even by specific lyrics.

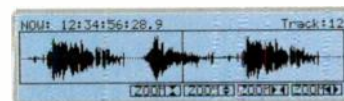


An optional internal JAZ drive allows quick access to all your work.

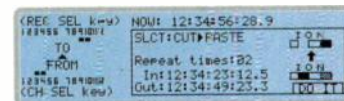
### Easy Editing

Ever wonder how people managed to write anything before word processors? Well, after experiencing non-linear editing on the DPS12, you'll wonder the same thing about audio. Insert, Delete, Erase, Copy or Move sections of single- or multi-track audio from anywhere to anywhere within your project. This is stuff you just can't do with tape.

The DPS12's high-quality jogging and graphic waveform display let you zero in on your precise edit points.



Then call up an edit screen (complete with a graphic representation of your selected operation) and Do It.



Next, use the special Play To and Play From keys to confirm that seamless edit. Changed your mind? 256 levels of Undo are only a button press away.

### Mix Master

The DPS12's digital mixer is a model of flexibility.



During mixdown, for example, the inputs can be used as an additional 8-channel Thru Mix, perfect for adding tracks from sequenced MIDI modules to the 12 recorded tracks for a true 20-channel mixdown. Two AUX sends and digital EQ are also included.



Found the perfect mix? Mix setups can be saved as snapshots and recalled at any time. And since all of the DPS12's faders and panpots generate MIDI controller data, you can record your mix moves into an external MIDI sequencer (like our MPC2000, for example) and play them back in sync with the DPS12 for a fully automated mixdown.

### Effects Inside

If you want the added convenience of integrated internal effects (not to mention keeping your mix entirely in the digital domain), add the EB2M multi-effect processor board. The EB2M gives you two independent studio-quality effects processors with a wide variety of programmable effect types.

### It Wants To Be Your Friend

It's one thing to give you all the tools you need to do the job, but it's another thing entirely to make them useable. Here, the DPS12 really shines. It is, quite simply, really easy to use.

At the heart of its friendliness is its informative graphic display. Backlit and easy to read, it always gives you a clear picture of what's going on with your DPS12. Frankly, it's all so simple that most of you may never have to take the manual out of the box.

### Check It Out

There's a lot more to the DPS12 than we could fit in this ad, so head down to your local Akai Professional dealer for some quality hands-on time with a DPS12. And don't forget, that's

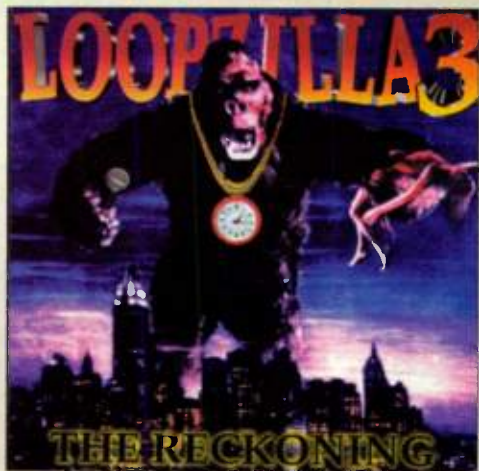
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## SOUND ADVICE ▲ ▲ ▲ ▲



### ▲ BIG FISH AUDIO

Another monster-sized collection of hip-hop and funk grooves from Big Fish Audio has hit the market. *Loopzilla 3: The Reckoning* (\$99.95) is a 2-disc, audio-CD set with 140 minutes of loops.

*Loopzilla 3* features drums, guitar, bass, Rhodes, vocals, horns, turntables, and more, in such styles as R&B, New York hip-hop, Miami bass, and West Coast rap. Contributors include Boushay Mosely and performers from Boo Yaa T.R.I.B.E. and the Dazz Band.

Tempo and key are listed for more than 100 ensemble loops, which include up to twelve submixes broken out by instrument. There are also 91 drum loops listed by tempo, 60 sax loops, 58 flute loops, and 20 scratch loops. Six tracks at the end of disc 1 contain 52 guitar loops taken from *Loopzilla Funk Guitar & Bass*. Big Fish Audio; tel. (800) 717-FISH or (818) 768-6115; fax (818) 768-4117; e-mail [info@bigfish.com](mailto:info@bigfish.com); Web [www.bigfishaudio.com](http://www.bigfishaudio.com).

Circle #406 on Reader Service Card

### PATCHMAN MUSIC

Patchman's second volume of Voices for Yamaha's VL70-m and MU100R synths is now available for \$42.95; both volumes can be purchased for \$72.95. The

collection features 60 sounds designed for use with a breath or wind controller.

The sounds include new trumpets, French horns, flutes, tenor saxes, bari sax, synth violin, synth cello, acoustic and electric guitars, electric basses, a Brecker-style chorded lead, fat analog-synth leads and basses, steel drum, and breathy, exotic wind instruments. Patchman Music; tel. (216) 221-8282; e-mail [matteblack@aol.com](mailto:matteblack@aol.com); Web [members.aol.com/Patchman1](http://members.aol.com/Patchman1).

Circle #407 on Reader Service Card

### ▼ F7 SOUND AND VISION

The debut product from F7 Sound and Vision is *Concept:FX* (\$49.95), a Mac/PC CD-ROM with 195 royalty-free sound effects. These samples are highly processed recordings intended to go out on a limb. Featured sounds include metallic textured ambiences, static hits, thunderous explosions, churning low rumbles, flocks of birds, simulated drones, alarms and warning sounds, mutated chatter, and more.

All sounds are included as both AIFF and WAV files in 44.1 kHz, 16-bit; 22.05 kHz, 16-bit; and 11.025 kHz, 8-bit quality.



*F7 Sound and Vision*; tel. (813) 991-4117; e-mail [f7sound@gte.net](mailto:f7sound@gte.net); Web [www.f7sound.com](http://www.f7sound.com).

Circle #408 on Reader Service Card

### ▼ SWEETWATER SOUND

Sweetwater has amassed a gigantic library of instrument samples for Kurzweil's K2000/K2500; now, the highlights of that collection are available in audio-CD format for use in any sampler. The *Performance Instruments Sampling CD* (\$149) contains 74 minutes of samples comprising over 100 instruments, including clarinet, French horn, harpsichord, oboe, harp



glissandos, pipe organ, pizzicato strings, trombone, Hammond B-3, bari sax, acoustic bass, accordion, pianos, acoustic and electric guitars, and more. There's a stereo drum kit with three Velocity levels, snare and kick collections, percussion toys, and Roland TR-808 and TR-909 loops.

Because these samples were previously programmed for the K2500 and were transferred digitally from there to DAT, their tuning, timbre, and volume have already been carefully matched. Sweetwater Sound; tel. (219) 432-8176; fax (219) 432-1758; e-mail [sales@sweetwater.com](mailto:sales@sweetwater.com); Web [www.sweetwater.com](http://www.sweetwater.com).

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**SOLIDTUBE**

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15.5ms read/17.5ms write

**Average seek time**

10ms read/12ms write

**Maximum sustained transfer rate**

6.62MB/sec. max

† Assuming 2:1 compression ratio. Actual compression will vary with file and hardware configuration.

‡ Performance will vary when using 1GB cartridges.  
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“How I fit 1 speeding downtown bus,  
a crippled lunar lander, and  
5 car-tossing tornados into a  
**4 INCH SQUARE.**”

**STEPHEN HUNTER FLICK**

Sound Designer

Creative Cafe

Stephen Hunter Flick is a communicator. As the two-time Academy Award-winning sound effects specialist whose work includes films like *Speed*, *Apollo 13*, and *Twister*, Stephen works with major studios (20th Century Fox, Universal, Sony Pictures to name a few) creating sounds that aren't just heard, but felt. From compiling over 2,000 sound files to create a massive tornado to transporting or even cutting straight to digital picture, Stephen's work takes space. Big space. Space like the high-capacity Jaz® drive. Incredibly, he used 41 Jaz drives at once on *Twister*, demonstrating its usefulness as an industry standard.

Stephen's work is larger than life, but thanks to his Jaz drive and handy Jaz disks, it fits neatly into his pocket.

Learn more about Stephen's story at [www.4inchesquare.com/emn](http://www.4inchesquare.com/emn).

The high-performance standard in removable storage  
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Each cartridge has two monster gigabytes of capacity

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1-Step™ backup software can protect up to 4 gigs (compressed!)

**Access time**

15.5ms read/17.5ms write

**Average seek time**

10ms read/12ms write

**Maximum sustained transfer rate**

8.7MB/sec. max

For information about connecting your Jaz drive to a Mac or PC, see your reseller or visit us at:

[www.iomega.com](http://www.iomega.com)

BECAUSE IT'S YOUR STUFF.™



World Radio History

## THE CARD DEALER ▲ ▲ ▲ ▲

### ▶ ALESIS

**A**lesis's new ADAT-PCR (Mac/Win 95 and NT; \$499) gives ADAT owners the chance to fully integrate their computers and their MDMs. This PCI card not only supplies ADAT optical digital I/O but also has 9-pin ADAT sync I/O.

The 8-channel ADAT optical jacks can also serve as stereo S/PDIF I/O, and they accept audio in either format at up to 24-bit resolution and 48 kHz sampling rate. Thanks to the 9-pin sync ports, you can transfer tracks between your ADAT and computer with sample-accurate synchronization, and the computer can send or receive commands from an ADAT or from a controller such as the BRC. This also lets you sync computer hard-disk audio to SMPTE.

The package comes with a special 8-track version of Steinberg's *Cubase* AV digital audio sequencing software. Also included are drivers for Windows



95 and NT and Power Macintosh. Alesis Corporation; tel. (800) 525-3747 or (310) 255-3400; fax (310) 255-3401; e-mail [alecorp@alesis1.usa.com](mailto:alecorp@alesis1.usa.com); Web [www.alesis.com](http://www.alesis.com).

Circle #414 on Reader Service Card

### ▼ APPLIED MAGIC

**A**ppplied Magic's OnStage sound card (\$1,595) features digital and analog audio I/O, synchronization, MIDI, and onboard DSP that allows 8-channel, real-time mixing. The PCI card offers 4-channel analog I/O (+4 dBu) via balanced XLR connectors on a 6-foot breakout cable. The A/D and D/A converters offer 20-bit resolution.

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The card receives and generates SMPTE LTC and VITC sync in all major frame rates and drop/nondrop modes. It also genlocks to video. Video and LTC I/O are on BNC connectors. These connectors and the MIDI In, Out, and Thru ports are on a second 6-foot breakout cable.

Applied Magic rates the card's audio performance as 99 dB dynamic range, 110 dB signal-to-noise ratio, and -90 dB THD + Noise. Applied Magic, Inc.; tel. (888) MAGIC-55 or (760) 931-6417; fax (760) 931-6440; e-mail [product-info@applied-magic.com](mailto:product-info@applied-magic.com); Web [www.applied-magic.com](http://www.applied-magic.com).

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### ▶ MIDIMAN CO<sub>2</sub>

**D**o you need to bridge the chasm between the optical S/PDIF jacks on your DAT machine and the coax jacks on your computer's audio card? Midiman's CO<sub>2</sub> (\$79.95) can do that. The compact device (3.5 inches x 2.25 inches x 1.2 inches) has one optical and one RCA (coax) input along with one optical and one RCA output. A button lets you se-



lect which of the two inputs is active. Both outputs are always active.

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World Radio History

## KEY CHANGES

**S**teinberg's *Cubase* line now supports Emagic's Unitor8 MIDI interface/sync box, Audiowerk 8 audio card, and Active MIDI Transmission, which improves performance in large MIDI systems that use multiple interfaces connected in series...**Sonorus** has announced the release of ASIO drivers for *Cubase VST 3.5*. These drivers deliver better performance than Windows 95 Wave drivers. The company will release drivers for Windows NT 4.0, as well. Sonorus is also shipping its Sync Backplate (\$149) for Mac and PC, which provides word clock in and out to the Studi/o card...**Emagic's Logic Audio** series for Mac now supports Steinberg's VST plug-in format...**TC Electronic** has developed the TC Unity card for Yamaha's O2R digital recording console (\$1,195; \$1,495 with 8-channel AES/EBU digital I/O). This 24-bit card has two effects engines with the same effects as TC's M2000 processor...**Sonic Foundry and Microboards Technology** have joined to release the Professional CD Factory (\$795), which includes Sonic Foundry's *CD Architect* and Microboards' PlayWrite 4080, a CD-recording system built around a Panasonic CD burner. In addition, Sonic Foundry has upgraded its *Noise Reduction* plug-in for the DirectX format to allow real-time preview of the plug-in's operation...**Genelec** has added a fourth input to the L/C/R inputs on its 1092A and 1094A active subwoofers for monitoring of 5.1 surround-sound mixes...**Wildcat Canyon Software's Autoscore 2.0** (Deluxe version \$119; Professional version \$249) for Mac and PC is now shipping. New features include improved pitch-recognition algorithms, WCS's TruTrack technology for more accurate scoring and playback, and a refined user interface.

—Rick Weldon

### ▶ ALLEN & HEATH WZ14:4:2

**T**he latest addition to Allen & Heath's MixWizard line is the WZ14:4:2 (\$1,495), a 4-bus mixing console with ten mic/line inputs and two stereo inputs. Designed for both live sound and recording, the WZ14:4:2 offers the same vertical-PCB construction, nutted pots, and minimum signal-path patching architecture.

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There are four stereo returns that can be routed to the main L/R or aux buses. Twelve-segment LED meters display L/R signal levels, and there are also 4-seg-

ment meters for the aux buses. Allen & Heath's SYS-LINK lets you connect the buses of compatible mixers.

The WZ14:4:2's frequency response is



rated at 20 Hz to 50 kHz (+0/-1 dB) and mic EIN at -128 dB (150Ω source). THD + Noise is listed as <0.006% (channel in to mix out @ +14 dBu and 1 kHz) and crosstalk as -90 dB (fader down @ 1 kHz). Allen & Heath/Harman Music Group; tel. (801) 568-7660; fax (801) 568-7662; e-mail customer@dbxpro.com; Web www.allen-heath.co.uk.

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### ▼ WHISPER ROOM SE SERIES

**U**ntil the technology behind the Cones of Silence from TV's *Get Smart* is declassified, your best bet for sound isolation may be an enclosure from Whisper Room. The company's new SE series includes both Standard and Enhanced models in various sizes. Prices start at \$2,195 for a one-person unit. Standard models may be upgraded to

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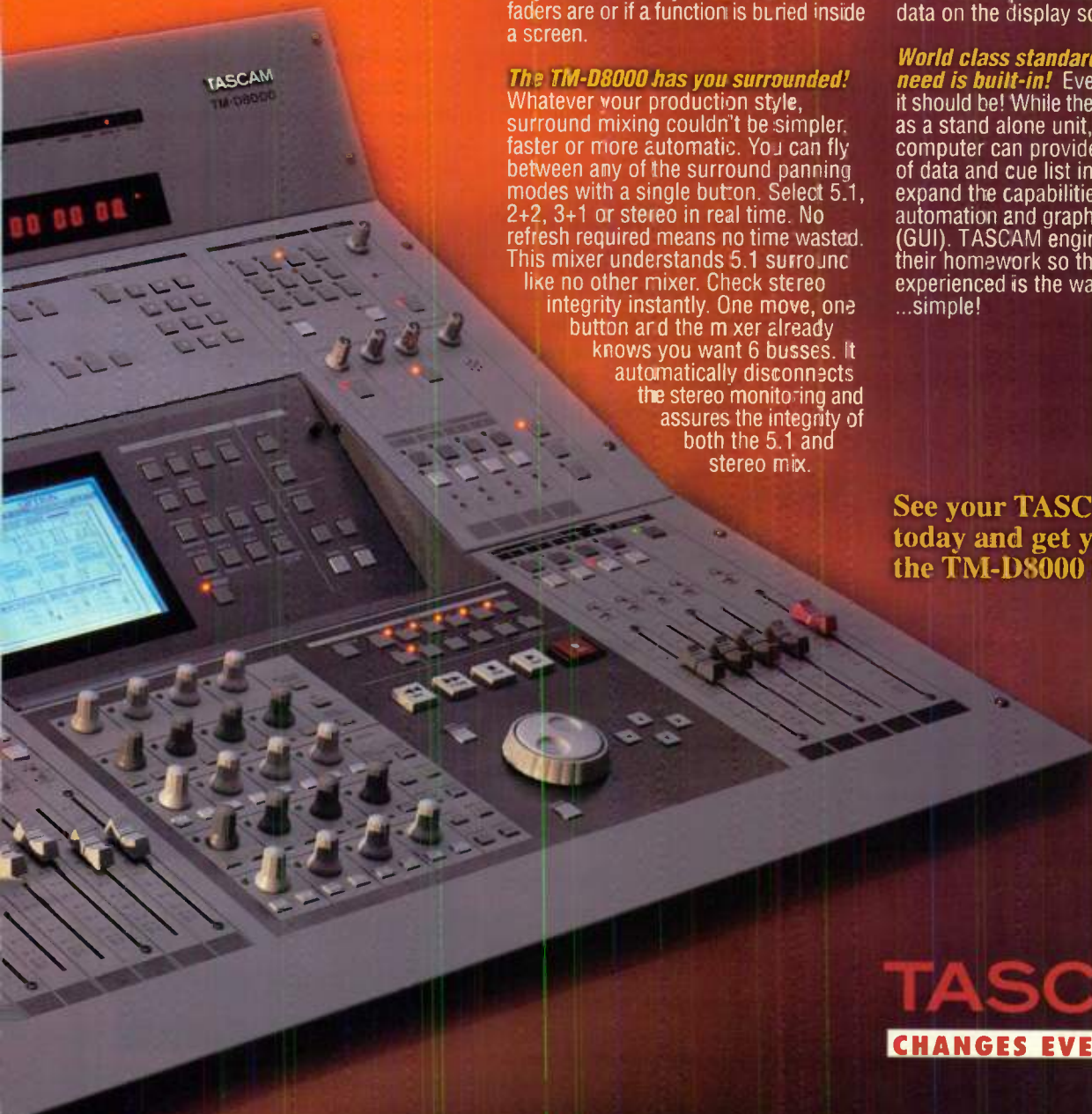
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# is the SM58

photography by Eric Harger



# still king?

By Brian Knave

Seven new  
low-priced  
dynamic  
microphones  
challenge  
the throne.

W

hen the Coca-Cola company revised the recipe for Coke several years ago, fans of the soft drink had a collective hissy fit. Eventually, the company was forced to reissue the original brew under a new name, "Coca-Cola Classic." The lesson was clear: you don't mess with a classic.

Shure Brothers, evidently, took this lesson to heart. When the company released the Beta 58 dynamic microphone in 1989, it didn't dare discontinue the mic's predecessor, the SM58. After all, since its introduction in the mid-1960s, the SM58 has been the best-selling—if not most-beloved—professional handheld dynamic microphone of all time. Shure wasn't about to go tampering with a sure thing. Indeed, to this day, the design of the SM58 hasn't changed one iota (although, as is true of an increasing number of "American made" products, the mic is now assembled elsewhere—in this case, in Mexico).

Naturally, any product that rules the roost for so long becomes the envy of the competition and is duly targeted as the item to beat. Not all manufacturers take this tack, of course; but a good number of microphone makers are up front about their attempts to upstage the SM58. And, like clockwork, a new batch of contenders comes to market each year or so.

We decided to test the sound quality and versatility of the latest crop of dynamic mics aimed to compete with the SM58. To narrow the selection, we picked only handheld vocal mics priced between \$100 and \$200 that were released in either 1997 or 1998.

Of course, these mics are intended primarily for live vocal performance. But SM58s do get used for more than live vocals, so we figured it made sense to test all the mics in multiple applications. We not only checked out how the mics performed on stage but we also tested them on studio vocals (both male and female), drums, and guitar amps—applications for which the SM58 is commonly used. Moreover, because sonic preferences are ultimately subjective, we enlisted the help of several listeners.



## APPLES AND ORANGES

We found seven new microphones that fit our criteria. However, in all fairness, it must be stated up front that certain differences exist between the mics we tested—differences that could be said to skew the playing field. For example, the SM58 and two other mics use alnico elements (alnico is shorthand for an alloy made of aluminum, nickel, and cobalt), whereas the others use the more modern—and typically hotter—neodymium-iron-boron capsules.

Another difference is polar patterns. Most of the mics are listed as cardioid, but there are supercardioid and hypercardioid models, as well. Should this affect how the mics sound? Well, theoretically at least, yes. For example, a hypercardioid pattern, which is the tightest of the three, typically exhibits more proximity effect than a supercardioid and a supercardioid more than a cardioid pattern. More proximity effect means more bass boost the closer you get to the mic.

But generally speaking, even with these design differences, the eight mics we tested are essentially cut from the same cloth in the sense that they're all designed for the same task. Within the parameters we've defined, each is the respective company's best shot at sending you on stage with an inexpensive but high-quality microphone that will make you sound good—and *feel* good—during performance, while providing low handling noise, good off-axis rejection, and maximum gain before feedback. That's why we began our testing on stage.

## TESTING ONE, TWO

Stage tests for the microphones were performed (and recorded to DAT) at Yoshi's Jazz House in Jack London Square, Oakland, California. Sound Engineer Robert Berenson, a regular freelancer at Yoshi's, manned the Crest Century TC console. The sound system at Yoshi's is a custom Meyer installation that, along with the room's excellent acoustics, makes for one of the finest-sounding rooms for amplified music in the San Francisco Bay Area.

We began with an a cappella gospel quartet, the Redeemed Convicts for Christ. (Each manufacturer kindly supplied us with four identical mics just for this purpose.) The quartet performed the same two numbers eight times in a row, leaving the mics on the stands for the first song and hand holding them for the second (to test handling noise, bass boost, etc.).

Next, we were lucky to catch two Bay Area rappers before they left town for their first European tour. Rasta Cue-Tip (Stone's Throw records) and Planet Asia (Heratik records) took the stage and gave the mics a completely different kind of workout. Not only did the rappers hit the mics hard but the way they commandeered the stage, gesticulating in every possible direction, provided a great test of feedback rejection (an area where all the mics performed well, by the way).

Later, at a personal studio in San Francisco owned by Mike Shapiro, we tested each mic in the classic position (off axis to the speaker and nearly touching the grille cloth) on a cranked up Fender Deluxe guitar amp. To test this application, Shapiro ripped through eight performances of the Freddy King classic, "Hideaway." Shapiro also sang (separately) to help test the mics on male vocals, and his girlfriend, Jeanne Bradshaw, who has a Patsy Cline-sounding alto voice, kindly performed as our female test singer.

Back at my own personal studio, I carefully tested the mics one at a time on snare drum, kick, and toms. For the snare drum tests, I recorded not only backbeats but also cross-stick clicks and brush patterns. (The latter proved especially telling of coloration and transient response.) All of the studio tracks were recorded using ADAT-XTs and Mackie mic preamps—the same kind of stuff many readers have in their own personal studios. And, of course, all of the recordings were made sans EQ and effects.

To broaden the tests, I employed as many ears as possible, even though it sometimes meant juggling

contrary opinions. I noted the perspectives of each performer as the tests proceeded and later solicited the help of three folks from the office for critical-listening tests: fellow Associate Editor Jeff Casey, who has professional recording and mixing experience from his New York City days; EM Editorial Assistant Rick Weldon, who plays various instruments in three different bands, two of which recently released CDs that Weldon helped record and mix; and *Mix* magazine Technical Editor Chris Michie, who has both studio and live-sound engineering credits with Pink Floyd, Roxy Music, Sarah Vaughan, Burt Bacharach, and countless others.

One of the last tests I performed was "mic matching": with assistance from Weldon, I put the SM58 up against each other microphone and then dialed in whatever equalization settings were necessary to make the SM58 sound like the other mic. (This works better than you might think.) Although not terribly scientific, this test helped reveal the different frequency contours of the mics as compared to the SM58. Not surprisingly, the results jibed pretty consistently with what I had been hearing from each microphone. Finally, I sang through the mics myself, paying attention to how the mics reproduced my own voice, to what degree they altered and/or enhanced it, as well as to how they felt in my hand as I performed.



An a cappella gospel group proved ideal for testing projection, blend, handling noise, and off-axis rejection of the dynamic microphones. Shown are the Redeemed Convicts for Christ testing mics at Yoshi's, located in Oakland, California. From left to right: Cameron Edwards, Horatio Finely, Will Garrett, and Harry Caldwell.

ALEX BUTKUS



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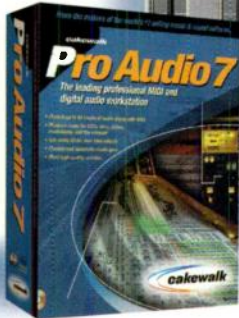
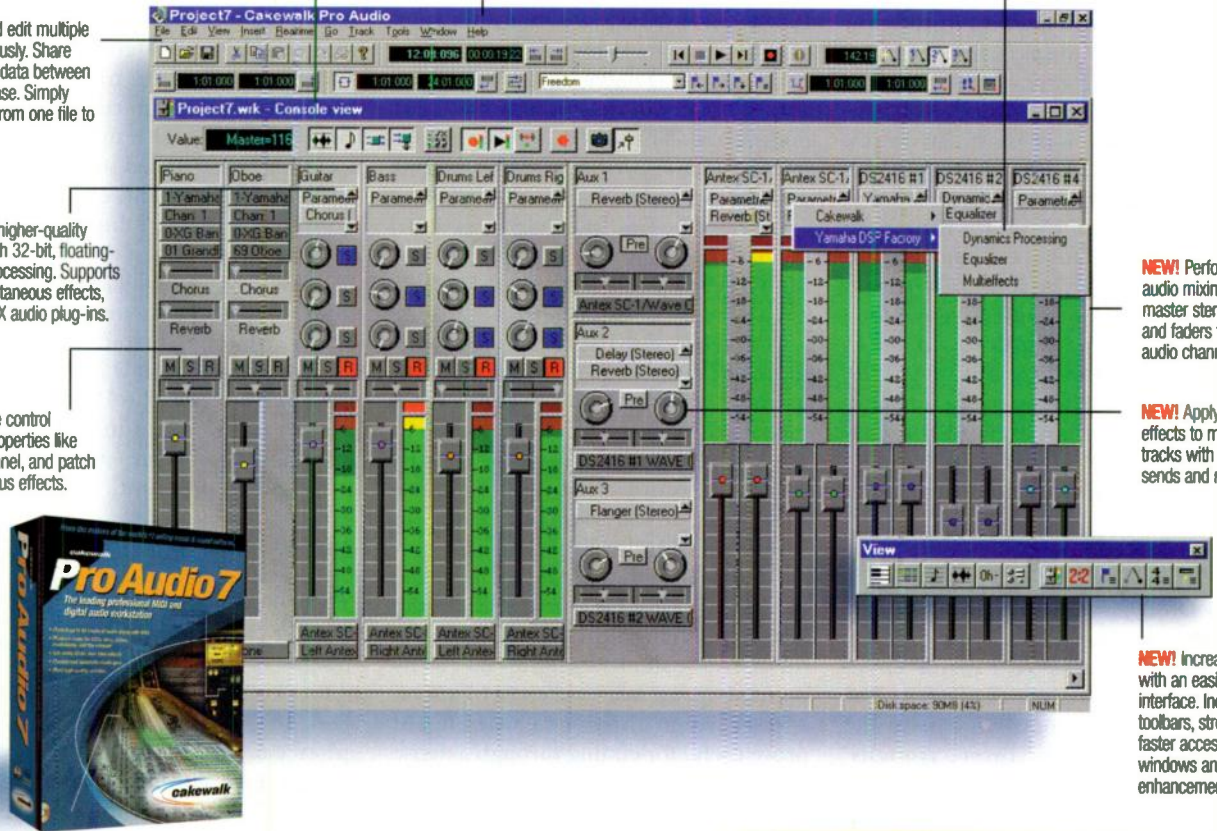
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Overall, we were impressed by the mics. Each performed admirably on stage, and in the studio each delivered usable tracks on one or more instrument. However, there were clear winners—and losers—in most categories. Keep in mind that the test results reported here are strictly in relation to one another and should not be read out of context. This is a *comparison* test, after all. Because the sonic differences among the mics were often slight, much hairsplitting was required. In other words, if you listened to any one of the mics on its own, many of the nuances discussed might not be readily apparent. With that said, here are the mics and what we learned about each.

### AKG D 880

Half an inch taller than an SM58, the AKG D 880 is a bold-looking microphone with a shiny, black enamel finish and two decorative teal bands encircling its ovoid wire-mesh grille ball. The die-cast zinc-alloy body is one piece and is smooth except for three “troughs” along the top that provide a convenient grip for sweaty hands. The XLR connectors are gold plated.

The D 880, a member of AKG’s Emotion line of dynamic mics, comes in a foam-lined, plastic carrying case (sans handle) with an external foam windscreen and a plastic mic clip. I tested the mic clip (which comes with a European thread adapter) and found it sufficiently sturdy and capable of accommodating most other handheld-style mics. (Also included in the Emotion series is the model D 880S, which is identical to the D 880 except that it offers an on/off switch.)

**Overall performance.** The D 880 has a big, exciting-but-quite-hyped sound with lots of extreme low and high end. The exaggerated low end (seemingly residing between 80 and 220 Hz) makes for a full sound but, de-

pending on the instrumentation, can muddy the mix. However, the lows are balanced by a bright and sparkling high end (significant boost around 12 kHz) that allows the mic to cut through any mix and generally saves it from sounding “woofy.”

Another characteristic that sets the D 880 apart from the other mics is its big ears. Despite being labeled a super-cardioid, the D 880 exhibited the least amount of room rejection of the eight mics tested. This was readily apparent in the DAT recordings of the gospel group singing at Yoshi’s: the natural echo from behind the stage was audible, making the dry mix sound surprisingly reverberant, almost as if it had been processed with reverb.

**Concert vocals.** The D 880s were very flattering on the gospel quartet. The blend was full and the overall sound extremely articulate. As Harry Caldwell, the group’s musical director, put it, “When we went from the SM58s to the AKG mics, it sounded like someone switched the Dolby off.”

There was, however, a bit of harshness on the high end. (Michie described the sound as “slightly brittle.”) Of course, the Meyer system’s exceptional clarity pointed up the mic’s surfeit of highs; on a lesser system, those same highs might prove useful for cutting through a dense mix. The rappers, who performed over full mixes, loved the high-end articulation and fat bass provided by the D 880. However, the mic exhibited a fair amount of low-frequency handling noise, which shouldn’t pose a problem as long as the highpass filter found on most pro and semipro consoles is engaged.

**Studio vocals.** The D 880 definitely made our male singer’s voice bigger than life. To me, though, the fullness was somewhat artificial sounding. (Weldon described it as “too much machismo.”) Also, there was a discomfiting low “windy” sound. This was also noticeable on female vocals, which were overly thick and sounded as if the lows were somewhat disembodied from the main part of the voice. On my own voice, however, which is somewhat thin and lacking in body, the D 880’s particular frequency enhancements were a godsend.

**Instruments.** On electric guitar, the D 880 captured a huge, full-bore sound with gobs of low bass and high detail. Overall, though, I found the sound a bit over the top. The results were similar

on kick drum: the D 880 delivered more information than any of the other mics, capturing a super-detailed beater click as well as the extreme low resonance (ring) of the drum shell; however, the *balance* of information didn’t result in a particularly satisfying kick sound.

Snare cross-stick and backbeat both sounded good—clear and articulate—but the mic’s mediocre off-axis rejection resulted in the hi-hat and kick drum leaking through considerably. On the brush beat, the mic captured a beautiful, very detailed sound with great dynamic response and excellent translation of the drum’s high harmonics. The sustained swish of the brush sounded nice, too; however, it didn’t have enough upper-mid content to constitute an accurate portrait of the drum’s sound. Likewise, the D 880 captured a nice stick hit from the 12-inch tom but failed to fully reproduce the drum’s dominant (midrange) tone, resulting in a slightly thin sound.

### AUDIX OM-2

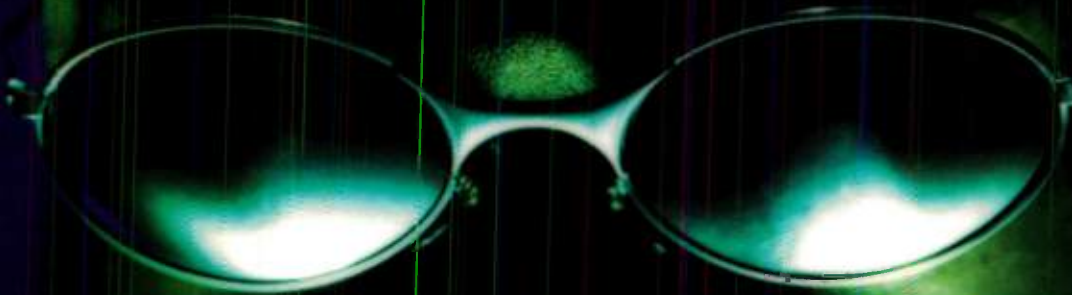
Almost as tall as the AKG D 880 but with a more slender body and no splashes of color, the solid black Audix OM-2 has a sleek and elegant look. Its spherical wire-mesh grille ball fits flush with the curved top portion of the zinc-alloy body, creating a smooth taper and uninterrupted line. The grille ball, made of “spring” steel, is tough as nails. At the urging of Audix, I dropped the mic head first onto a thinly carpeted concrete floor several times from waist height. The mic bounced like a ball and suffered neither dent nor scratch. It still worked, too.

The OM-2 comes in a padded corduroy zipper pouch with an “unbreakable” nylon mic clip and European thread adapter. (I actually tried and wasn’t able to break the clip.) Despite the OM-2’s slender build, the clip had no problem adapting itself to the other mics. Like the D 880, the OM-2 features gold-plated XLR connectors.

**Overall performance.** The OM-2 has a balanced and accurate-sounding frequency response and the best transient response of the bunch. Depending on the source, the sound is generally



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smooth, clear, and rich in harmonic content. The tonal accuracy and exceptional transient response, however, make this a somewhat “naked” and revealing microphone—probably not the thing for singers with reckless mic technique, as the OM-2 doesn’t do much to conceal plosives or other dynamic anomalies. But these same qualities, it seems, make it a versatile and good-sounding instrument mic.

Interestingly, it proved difficult to match the sound of the OM-2 by applying console EQ to an SM58. Very slight boosts (1 or 2 dB) at 80 Hz, 4 kHz, and 12 kHz made the SM58’s response similar to the OM-2’s, but there was a certain quality—midrange harmonic richness, for lack of a better term—to the OM-2’s sound that I couldn’t replicate with simple EQ.

**Concert vocals.** When the quartet went from the AKGs to the Audix mics, the blend of voices became smoother, thicker, and better balanced, with more upper-midrange representation and an overall less strident—if less articulate—sound. In fact, to my ears the OM-2s provided the choicest blend of the a cappella singers—though I could easily imagine how, on a lesser sound system, the relatively unhyped response might render the mics less than capable of cutting through a dense mix. On the rappers, for example, word articulation was not as good as with the AKG mics.

Handling noise was lower than with the AKGs, though plosives were more pronounced. Off-axis rejection was good but not as good as the SM58’s.

**Studio vocals.** Again, this mic tends to reveal rather than hide faults and it doesn’t offer much in the way of hype or vocal “enhancement.” The tone on both male and female vocals was true to the voices, but plosives were not particularly well handled. The OM-2 sounded more flattering with our male singer; on the female singer, it sounded a



bit bald and edgy—as if the mic were positioned directly next to her vocal cords.

**Instruments.** For my money, the OM-2 was the best all-around instrument mic of the group. It sounded excellent on the guitar amp—accurate and dimensional yet controlled. Though slightly deficient on lows when used as a kick-drum mic, the OM-2 also provided a very usable kick track.

It was on snare drum and toms that the OM-2 really delivered the goods. On snare, cross-stick hits and backbeats were reproduced faithfully and with exceptional dynamic response. And the brush beat was gorgeous: very accurate and detailed, with a full, natural-sounding swish that would make the track shine in a mix even without compression or EQ. The tom track also sounded great, exhibiting the perfect balance of visceral stick hit and warm, resonant tone.

### ELECTRO-VOICE N/D267

A hair taller than the AKG D 880 or Audix OM-2, the Electro-Voice N/D267 has a 2-piece, fine wire-mesh grille ball divided in the middle by a gold-colored silicone band. The band, it turns out, is the outer rim of the internal “Acousti-DYM” shock-mount system for the N/D267’s capsule.

The body of the N/D267 is covered with a durable, rubberlike material that feels similar to human flesh. Electro-Voice calls this the “elastomeric Warm Grip” handle, and it certainly does feel different from (and warmer than) the usual metal mic body. In fact, I loved how this mic (which is noticeably lighter than the others, as well) felt in my hand. The only problem is that the gripping quality of the rubber—along with the fact that the diameter of the mic body is slightly larger at the bottom than most other dynamics—makes the N/D267 difficult to fit into standard-size mic clips.

The N/D267 comes in a classy canvas zipper pouch with the EV logo embroidered on the front in shiny gold thread. EV also provides a mic clip, which, fortunately, works perfectly with the N/D267, snapping quickly into place around the mic body and providing a secure grip. Not surprisingly, though, the clip doesn’t work so well on non-



ALEX BUTKUS

**Planet Asia gets literal with two idiomatic expressions: “in your face” and “eat the mic.” Who better to test microphone articulation and handling of high SPLs than a rapper?**

rubberized microphones, which tend to slip easily from its grasp. (There is also an Electro-Voice model N/D267S, which provides an on/off switch.)

**Overall performance.** The N/D267 has a warm, fat, smooth, though slightly “soft” sound that does a great job of quelling plosives, sibilance, and other unwanted noises. It also exhibits low handling noise and excellent off-axis rejection. In favorable applications, the N/D267’s sound was described as sturdy, sexy, and magical; in less-than-favorable ones, it was called murky or lackluster. In terms of transient response, the N/D267 seems rather slow and unresponsive, which makes it not so good as an instrument mic. Rather, vocals are where this mic shines.

To match an SM58 to the EV N/D267, I dialed in 3 dB at 80 Hz, 6 dB around 300 Hz, and 3 dB at 3 kHz. It was the big 300 Hz bump, though, that seemed mostly responsible for the N/D267’s characteristic warmth and sexy smoothness—as well as the cloudiness it exhibited on certain source sounds.

**Concert vocals.** The Redeemed Convicts for Christ chose the N/D267 as their favorite mic, and it definitely did flatter their voices. I asked them what they liked so much about the mic. “It just makes us sound better,” answered Cameron Edwards. Caldwell’s

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explanation was somewhat more edifying: "If I were trying to woo a woman down in the front row," he said, "this is the mic I'd want."

The rappers, too, were fond of the N/D267, especially Planet Asia, who said the mic sounded "dope." Sound engineer Berenson also liked the sound of the N/D267, which he described as both brighter and more bassy than the OM-2 and excellent at handling high SPLs. But Michie, who heard the group's performance on DAT, thought the N/D267's sound was okay but "fairly featureless." He was impressed, however, by how well the mics handled "pops and wind."

**Studio vocals.** The N/D267 was more flattering on female vocals than male. The sound was smooth, round, and not edgy, with a full but never booming low end. It reminded me a bit of a tubemic sound. On our male singer, however, the N/D267, though warm and smooth, sounded somewhat covered. But it worked a kind of magic on my voice, making up for the thinness and providing a full, luxurious tone.

**Instruments.** On guitar amp, the N/D267 produced a muted, somewhat mushy tone with occasional grating highs. Also, it seemed that certain notes jumped out while others got short

shrift. Drums, too, fared poorly. The kick sounded drab and, curiously, insufficient in lows, and the snare-drum tracks were lackluster. The mic's geriatric transient response was particularly evident on the brush beat, which sounded covered and uneventful. The tom sounded muffled, lacking in both stick hit and resonance.

### PEAVEY PVM 22

A member of Peavey's new Diamond Series of dynamic mics, which are said to have "diamond-coated" diaphragms for improved transient response, the PVM 22 has a flat black, rubberized-paint finish on a steadily tapering die-cast zinc body.

Only slightly taller than an SM58, the mic has a 2-piece grille ball, the top of which is removable (like the EV N/D267's).

The PVM 22 comes with a black "velveteen" drawstring pouch and a distinctive-looking nylon mic clip. The mic clip, though, proved untrustworthy. Due in part to the PVM 22's tapered shape, the clip was incapable of holding the PVM 22 securely. Indeed, it proved unable to securely hold any of the other microphones—except for the rubber-handled EV N/D267, which it clung to tightly. (According to Peavey, the problematic clip has since been replaced by an improved one.)

**Overall performance.** The PVM 22 exhibited low handling noise, good off-axis rejection, and sturdy SPL handling. It was also the hottest mic of the bunch. Its overall sound, however, is quite colored, with a substantial bump around 1 or 1.5 kHz—a boost that, on some sources, results in a slightly nasal sound. (To achieve a similar sound from the SM58, I boosted 1 kHz by 9 dB.) In addition, the PVM 22 is shy in both low-bass and high-treble response.

**Concert vocals.** On the gospel singers, the PVM 22s sounded noticeably less smooth and warm than the EV N/D267s. The sound was clear and the blend wasn't bad ("Nothing objectionable," noted Michie), but the overall tonality of the mics didn't particularly flatter the voices. And Caldwell, the bass singer, wasn't thrilled with the PVM 22's seemingly rolled off low-end response.

The lack of highs—7 kHz and above—made the PVM 22 mics insufficiently articulate for the rappers, while the diminutive low end didn't give them much to work with, either. At the same time, though, the mics exhibited some troublesome sibilance, especially on Planet Asia, who had the higher voice.

**Studio vocals.** On both Shapiro's and Bradshaw's voices, the PVM 22 produced a relatively thin, somewhat "pinched" tone with a mildly nasal quality. Weldon remarked that, compared to the other mics, the PVM 22 sounded a bit "flat."

**Instruments.** The PVM 22 wasn't bad sounding on electric guitar, where it produced a nice, honking tone with plenty of bite—not an all-purpose kind of sound, but one that is sometimes desirable. On kick drum, the PVM 22 came through with a solid, punchy

tone that everyone rated high. However, the mic didn't fare as well on snare or toms. On snare drum backbeats, the mic nicely captured some of the wood quality from the maple-shell drum, but the overall tone was a bit hollow and seemed, as Michie put it, "processed."

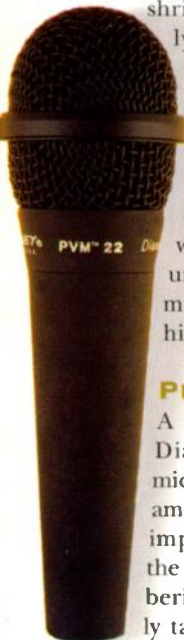
The PVM 22's distinctive coloration was clearly evident on the brush beat, where it produced a kind of "vintage" swish sound—the same tone you might hear on a jazz record from the late 1920s. The sound definitely had character and could prove useful in certain circumstances; however, it was not true to the source. Likewise, the PVM 22 made the tom sound weirdly artificial, almost as if it were synthesized.

### SAMSON Q2

The Samson Q2 is the most compact of the mics we tested, being nearly half an inch shorter than an SM58 with a much narrower wire-mesh grille. The mic has a unique "multi-stage" grille that is flat on top and fitted with a special "sibilance filter" that somewhat resembles the element in an old-style telephone receiver. The body of the mic—virtually the same color as an SM58—is unique in providing two switches near the bottom: one for a 10 dB pad and the other for a 12 dB/octave highpass filter tuned to 80 Hz (for eliminating stage rumble).

Like the AKG D 880 and Audix OM-2, the Samson Q2 features gold-plated XLR connectors. The Q2 comes packaged in a sturdy, foam-lined, hard-plastic case with a carrying handle. The included flexible-plastic mic clip was sufficient for holding the Q2, and it also proved versatile enough to hang on to most of the other microphones.

**Overall performance.** The Q2 has tremendous low and low-mid response but is timid in its reproduction of midrange and upper frequencies. The resulting sound is dark, sometimes boomy, and not especially clear or detailed. (To make an SM58 sound like the Q2, I added 6 dB at 80 Hz and 3 dB at 300 Hz.) Its off-axis rejection is





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Start with the gate. Set parameters for threshold, ratio, attack, hold, release, and output gain. See the effect of your settings on the graphical display, as well as on the gain reduction and audio level meters, they all interact in real time with your manipulation of the parameters. Start with a threshold setting of about -60dB to clean off the noise in between the vocal takes. You can save your final gate settings as a "gate preset" building block and recall it into any other setup you do.

**Compressor**

Then move to the compressor. The effects of the gate settings are still visible on the graphical display, so let that help you determine where to set your compressor threshold. The parameters you change here will also affect the curve on the graphical display in real time. Move through all the regular parameters like threshold, ratio, attack, release, and output gain. For vocals use a threshold of about -25dB, a ratio of about 3:1 or 4:1, and a slow attack and fast release for the most natural sounding effect. Your compressor settings can also be saved off as a building block to be called up into any other preset.

**Limiter**

On to the limiter. Changes you make to the limiter settings are also seen on the graphical display. Adjust the level up or down to suit your needs. The flat top line of the display moves up and down as you adjust the level. You can also set the speed at which the limiter lets go of the signal as it goes below the threshold. This is truly smooth limiting, with patented dbx PeakPlus™ algorithms, so rest assured that whenever you set your threshold level, your tape will not distort, and your signal will not get butchered as it goes across the threshold. And like the other parts of the processor, your limiter settings can be named and saved for later recall.

**De-esser**

De-essing works the same way: see the effects of your settings displayed on the graph. Parameters here are the common ones: threshold in frequency, 800Hz to 8kHz, and amount in percent. Other available processing includes EQ - both in-path and sidechain, for special-effect types of processing. When you are editing any of the building blocks, its icon is visible on the display, and the parameters are shown on the graph, so it's always easy to know where you are. Parameters are easy to see in this page's icon operating system. When it's as complex as this, it's nice to know somebody was thinking when it was put together.

**and More**

You can also work in stereo, or set up a completely different and independent processing chain for the other channel. Also, notice that the audio meters are capable of showing both peak and average levels for input and output. Optional digital output with the TYPE IV™ Conversion System with TSE™ (Tape Saturation Emulation) provides up to 24-bit output in either AES/EBU or S/PDIF formats with the trademark digital processing of TYPE IV™. The DDP also has full MIDI/ARTISTRIE capability, with separate MIDI in and then jacks. Enter processing setups may also be saved into one of 50 user defined presets, or use one of the 50 factory setups.

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excellent, though, and feedback is never a problem; however, the Q2's bass-heavy response makes for noticeable handling noise (which may be one reason the mic comes with a switchable rumble filter). The mic also exhibited difficulty in handling plosives.

**Concert vocals.** The Q2s produced a dark, dry, fairly intelligible, but somewhat covered sound. Berenson, the sound engineer, noted that the overall sound was similar to the Peavey PVM 22s' sound but with less clarity and better low mids. As for the singers, Caldwell enjoyed the bass response, but Horatio Finely, the group's tenor, remarked, "With this mic, I feel like I have to do more work."

Listening back to the DAT recording, I noticed not only some boominess in the low mids but also some distortion on the lead vocalist. However, we came nowhere near overdriving the console preamps.

For the rappers, who not only consistently ate the mics but also performed over a full, bass-heavy mix, the Q2s were not the mics of choice. Word articulation was poor and the overall sound was slightly murky. Also, plosives boomed noticeably and occasional distortion was evident.

**Studio vocals.** The Q2 didn't fare much better on studio vocals. The results were slightly better on the female vocals, but both the male and female

tracks sounded muffled, almost as if there were a dish towel hanging over the speakers. And as Weldon pointed out, there was a discernible "thinness" in the midrange.

**Instruments.** Not surprisingly, the Q2 didn't shine as an instrument mic, either, except on one instrument: kick drum. And here it was consistently voted best of the bunch. In fact, the Q2 kick-drum track was downright delicious sounding, with a deep, full-bodied response, the perfect blend of oomph and thud, and none of the annoying shell ring that some of the other bass-friendly mics picked up. Also, if you're partial to a full, very round tom sound with minimal stick attack, this mic will do the trick.

On snare drum, however, the Q2 produced tracks that I found practically unusable. Ditto for the Q2's electric guitar track, which sounded bass heavy, muffled, and generally unappetizing.

### SENNHEISER E835

The E835 is one of four vocal microphones in Sennheiser's new Emotion series. It is the tallest and heaviest of the mics we tested, about an eighth inch taller than the EV N/D267. It has a smooth and handsomely tapered blue gray body and a squared-off, or "flattop"-style, wire-mesh grille.

The E835 comes with a black nylon zipper pouch and a nylon mic clip (complete with European thread adapter) that holds the mic securely. The clip proved ver-

satile enough to hold all the other mics securely, too.

**Overall performance.** The E835 has a bright, clear, and highly articulate sound with plenty of low end and an all-around nicely balanced frequency response. The detailed high end can accentuate sibilance and sometimes sounds harsh. However, the mic is nicely tailored for vocals and is versatile enough for instrument applications.

In terms of the other mics, the E835 sounded closest to the AKG D 880 but with less bass hype and better representation of midrange frequencies. Handling noise was not a problem, and off-axis rejection, though not as good as the SM58's, was sufficient. Plosives, however, weren't especially well handled, and the mic sometimes boomed in the low mids.

Except for the enhanced highs and, to a lesser degree, lows, the E835 proved similar in character to the SM58: I matched the sound of the mics pretty well by adding 1 dB of 80 Hz and 5 or 6 dB of 12 kHz to the SM58.

**Concert vocals.** Going from the Peavey and Samson mics to the Sennheiser E835s, the gospel group was quick to note the improvement in sound. "It's like we came back to the party," said Caldwell. The mics produced a full, rich, and flattering blend of the a cappella voices. "They're a hair tangy," remarked Edwards about the E835s, "but they're easy to work."

The rappers, too, dug the clear, bright sound, beefy bass, and great articulation of the E835s. Back at the studio, though, where I was able to



## Opinions Vary

When it comes to microphones, personal taste is the final arbiter. The following are the four most-favored mics, ranked from first to fourth, according to the different folks who used the mics and/or lent their ears for the listening tests, and relative to the application and/or listening environment.

	Gospel Group (live)	Rappers (live)	Berenson (live)	Bradshaw (studio)	Casey (studio)	Knave (studio and live)	Michie (live)	Shapiro (studio)	Weldon (studio)
<b>First Choice</b>	Electro-Voice N/D267	AKG D 880	Sennheiser E835	Electro-Voice N/D267	Audix OM-2	Audix OM-2	Shure SM58	Sennheiser E835	Sennheiser E835
<b>Second Choice</b>	AKG D 880	Electro-Voice N/D267	AKG D 880	Sennheiser E835	Sennheiser E835	Sennheiser E835	Audix OM-2	Electro-Voice N/D267	Audix OM-2
<b>Third Choice</b>	Sennheiser E835	Sennheiser E835	Audix OM-2	AKG D 880	AKG D 880	AKG D 880	AKG D 880	Shure SM58	Shure SM58
<b>Fourth Choice</b>	Shure SM58	Shure SM58	Stedman LD23	Shure SM58	Stedman LD23	Shure SM58	Electro-Voice N/D267	Stedman LD23	AKG D 880

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listen critically to the tracks, I detected occasional, though slight, amounts of distortion, both on the gospel and the rap tracks recorded with the E835s.

**Studio vocals.** Both male and female vocal tracks came out great: clear, full, present, and fairly natural sounding. After closely comparing the mics, we concluded that the E835's sound fell somewhere between the SM58's and the AKG D 880's. However, the E835's bass elements were better integrated into the sound than the D 880's. For me and Casey, it was a toss up between the E835 and the Audix OM-2 for best all-around studio-vocal sound (on "real" singers, that is; on my own voice, I preferred the enhancements provided by the AKG and EV mics). Weldon, however, was resolute in his preference for the E835.

**Instruments.** The E835 sounded good

on electric guitar, but the hyped highs made the tone too bright for my taste. The bass, too, was slightly overboard. On kick drum, the overall balance of frequencies was flattering, but the high click part of the sound was consistently distorted, which rendered the track unusable. (All of the mics were positioned at the same point, about six inches inside the single-head kick drum and aimed at the beater.)

The E835's snare backbeat had a great crack but lacked a bit in body. Also, the attack of the stick on the head wasn't captured as well as it was by the Audix OM-2. The E835 also sounded good on the brush beat—crisp, full, detailed—but once again the mic's transient response wasn't as accurate as the Audix or AKG mics'. On the tom, the sound was quite similar to that produced by the AKG D 880 but with slightly better low mids. Still, the tone was thin when compared to the Samson Q2 or Audix OM-2.

### SHURE SM58

The venerable SM58 needs no introduction. Only complete newbies to pro audio won't be intimately familiar with this industry standard among handheld dynamics. But I should mention (for those who don't know) that the SM58 comes with a black vinyl zipper pouch and a hard-plastic mic clip.

**Overall performance.** One of the difficult questions this comparison test brings up, of course, is how much we all have been conditioned—from years of working with SM58s—to believe that the SM58 produces the sound that a handheld dynamic mic *should* produce. I can't answer that question, but I will take a stab at characterizing the distinctive sound and general performance traits of the SM58.

The SM58 has a presence bump around 3.5 kHz, a more prominent one around 6 kHz, and a slighter one at 9 or 10 kHz, all of which help the mic cut through a band mix. In addition, a subtle low-end hump around 150 Hz or so increases dramatically the closer you get to the mic—the famed

proximity boost which has saved (and continues to save) a good many voices from sounding thin.

On top of that, the SM58 exhibits good off-axis rejection, has impressively low handling noise, and allows for considerable gain before feedback. Moreover, the mic's transient response, though not exceptional, is sufficient for the applications that the mic is typically used for. Last but not least, the SM58 does a decent job of minimizing both sibilance and plosives. Together, these characteristics—along with the particular balance of other frequencies, of course—somehow combine to produce the particular magic that has made the SM58 such a desirable and exceptionally long-lived product.

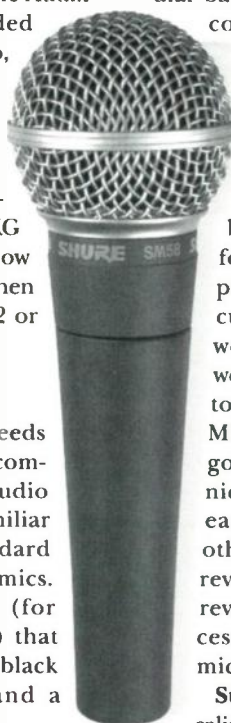
**Concert vocals.** Predictably, the SM58s produced a bright, clear, and robust sound for the gospel group. The rappers, too, benefited from the cutting power of the SM58s, as well as its bass boost. Plosives were noticeable but not over the top. And as live-sound veteran Michie pointed out, the SM58s' good room rejection results in a nice, dry sound that makes life easier for the house mixer. In other words, you can always add reverb to a dry signal—but if the reverb is already there due to excessive "room leakage" into the mics, you're stuck with it.

**Studio vocals.** On our male vocalist, the SM58 ranked consistently

high among the listeners. I felt that the mic worked second best on Shapiro's voice, and Weldon, who characterized the sound as "plain but full-service," picked it as his third favorite in this application. Casey, too, rated it third—not bad for a mic that's been around over thirty years.

The SM58 also worked well on Bradshaw's alto voice, producing a nice, well-rounded tone with a good balance of highs and lows. To my ear, only the EV and Sennheiser mics were more flattering to her voice.

**Instruments.** On the guitar amp, predictably, the SM58 held its own, producing a full and well-defined tone. (Weldon described the sound as "nothing fancy but definitely there.") The SM58's drum tracks were nothing to scoff at, either. The kick sound was serviceable ("Solid but unimpressive,"



ALEX BUTKUS

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noted Michie), and the snare tone, though a tad dull, exhibited the distinctive low “thud” the mic is known for. (Some engineers like it, some don’t.) The brush beat also fared well, with decent detail, a serviceable swish, and passable transient response. Best among the SM58’s drum tracks was the tom. It lacked a bit in stick definition (attack), but the basic tone was right there.

### STEDMAN LD23

If imitation is the sincerest form of flattery, Stedman is plainly enamored of the Shure SM58. Except for the Stedman logo and a black, rather than silver, windscreen, the LD23 (LD stands for “large diaphragm”) is a dead ringer for the SM58. Frankly, I was amazed by the similarities. For example, each mic has a 2-piece body that unscrews at the same place near the top. Even the wires inside are the same color: yellow and green (although the Stedman has a third, white wire). The capsules, too, look the same, the only visible difference being that the LD23’s sits about three eighths of an inch higher than the SM58’s.

The only other difference I could find between the mics was that the SM58 has more threads, both where

the two pieces of the body screw together and where the windscreens are interchangeable.

The mic clips are different, however: whereas the SM58 come with a hard-plastic clip—one that many engineers dislike due to its tendency to break when forced—the LD23 comes with a durable rubber clip. The clip does an excellent job of holding practically any handheld-style mic—that is, once you get the mic into the darned thing. Surprisingly, the LD23 does not come with any sort of pouch or protective carrying case.

**Overall performance.** In terms of sound and performance, too, the LD23 is a close cousin to the SM58. Berenson, in fact, described it as “a ‘58 without the hype.” The most obvious difference is less bass response—2 or 3 dB lighter around 150 Hz—which makes the LD23 sound less rich and full than an SM58. However, in certain applications this same trait helps clean up the sound, making it more clear and articulate.

Like the SM58, the LD23 exhibits low handling noise, good off-axis rejection, and sturdy handling of high SPLs. Control of sibilance and plosives seemed about equivalent to the SM58’s, as well.

**Concert vocals.** The LD23’s SM58-like presence boost was immediately noticeable on the gospel group, but the weaker bass response made for a slightly thin-

ner overall blend. In addition, the voices were well articulated, but there was a slightly compressed quality to the sound. From the gospel group’s perspective, the LD23s were fine but not exceptional.

The rappers sounded good on the LD23s—especially Planet Asia, who remarked on the mic’s clarity. But again, the LD23’s mild bass response made for a less virile sound than was provided by some of the other mics.

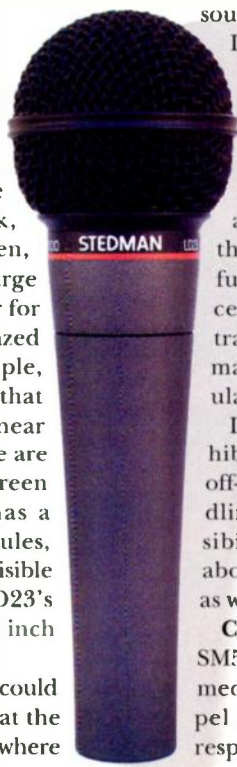
**Studio vocals.** On Shapiro, our male singer, the LD23 was flattering, sounding as good as or better than the SM58. On Bradshaw, though, the lack of warmth in the low end didn’t work to her advantage. The sound was serviceable, just not as luscious as with, say, the EV N/D267.

**Instruments.** Not surprisingly, the LD23 did a passable job on the guitar amp but, due to its mild bass response, just wasn’t as full or appealing sounding as the SM58. The same was true on kick drum: similar sound but with less bass (though slightly more detail). On the various snare-drum tracks, however, the LD23 presented a truer, more desirable picture of the drum than the SM58 did, with better click from the cross-stick hit, a bit more snap and snare sound from the backbeats (and less thud), and a more realistic balance of the various brush-beat elements. The transient response seemed improved over the SM58, as well. I preferred the LD23 on the tom, where it produced more attack than the SM58 and a slightly more controlled sound (less boom).

### PLURALITY RULES

Of course, no amount of testing can determine the best microphone for *your* purposes. If there’s anything to be learned from this comparison test, it’s that microphones are intensely application dependent. And as long as there are multiple miking applications, there will be room in the roost for a variety of different-sounding handheld dynamics.

It’s kind of like soft drinks. While there will always be Coke Classic, other delicious flavors abound. Ultimately, it is a matter of taste and finding what works best for you. The truth is, all of the mics tested here proved capable, usable



Spec Sheet						
Microphone	Element	Frequency Response	Polar Pattern	Maximum SPL	Weight	Price
AKG D 880	neodymium	60 Hz–20 kHz	supercardioid	147 dB (for 1% THD)	10.2 oz.	\$138
Audix OM-2	alnico	50 Hz–16 kHz	hypercardioid	>140 dB	10.5 oz.	\$149
Electro-Voice N/D267	neodymium	65 Hz–19 kHz	cardioid	158 dB	9.1 oz.	\$140
Peavey PVM 22	neodymium	50 Hz–16 kHz	cardioid	140 dB	9.9 oz.	\$149.99
Samson Q2	neodymium	50 Hz–15 kHz	cardioid	137 dB	10.5 oz.	\$174
Sennheiser E835	neodymium	40 Hz–16 kHz	cardioid	150 dB	11.6 oz.	\$159
Shure SM58	alnico	50 Hz–15 kHz	cardioid	150 dB (@ 100 Hz); 160 dB (@ 1 kHz)	10.5 oz.	\$188
Stedman LD23	alnico	37 Hz–18 kHz	supercardioid	152 dB	11.2 oz.	\$139

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tools, and considering how inexpensive they are, good values.

For myself, I don't like being confined to a single flavor. Although I will probably always have an SM58 or two on hand, now that I've gotten a taste of some other great sounds, I definitely feel the need to expand my palette of dynamic mics. After all, no single mic can cover all the bases. For the live-sound engineer, there is real value in having a variety of dynamic mics on hand to accommodate the broad range of voices certain to be encountered.

Of the seven new mics compared here, there are five I'd be very happy to have on hand for a live-sound gig: the AKG D 880, the Audix OM-2, the Electro-Voice N/D267, the Sennheiser E835, and the Stedman LD23. Each of these mics has its strong suit and particular flavor, and each is priced between \$138 and \$160—notably less than the SM58.

To get a big, sparkling, detailed sound with highs that can cut through practically any mix—no matter how lame the sound system—I would reach for the AKG D 880. With its fat lows and crisp highs, the D 880 does wonders to beef up a voice, seeming especially well suited to rappers, stand-up comedians, live announcers, etc.

For those who want a mic to reproduce the sound source with a minimum of enhancement or coloration, the



Singer Jeanne Bradshaw performed Patsy Cline's "She's Got You" for EM's dynamic-mic comparison tests.

Audix OM-2 is the clear pick. Its surprisingly natural-sounding frequency response and exceptional transient response make it good for practically any vocal or instrument application where realism is the goal.

If I were looking to add warmth and sex appeal to a thin or underconfident voice or to remove edginess from a strident one, the Electro-Voice N/D267 would be my first grab. This mic really enhances the warm, low-mid elements of the voice, making for a smooth, seductive sound.

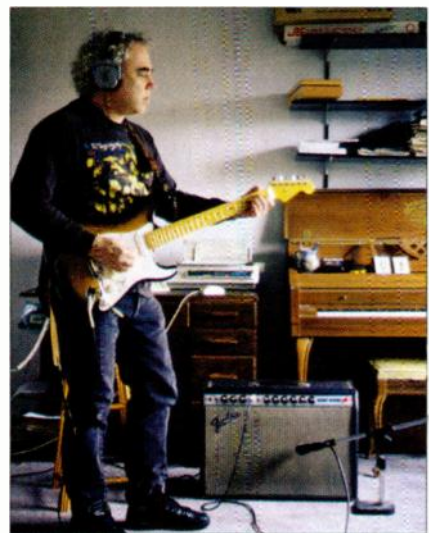
For a bright, clear, and somewhat less-hyped tone—but still plenty of highs and lows—the Sennheiser E835 is a great all-around mic. Not only does it work well on many different types of voices both on the stage and in the studio, but it also doubles nicely as an instrument mic in many applications.

And for those who favor the sound of the SM58 but would prefer something with slightly less hype, especially in the low end, the Stedman LD23 is sure to please. Like the SM58, it works consistently well on a variety of voices and sound sources.

### THE CROWN, PLEASE!

So, is the SM58 still king? Well, as you might have gathered from the multiple and meandering assessments presented in this article, that's not an easy question to answer! Clearly, there are at least a few dynamic mics currently on the market that both cost less (in retail dollars) and sound as good as or better than the SM58. However, in terms of brand recognition, versatility, and all-around performance, the SM58 is still a force to be reckoned with—and seems likely to remain so well into the millennium. To be king, after all, doesn't necessarily mean that it's the best; it simply means that it rules. And to date, no other handheld dynamic mic has usurped the SM58's share of the market.

Market share is no guarantee of quality, of course, but it's not as if the SM58 attained its stature by a fluke. True, the mic came to market long ago, when the competition was much less intense. But even so, the SM58 would never have survived all these years had it not been a capable, reliable, and consistently good performer. The key to the SM58's



Handheld dynamic mics have long been favored for close-miking guitar amps. Here, guitarist Mike Shapiro puts the mics to the test at his personal studio in San Francisco.

success, it seems to me, is simply that it sounds good on so many different people (and instruments) so much of the time. Then there's the durability factor (something a face-off such as this one cannot measure): as can be deduced by the number of working SM58s out there with severely dented grille balls, this mic is one hardy little beast!

Okay, so maybe the SM58 is still the "king," at least by these criteria. But so what? Those criteria, after all, don't really include the more important questions of sound quality, all-around performance, and value. When you take these practical questions into account, it's hard to argue that the SM58 remains the undisputed king of the dynamic microphones, even if it is a serious force to be reckoned with.

Issues of kingship aside, we hope these evaluations apprise you of what's currently available in low-priced dynamic microphones as well as provide a useful sense of how the mics compare to one another. Beyond that, we encourage you to listen to the mics for yourselves. The final estimate, after all, should be up to your own ears.

*Special thanks to Robert Berenson, Jeff Casey, Karen Dere, Marshall Lamm, Chris Michie, Monster Cable, Planet Asia, Rasta Cue-Tip, the Redeemed Cowicricts for Christ, Rick Weldon, and Yoshi's. Stone's Throw records can be reached at [www.stonethrow.com](http://www.stonethrow.com) or (408) 631-3012 and Heratik at (888) 939-1667.*



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# ALL TOGETHER NOW

BY JIM MILLER

*W*

hether it be a choir, string section, or brass trio, an ensemble can really add zest and style to an arrangement. But few personal-studio owners have an entire brass or string section awaiting their pleasure. Fortunately, thanks to MIDI controllers, synths, and samplers, we have alternatives, even if they are less than perfect.

To begin with, you have to choose whether to play each part in the section as a separate track or to play all of the parts in one pass, as if a real section were in the studio. And if you choose to play the parts in one pass, you can either layer a bunch of individual instruments (using one or more synths and samplers) to create a virtual "ensemble," or you can sample a real ensemble. For many musician-producers, using sampled ensembles is the most practical choice, so we're going to focus on that approach.

## OTHER VOICES

First, let's discuss why sampling real ensembles makes the most sense for many of us. Playing the parts one by one has the advantage of creating the feeling of individuals playing separate instruments. It also gives you more flexibility than playing all the ensemble parts in one pass. So far, so good.

# ALL TOGETHER NOW

However, to do this properly, you need to have a variety of instrument sounds available. You can achieve this by mixing samples from different libraries and using a variety of samplers and synths, including physical-modeling instruments.

In addition, to play the individual parts convincingly requires a solid knowledge of orchestration and the performance techniques and peculiarities of each instrument. You also should have good chops on your favorite MIDI instrument, including a good handle on controllers, so that you can add subtle variations and play with feeling. So although the results of this approach can be convincing, the time required and the difficulties involved in pulling it off properly might be more than you want to deal with.

Let's assume, therefore, that you want to layer solo synth instruments into a virtual ensemble and play the part in one pass. Many musicians choose this approach, but the results generally sound sterile.

Even if you have a variety of sounds available, you often have to make up for inherent sound-design limitations. The designers who create these sounds avoid recording sounds that have a lot

of personality and don't fit in with the rest of the collection. During the recording, they are forced to keep the musicians from doing things such as accenting attacks or sliding into notes—that is, playing with feeling. Yet feeling is exactly what is needed for an ensemble to be believable.

As a result, when you layer these sounds, there are no real dynamics, no slurred attacks, and no harmonic motion—things we hear (but may not be consciously aware of) when a real group of musicians plays together. The best programmers may try some tricks to add feeling to the samples (by putting a pitch envelope on the notes or a delay on the attacks, for example), but at best this can only slightly improve what is basically a static, lifeless sound.

If you are playing each part one at a time, you might be able to make up for these limitations—assuming, as noted earlier, that you are a strong player and have mastered controllers. But if you are playing the entire “ensemble” at once, you don't have control over the individual parts. Therefore, you can't create the sound and feel of real musicians playing together, and more often than not, you wind up with less-than-convincing arrangements.

On top of all this, whether you play each track separately or layer several instruments and play them in one pass, you will gobble up your precious supply of MIDI voices. This isn't always a problem, of course: you might have several synths or samplers with plenty of voices, or you could play back your sequenced ensemble tracks and record them as audio tracks.

That leaves us with our third alternative, which is to find an ensemble to record. True, you still won't have control over the individual parts, but live players will produce these parts, so you will get a measure of realism that is not possible when layering and is possible only with great difficulty when playing each part yourself. As a bonus, this approach won't use up all your MIDI voices.

## GETTING A GROUP

Finding a group of musicians to record may very well be your biggest chal-

lenge. It's usually difficult enough to get solo musicians who are willing to blow or bow notes for you, and when you attempt to recruit two or more, a whole new ball game emerges.

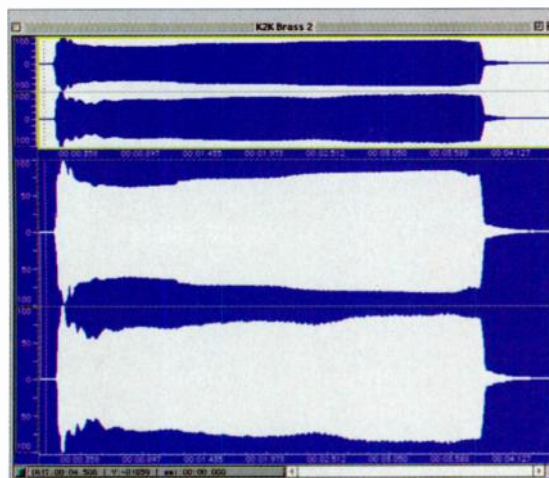
My best advice is to be patient. In many cases, the group will be vehemently opposed to the entire concept of sampling. You need to calmly explain to them that you are only going to use these sounds for your own compositions. Tell them the truth: the odds that your music will ever get to be a Top Ten hit are astronomically slim, so you will not likely end up a multimillionaire on the basis of their hard work. You may find this laughable, but believe me, it works!

If you are persuasive enough to get the group to agree to a recording session, the topic of money will eventually arise. You should either factor this into your budget or be prepared to work out some sort of trade. The group might need a good live recording or a few free studio sessions. It's not always practical—or even desirable, since such arrangements can sometimes end up being more trouble than they are worth—but it's something to keep in mind as a bargaining chip. Once you have an agreement in principle, I suggest that you put it down in black and white so there's no confusion later.

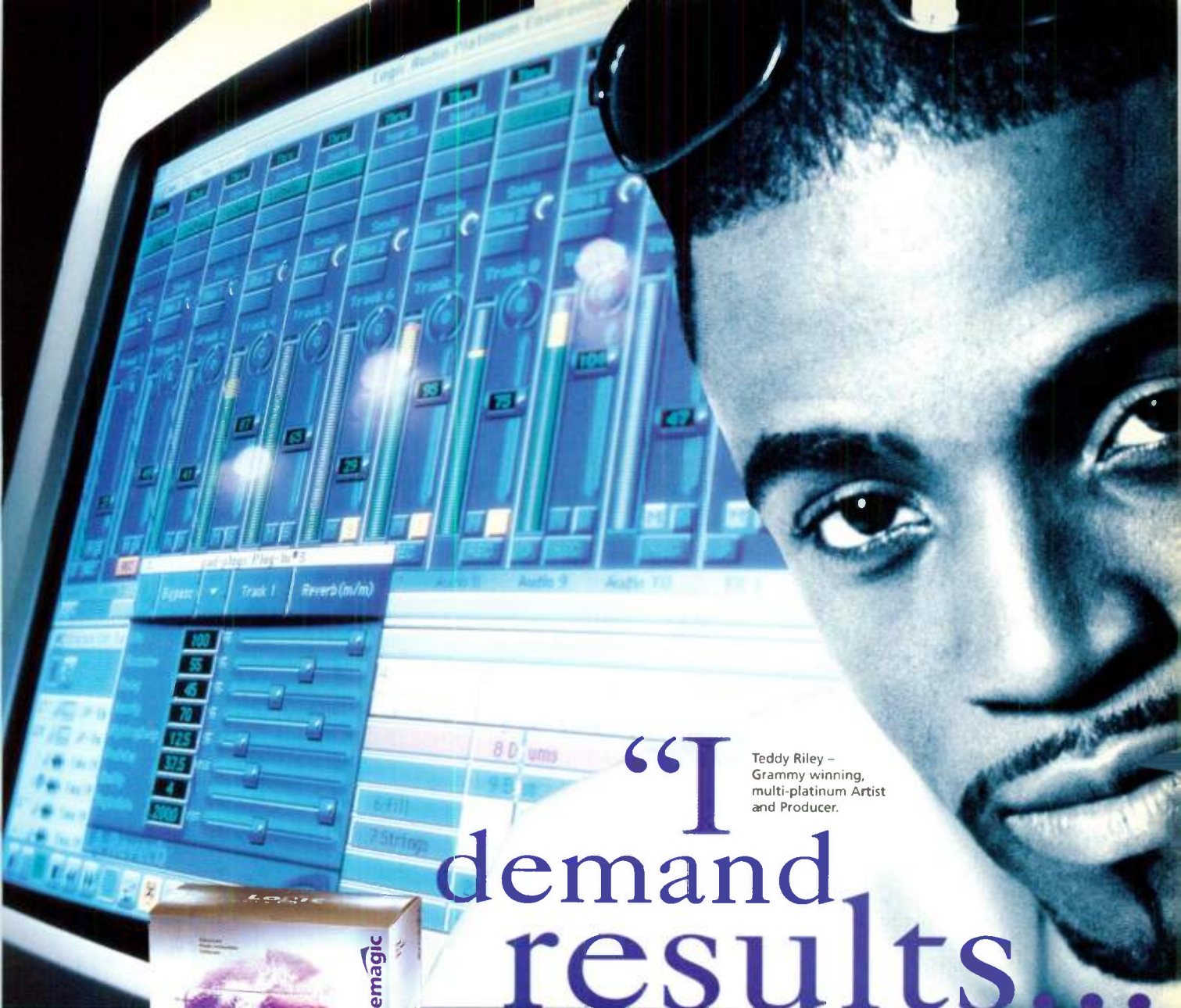
You might try contacting a local college or university. Sometimes you'll find that the school's choir, for example, would be willing to do a recording in exchange for a modest donation to the school. In this case, your job is a bit simpler because you have to convince only the instructor rather than the whole group. Some schools also have after-hours ensembles that consist of students and faculty members. This is also a much easier “sell.” In the end, you may have to do more work to get a really nice set of samples—you probably won't get the level of performance you would get with a professional group—but there will usually be fewer hassles and less money involved.

## TIME AND SPACE

Once you get your ensemble to agree to a session, you have to work out the logistics. Obviously, the more people involved, the harder it will be to coordinate a time and date. Most groups have a scheduled rehearsal night, so you might be able to set your session



“Layered Brass” is a factory Kurzweil K2000 sound that features trumpet on layer one, trombone on layer two, and tenor sax on layer three. You can see from the waveform that this sound doesn't have a lot of harmonic motion.



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for that night. The more important issue is finding an adequate recording space. The room needs to have proper acoustics and be able to accommodate all the players and equipment (DAT recorder, mixer, mics, etc.).

At this point, you will have already put a lot of time and effort into the project, so you shouldn't cut corners on the recording environment. If you need a large area, look into renting a small hall from a local school or organization (such as the Elks or American Legion). Other possibilities include local recording studios and radio stations that might charge you only for use of studio space, provided you bring your own equipment. Find out if they have any nights that aren't booked. There are quite a few options here, so do a thorough search for a space before you commit to anything. (I have been able to find big rooms for as little as twenty dollars.) Just remember to book more time than you think you'll ever need—because you *will* need it!

Make sure you arrive at the session early, giving yourself plenty of time to set up and troubleshoot. There's nothing more embarrassing than having to tell a roomful of musicians that you forgot a mic stand, so leave yourself a cushion for an emergency of this sort.

Regardless of what size room you wind up in, keep in mind the fundamentals of room acoustics and adhere to the basic guidelines for instrument and mic placement (see sidebar, "Ensemble Setup"). Before you do anything, survey the room to determine what its acoustic response might be. Set up the musicians away from the walls or any unusual room boundaries (a hallway or entryway, for example). Also make sure there are no mechanical devices present that could generate noise during the session.

You'll probably end up using condenser mics because they have the ability to accurately capture an instrument from a distance and generally provide superior performance. Although I swear by the AKG C 414, you can find many great-sounding mics that will do a

fine job. When recording brass with condensers, make sure your mics can withstand the high sound-pressure levels; if you even suspect there might be some clipping going on, use some padding or reposition the mics.

Make sure that you record the session in stereo. Even if you don't plan on using stereo samples or you don't have enough RAM now (though with RAM so affordable, what are you waiting for?), at some point you might change your mind. Always leave yourself the option.

Most important, be sure to check for phase coherency between the mics by panning both channels to center and listening for any thinness or subtle flanging. You don't want to get home and find out that your mics were canceling each other. At this point, you should have everything set up and be ready to hit the Record button.

## THE SESSION

Once everyone is present and has warmed up a little, you will need to step forward and explain exactly what you expect. Even if you have discussed these details over the phone with the group's representative, review the agenda again.

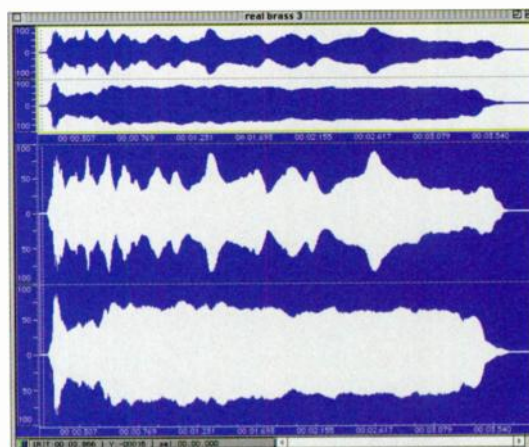
Tell them you will begin with the lowest notes and work chromatically up the scale. Make sure they know that if they hit a clunker (and even the best players will), they should just stop and try again. Explain that you want at least three or four takes of each note, with good articulation and technique. Keep in mind, however, that you are looking for a recording with some personality, not the perfect consistency you'd want in a solo sound, so *perfect* articulation on each note is not necessary. A good group feel is more important.

For any ensemble or section sound, you will want at *least* four or five seconds on each sustained note—six would be even safer. You need to determine who will conduct the players. If there is a choir director or other nonplaying member present, this person can lead the ensemble just as if it were an actual performance. If not, the lead player will have to take charge. However, he or she may have trouble counting a

downbeat while getting ready to blow a note, in which case you may be forced to tap out a "one-two-three-four-play" so that everyone starts at the same time. Because there's no music from which the players can take their cues, this is the toughest part of the session.

You will want at least one set of samples with smooth attacks and another with accents. It would be good at this point to have the musicians try some different attacks, which will also help you set optimal recording levels. (If you are recording brass or wind instruments, be sure to review "Blow the House Down!" in the February 1998 *EM* for a discussion of how to record special performance techniques, such as *doits*, *shakes*, and *scoops*.)

You also have to decide whether you want the players to use vibrato. Although many musicians abhor samples that contain natural vibrato, it is essential that the ensemble plays as it would during an actual performance, which is usually with some amount of vibrato (though brass instruments tend to use less than winds or strings). This animation cannot be added "after the fact," as you might do with a solo sound (using a mod wheel, for instance). Because each player in the group will start the vibrato at a different point and perform it at a different speed—which is part of what makes an ensemble sound so distinctive—these nuances need to be captured with the performance. If you were to depend on an LFO to add this effect, everyone in your sampled ensemble would be playing



"Real Brass" is a sample of a 3-piece brass ensemble consisting of a trumpet, trombone, and tenor sax. Note the huge difference between the left and right channels and the many peaks in the waveform (particularly in the left channel), indicating the complexity of the sonic information.

## ENSEMBLE SETUP

When recording a string section in stereo, it's a good idea to observe the traditional positioning of each instrument (see Fig. A). Historically, the violins are always on the left, the violas toward the center, and the cellos and double bass on the right. Although some modern ensembles position the players in other configurations, this placement is tried and true and is a good choice when working in a foreign recording environment.

If you're in an unfamiliar room, stick to basic mic selections and placement. Although omnidirectional mics can sometimes deliver a better response than cardioids, they are tricky to work with and often capture sounds that you won't notice at the time (such as traffic outside the building). If you have a stereo mic available, give it a listen. Crown's SASS microphone is specifically designed for recording group performances and really replicates the stereo image well.

Otherwise, your best bet is probably a cardioid x-y pair positioned dead-center in front of the ensemble. As a variation on this approach, and if

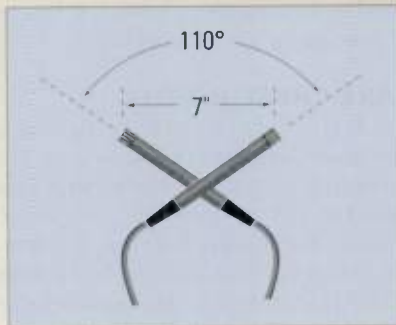


FIG. B

you have a somewhat ambient space to work in, you might try the ORTF (Office de Radiodiffusion-Télévision Français) configuration (see Fig. B), which positions two cardioid mics further back from the "stage." The cap-

sules are separated by about seven inches at approximately a 110 degree angle, which best represents human hearing.

My suggestion for finding the best mic placement is to mount your x-y pair (or stereo mic) on a single mic stand so it can be moved easily. Then, set up the ensemble and do what a microphone does: listen! Put your head in the general area where you think the mics should be, and then close your eyes. Move around until you find the "sweet spot." When you find it, replace your head with the mics (so to speak). Put on a pair of headphones (monitoring the mics, of course), and adjust the level so it is comparable to that of the ensemble's natural volume. Then, move the mic pair around slowly until you find the sweet spot again and it sounds like you're listening to the ensemble directly rather than through headphones.

—Jeff Casey

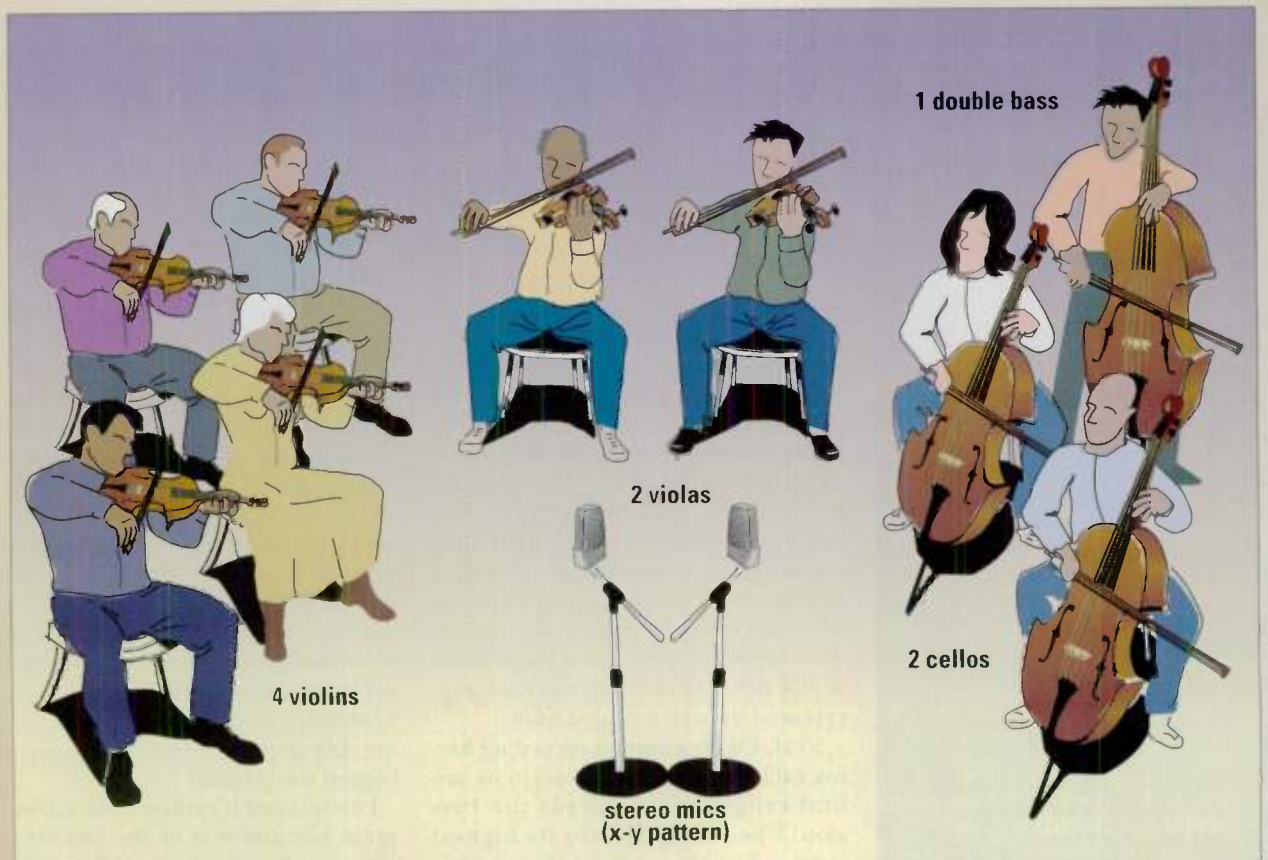


FIG. A

# Alive and Kickin'



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with the same vibrato rate and depth, which would sound unnatural. If you're unsure, get a few takes of each.

## TAKE CAREFUL NOTE

You'll also have to consider high- and low-note priority. Let's say you are recording a string ensemble with one bass, two cellos, two violas, and three violins. The lowest note on the double bass is E, while the cello's low note is the C above that. Meanwhile, the viola's lowest note is the C an octave above the cello, and a violin's low note is the G above that. Only the double bass can play the lowest eight notes of the scale.

So here's your quandary: Do you want the cello to double those eight notes an octave higher and then shift back to its low C when the bass reaches that note? Or do you want to record the bass alone for the first eight notes and then have each instrument begin to play when the lowest note of its compass is reached? Or do you want everyone to start playing on their lowest E? Yikes, this is complicated!

I can't categorically answer this important question for you, but I can give you some good advice: record a number of options. I would do one recording where the players start on their lowest common note—in our string example, that would be each instrument's lowest E—then each would shift back down when the lowest note of its actual range comes in (e.g., G for the violin). Continue on up the scale until each instrument hits its highest note. The violin, of course, can go higher than anyone else, so you can have the other instruments shift back down an octave when necessary to double the violins. This approach gives you a huge string sound because many octaves are represented in each sampled note.

Next, I'd do a second recording having each instrument play *only* in its natural range (which means the bass would be reaching into its highest range when the violin is just starting to play). Continue up the scale, allowing each set of instruments to drop out

when its highest note is reached. By recording your section both ways, you end up with two usable sets of sounds but with totally different string timbres. Feel free to mix and match scales however you please. Just have an idea of what you want to do in advance so you don't look like a moron when the players bring this subject up—and believe me, they will.

## FOR THE RECORD

As a rule of thumb, when in doubt, just keep recording. You can sift through the many variations and takes once you're back in the studio where nobody will see you openly weeping. I say this only because it's very easy to get totally overwhelmed by all the material you will have after the session is over.

Good record keeping is essential to the recording process. Keep a log book that identifies each take and its position on the DAT, and slate each one on tape. This way, when you get back to the studio, you can easily find the keepers.

One final word regarding the recording session: if things are going badly, be brave enough to pull the plug. If you are an hour into the session and you only have two or three notes on tape that you feel are usable, just stop. Admit it's been a disaster, and cut your losses. By this point, the musicians will probably be even more embarrassed than you are. Fortunately, unless you are dealing with very inexperienced players, this shouldn't happen.

## BACK AT THE RANCH

If you kept good notes at the session, you should be able to go right to the best set of takes and start there. Try to digitize *all* the notes you think sound good (provided you have the RAM to do so), even if you know there are more than will be needed for your final set. It's better to have too much to work with than too little. Work slowly; there's no time limit here. Spend a day, two days, a week—whatever it takes to get the best set possible. Don't even begin to think about looping anything at this point; just make sure the notes have been imported. During this process, use EQ sparingly to repair only the biggest sonic flaws.

I mentioned it earlier, but I will say it again because it is of the utmost importance: You are looking for a sense of liveliness in your ensemble samples, a set that oozes personality. You cannot



possibly evaluate these sounds the same way you would if you were creating a multisample of a solo instrument. In most cases, your ensemble sound will be mixed behind all your other instruments. Therefore, small variations in attack, pitch, and phrasing will be less noticeable and will subtly give your arrangement a much more human sound. You may not believe this now, but when you are finally able to play your ensemble sound along with the rest of your instrumentation, I guarantee it will be a revelation!

If you have extra RAM, you also have the option of creating two sets of similar sounds that cross-switch back and forth. For example, you could have a set of samples on one keymap that has a smooth attack, while your second has a more accented attack. Alternatively, you could put smooth brass on one layer and brass with shakes or scoops on another. Keep these ideas in mind as your set develops.

## ROUND AND ROUND

After you've finished importing your sounds, take a break and do your loop-

ing on another day. Modern technology has made looping ensemble sounds much easier than it once was. Of course, that doesn't mean it's fun. I can't wait until someone invents the super-duper, press-a-button-and-it's-looped-perfectly software. (AnTares Systems' *Infinity* is probably as close as you can get these days.) So for now, we're still on manual control, having to select our loop points based on experience and some amount of luck. (For a more detailed look at looping techniques, see "In the Loop" in the September 1996 *EM*.)

Fortunately, even if the looping process introduces some amount of cycling or phase shifting to the sound, it will be virtually unnoticeable unless you compare it to the original recording. Longer samples mean less cycling/shifting, and this is where you'll be glad you made 5- or 6-second recordings and have plenty of RAM.

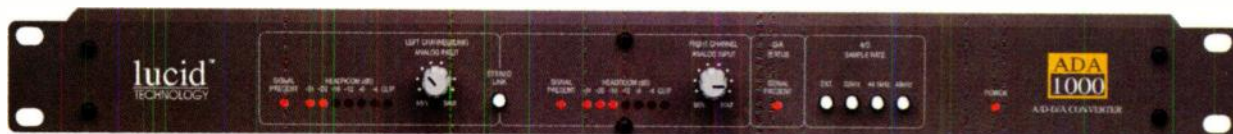
If you've done any looping before—and creating an ensemble multisample is not exactly the place to start learning—you know that some amount of equal-power crossfading will need to

be done. Your ears have to be the final judge of exactly how much crossfading is required, but as a rule of thumb, start between 40 and 50 percent and work your way up. Some samplers use units of measure other than percentage; refer to your manual for an accurate interpretation.

## SUMMING IT UP

The quality of your finished ensemble samples depends upon the talent of the musicians you hire, your patience and thoroughness in working with those musicians, and your skill as a recording engineer. With today's tools, it's easier than ever before to create a great sound. If you follow the steps outlined in this article and put in the hours of effort required, I promise you will be rewarded with ensemble samples that exceed even your wildest expectations.

*Jim Miller is a regular contributor to EM whose samples have appeared in libraries from Alesis, Akai, Kurzweil, Roland, and Sweetwater Sound. He misses his dog Otter, friend and companion for fourteen years.*



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Dear Mickey

FRIDAY  
APRIL 20



Nov. 17, 1997

Dear Aunt Linda,  
Thanks for letting me sing. It was really scary at the begining. It also was a great experiance. I've never sang a song like that. It was like the day of my life. I kind shivered while I sang. But, It was so so much fun. I bet that it was a great experiance for you too. I just can't beleve I did it. I love you.

Your favorite niece,  
Kelsey Loudi



ILLUSTRATION  
BY LAURA WILLIAMS

FROM BLANK TAPE TO  
FINISHED DEMO IN ONE DAY.

# Diary of a Song Session



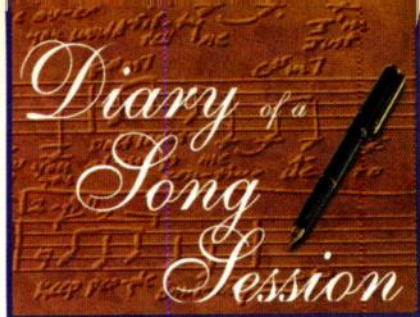
*Like many songwriters, I got into home recording to demo my own songs. Later, I began to supplement my income by producing demos for other songwriters. Now that I've developed a reputation for making good demos, I'm often asked by other personal-studio owners how I conduct a demo session. Typically—like me—they're working with a limited number of audio tracks, so they're usually curious about multitracking strategies. They want to know, "Which instruments do you record first, second, third, and so on?"*

*Another thing they want to know is how to make the groove feel "live"—as if the musicians are playing together—when recording one track at a time. I am also frequently asked how to record a drum kit with only two or three tracks. (I record real drums whenever possible. It's more of a hassle than sequencing the parts, but for most styles of music I prefer the sound of real drums.) And then there are the more general questions, such as how much production is necessary, what do publishers really want to hear, etc.*

**BY  
BRIAN KNAVE**

*To answer these and other questions, I'll detail a recent song session step by step. This particular session was notable for a couple of reasons: first, the demo—from blank tape to final mix—was completed in a single day; and second, the lead singer was a young girl who had never before set foot in a recording studio.*

*Of course, I'm not suggesting that you try to cram this much work into a single day, nor would I recommend that you attempt to mix a song at the end of a full day of recording. (Whew!) But in this case, one day was all we had, so we made the most of it.*



## STILL YOUNG AT FIFTY

For the session chronicled here, I had the good fortune of working with an experienced songwriter—something that usually expedites the demo session considerably. Not only was the song tight in terms of structure and narrative but its market was clearly defined. Entitled “Dear Mickey,” the song is a poignant ballad written to Mickey Mouse from a child’s perspective. The child has learned that Mickey is more than fifty years old, yet she can’t reconcile this information with the fact that the celebrity mouse hasn’t aged. Also, she wonders why people so often become unhappy as they grow older.

Songwriter Linda Kriss wrote “Dear Mickey” in 1982 and pitched it to Disney’s children’s publishing division in 1987 in hopes that the company would be interested in using the song for Mickey Mouse’s 50th anniversary celebration. The head of the division liked the song and forwarded it to three creative directors. They liked “Dear Mickey,” too; however, the song had come in too late to be of use for the anniversary. Kriss was told only that Disney would like to “hang on” to the song for possible future use. (Someone at Disney also pointed out that, due to the trademark-specific content of the lyrics, the song couldn’t be used elsewhere, anyway, without risking legal infringement.)

Kriss didn’t pursue pitching the song after that, nor did she hear back from Disney. A few years later, though, the song became a favorite of Kriss’s niece, Kelsey Laudi, a young girl who had shown musical talent from an early age. Kriss promised Laudi that if she learned the song, she would take her into a studio to record it and would repitch the song to Disney.

Laudi was eight years old when Kriss contracted me to record the song last autumn. The proposed schedule was tight. Kriss would fly in from Seattle for the day, and Laudi would arrive by car with her mother from the Sacramento area. Having only one day to complete the song demo, we would have to plan the session carefully and stick to the schedule.

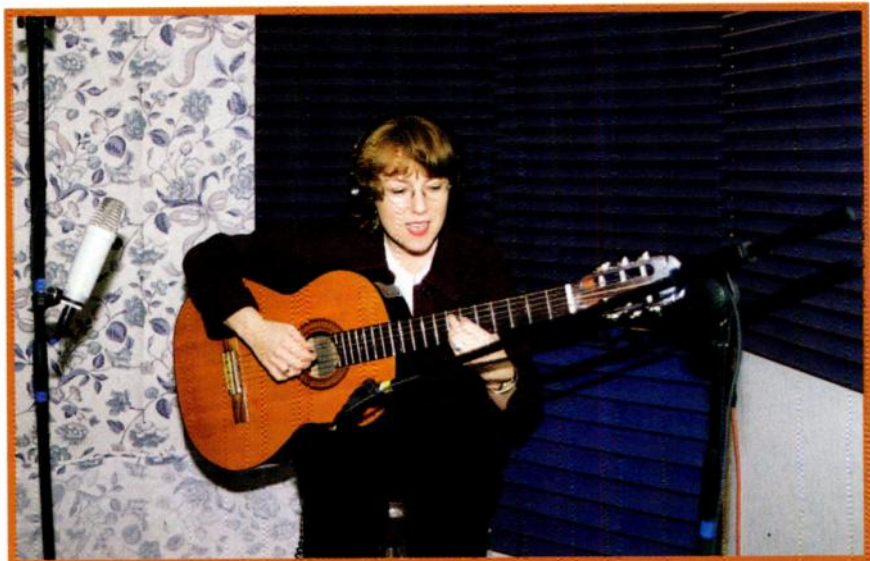


FIG. 1: A Neumann KM 184 small-diaphragm condenser and a Rode NT1 large-diaphragm condenser capture a stereo image of Linda Kriss’s nylon-string guitar.

Of course, eight-year-olds aren’t exactly known for long attention spans. Realizing that the young singer’s age and inexperience could prove a liability, we came up with a schedule designed to maximize our chances of getting a usable vocal track. Our strategy was to have the guitar tracks recorded and everything set up and ready to go, so when Laudi arrived in the afternoon, she could slip into the headphones, get comfortable with the sound, and record her part quickly—hopefully before losing momentum or interest.

What follows is a step-by-step account of the song session for “Dear Mickey.” It illustrates not only an approach to recording a musically coherent-sounding song one track at a time, within the constraints of the 8-track format, but also an approach to making the most of a day. The session began at 1:00 P.M. on a Sunday and was finished at 2:00 A.M. the following morning. Total work time was eleven hours.

## THE WEEK BEFORE

I received sheet music, lyrics, and a rough demo from Kriss and began getting acquainted with “Dear Mickey.” Kriss played a nylon-string guitar on the rough, and the sound seemed appropriate for the relaxed groove and reflective mood of the song. At Kriss’s request, I tried to locate a premium classical guitar for the recording session. I didn’t find one in time, though. But Kriss’s guitar sounded fine, and besides, I felt that the recording would

likely go more smoothly with Kriss playing her own instrument.

The song form, though unusual for having the hook in the verse, worked beautifully. The question now was what instrumentation to use. Initially, Kriss wanted guitar and vocals only, as the song was earmarked for a limited pitch and wouldn’t require extensive production. Besides, she pointed out, it would definitely be rerecorded if Disney were to do anything with it. Just the same, I pushed for a fuller sound: bass and drums, at least, to accompany the guitar. I could hear in my head how nice a fretless electric bass would sound with the nylon-string guitar, and what’s more, I knew the perfect bass player for the job.

Fortunately, Kriss agreed to the additional production costs. I hired Bay Area bass virtuoso Marty Holland, read him the chord progression over the phone, and instructed him to show up at 4:30 P.M. the day of the session. Holland is not only a terrific player but he can both read and improvise exceptionally well—important abilities when time is short.

I planned to play the drum parts myself, so now the only thing missing was a soloist. Instrument solos are not essential on song demos, of course, but when tastefully incorporated into an arrangement, they can provide a welcome “breather” from the lyric sections. The important thing is to keep the solo brief and musical. This is not the place for an extended display of chops.

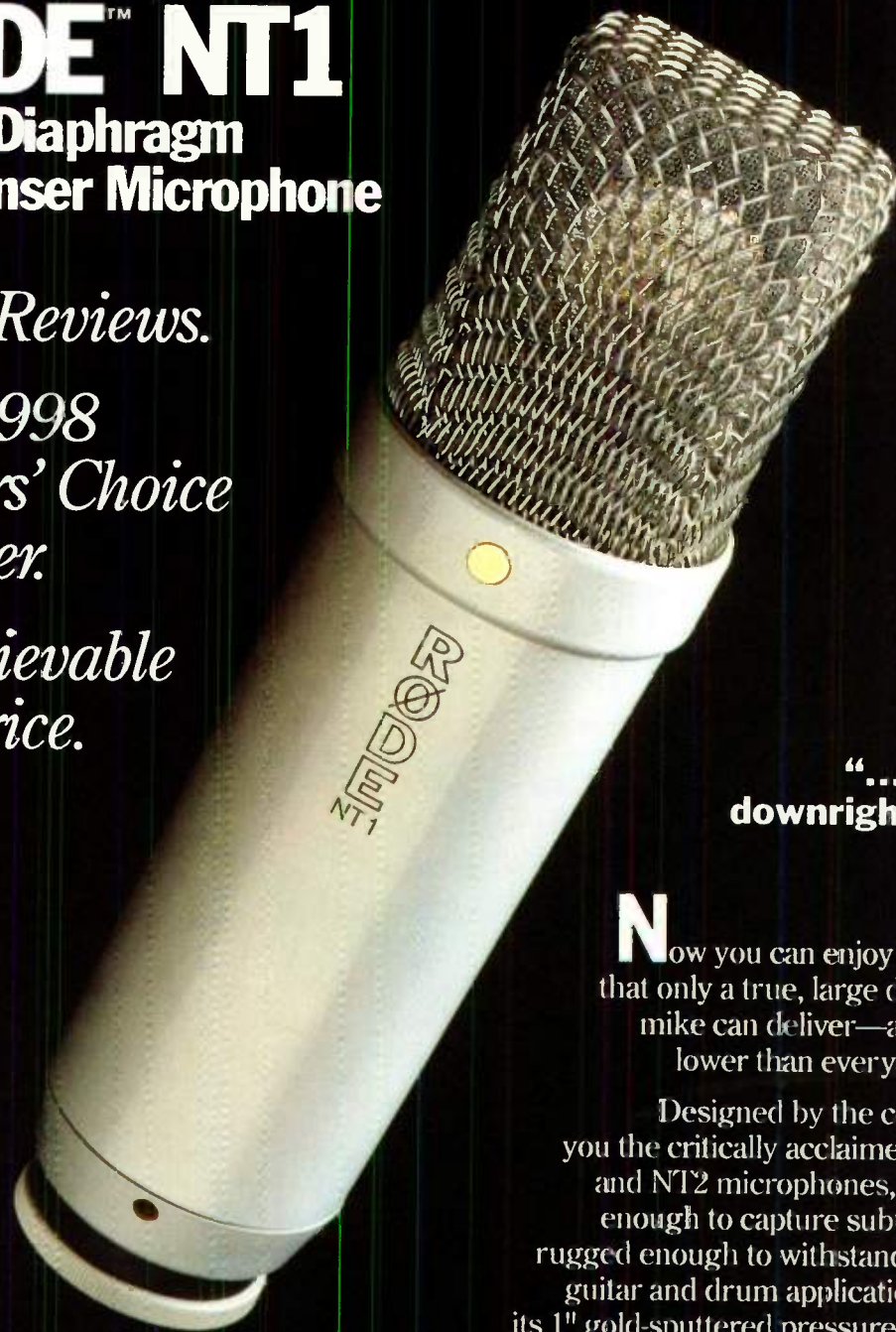
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A 4-bar section at the beginning of the second bridge, where Kriss usually hummed the melody, seemed a good place for the solo. To save time (and money), I recommended that we simply have Holland solo on bass. Kriss liked the idea, and now everything was in place for the session.

### 1:00-2:30 P.M.

Before Kriss arrived at 1:00, I formatted an S-VHS tape, set up two mic stands, and arranged several wood panels on the floor and along the walls to create some early reflections from the guitar. (Without the wood panels, my studio is very dead sounding.) As soon as Kriss arrived, I got her situated on a drum throne and started listening to the guitar with different mics as she tuned.

We detected a buzz coming from the fourth string. I tried muting it with

some tissue paper tucked beneath the string at the bridge, but that didn't do the trick. We were able to diminish the buzz somewhat by slackening and retightening the string a few times. I was also careful to place the mics so as not to accentuate the buzz.

I ended up choosing two different mics for stereo-miking the guitar: a Neumann KM 184 small-diaphragm condenser and a Røde NT1 large-diaphragm condenser. The KM 184 was positioned about two inches beneath the fourteenth fret (see Fig. 1), aimed directly into the wood. The NT1 ended up about two feet back from the front of the guitar, approximately level with Kriss's right ear, pointed at the soundboard slightly above the point between the bridge and soundhole. The KM 184 captured a warm, woody tone with lots of bass while the NT1 provided a bigger, brighter picture of the guitar, from more of a listener's perspective.

After finalizing mic positions, I set up my sequencer (Passport *MasterTracks Pro*) and used the metronome on my Korg 01/W workstation to determine the tempo at which Kriss was playing

the song. I then played along on my KAT trapKAT drum controller (connected to a Roland TD-7) in search of a basic beat that worked with the groove. After finding a beat Kriss liked, I recorded a few bars of it at the chosen tempo, looped the bars, and quantized the resulting dummy track so Kriss would have a steady groove to play along with.

Next, I recorded the sequenced beat and a 4-click count onto tracks 7 and 8 of my Alesis ADAT-XT. That way, the computer wouldn't have to be on as we tracked the acoustic guitar—an important noise-reduction consideration in a one-room studio.

Now we were ready to record the guitar. I shut down the computer, covered the XT with a special rack door I devised to mute transport noise, and started tracking. We did three passes, recording onto tracks 1 and 2, 3 and 4, and 5 and 6, respectively. Listening back, we settled on take two as the keeper. I then internally bounced tracks 3 and 4 to tracks 5 and 6 so I could open up tracks 1 through 4. (I find that keeping instruments logically grouped ultimately simplifies things.)

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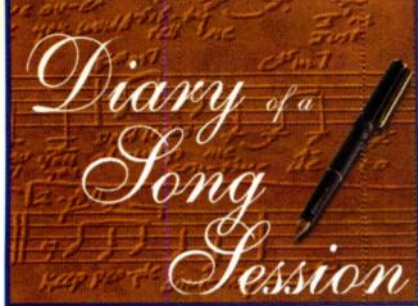
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Using the NT1, Kriss recorded a quick dummy vocal onto track 4 as a reference for her niece. Afterward, I broke down the mics, put away the wood panels, and prepared for vocal tracking.

#### 2:30–4:30 P.M.

Laudi arrived on schedule at 2:30. Per my usual method, I had set up three stands and positioned three different mics (with grilles nearly touching) to determine which mic was most flattering to the youngster's voice. The three mics were an AKG C 414, a Groove Tubes 6TM, and a Røde NT1. As I oriented Laudi to the headphones and adjusted levels for her mix, it became apparent that the Groove Tubes 6TM was the mic of choice for her voice. I took down the other mics and stands, situated Laudi on a drum throne, and positioned the 6TM (see Fig. 2).

I took my seat at the console, and Laudi started rehearsing her part. As usual, I engaged the Record button from the get-go, in case some magic happened. It did. In fact, the first verse of the "rehearsal" take sounded so good that we ended up keeping it. The remainder of Laudi's part, however, required a good deal of punching in as well as a bit of coaching from Aunt Linda. Total time for the take was one and a half hours—not bad at all for a young, first-time recording artist.

#### 4:30–5:30 P.M.

Holland showed up at 4:30 and briefly met the singer before she and her mother drove back to Sacramento. Then we got to work. I set up a music stand and rolled the track so Holland could get acquainted with the song. By the time I got a sound for him in the monitors, he was playing the tune down solid.

At first, I patched the bass through a Countryman DI box, but the resulting tone was not terribly exciting. So we tried going through the instrument input on a Joemeek VC1 Studio Channel, which provided a warmer, fatter sound.

After fine-tuning the bass to the track, Holland was ready to start tracking. We recorded three passes, using

tracks 2, 3, and 4, respectively. Each performance was good, but the third take seemed to be the keeper, thanks to an evocative bass solo that nicely complemented the song. Total recording time for the three tracks was about 30 minutes.

#### 7:30–9:00 P.M.

We came back from a 2-hour dinner break with fresh ears, listened again to the bass tracks, and confirmed our judgment that take number three was the charm. So I erased tracks 2, 3, 7, and 8—all except for the 4-click count on tracks 7 and 8, which I would need when recording the drum tracks. Of course, I could have simply waited and recorded over those tracks, but I find it saves some hassle to clean up tracks first. That way, I don't have to go back later and erase (or mute) little sections of the original track that may not have been recorded over (which is likely when you are overdubbing intermittent parts).

At this point, we experimented with some vocal harmonies. They sounded so nice that we decided to allot two of the remaining tracks to background vocals. The only problem was that this left only two tracks for drums, which would mean no separate kick-drum mic if I used stereo overheads on the kit. Of course, I knew I could get by with a single mic overhead and another on the kick (as George Martin did on many early Beatles cuts), but I really wanted a stereo image of the drums. Not only would it help to fill out the sparse mix but it would also sound nice with the stereo guitar tracks. The solu-

tion, which allowed me to use the stereo overheads, was to trigger the kick drum with my KAT fatKAT controller and record the "track" into the sequencer.

Of course, this approach required the computer to be on during recording. Fortunately, the levels generated by drums are usually sufficient to mask the whir of a CPU fan. But just to be safe, I covered the computer with a thick quilt.

I used a bare-bones drum kit: a 5½-inch maple snare, a 19-inch flat ride, a 16-inch dark crash, a pair of 13-inch hi-hat cymbals, and the fatKAT pedal. (Fortunately, the song didn't call for any toms.) Next, I positioned a matched pair of Neumann KM 184 condenser mics in an x-y configuration (coincident pair) behind the drum throne, with the capsules looking down on the drums from a point about eight inches above my forehead. This position is ideal for minimal miking of drums. The mics "hear" the kit from the drummer's perspective, which leaves the job of balancing individual drum and cymbal levels to the drummer.

I positioned the ADAT LRC (remote control) within reach of the drum throne by extending the cable with an instrument cord and two female ¼-inch-to-½-inch couplers (often called "barrel connectors"). Going back and forth between tracks 5/6 and 7/8, I recorded four passes of drum tracks, nailing it on the fourth take. Now it was time to break down the drums and mics and set up for recording Kriss's harmony vocal parts.



FIG. 2: Kelsey Laudi sings "Dear Mickey" into a Groove Tubes 6TM tube mic.



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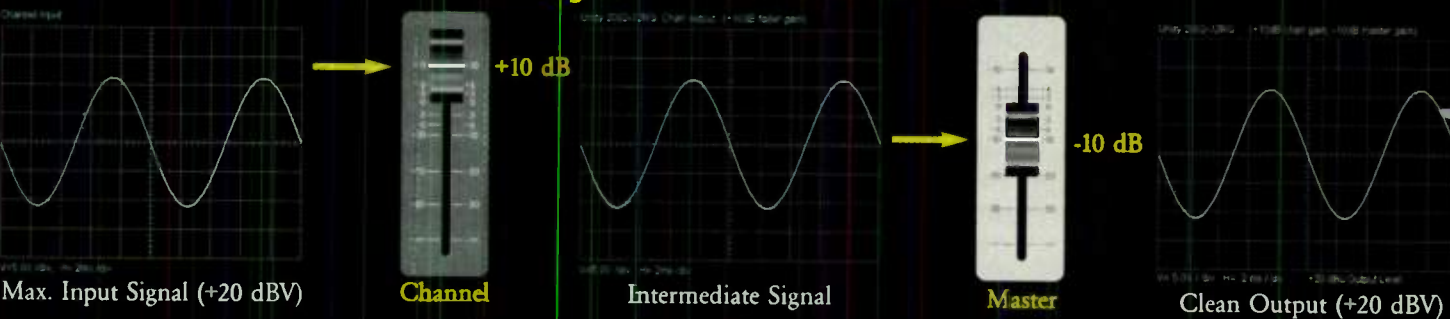
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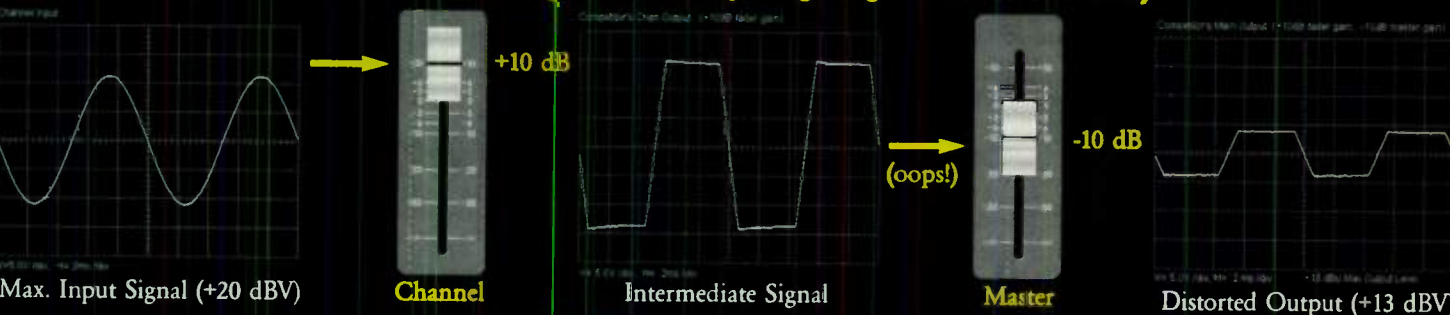
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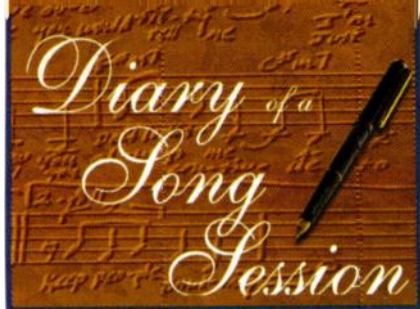


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### 9:00–11:00 P.M.

First, we auditioned the three large-diaphragm condenser mics mentioned previously. I chose the Røde NT1 for Kriss's voice, in part because it was brighter than the AKG C 414 and quieter than Groove Tubes 6TM. Also, it sounded quite different from the 6TM (used on the lead vocal), and I liked the contrast.

Now we began working in earnest on the vocal harmony arrangement, using the keyboard to figure out some of the more complicated passages. We recorded the tracks one section at a time, doing the verse backups first and then coming back to the bridge parts. Tracking harmony vocals is typically one of the more painstaking duties in making a demo. It requires intense, critical listening, both for pitch and timing. One tip is to set up a simplified mix for the singer. For example, I took out the drums and bass and brought down the guitar levels so Kriss could better hear the lead vocal. Then, for the second pass, I panned the harmony tracks to one side of Laudi's vocal track, separated them a bit from one another, and brought up their levels so Kriss could focus on matching her second part to her first.

After recording the harmonies, we listened to the song from beginning to end, soloing the vocal tracks in various configurations (both with and without the guitar) and listening for any out-of-tune notes or timing problems. Once we were satisfied that everything was spot on, it was time to start mixing.

### 11:00 P.M.—1:00 A.M.

I began the mix for "Dear Mickey" by determining which compressors to assign to the various tracks. This is an important preliminary consideration, even if you don't end up using all of the compressors assigned. Decisions should be based on several factors, including which instruments are most in need of compression, which units work best for which instruments, and stereo versus mono applications. For example, I appointed mono compressors to the lead vocal and bass tracks and dual-

mono compressors to the stereo guitar, vocal-harmony, and drum-overhead tracks. (I engaged the stereo-link feature on the dual-mono units.)

After patching in the compressors, I put each in bypass mode and worked on panning. After playing around with a few different approaches, I settled on sweeping the drums across one side of the stereo spectrum and the guitar across the other, with the two instruments overlapping slightly near the center of the mix. Specifically, one guitar track was panned to 8:30 (not quite hard left) and the other around 1:00, and one drum overhead was panned hard right and the other around 1:00. This resulted in the guitar and drums sounding distinct from one another yet blending enough in the mix to give the sense of a band playing all together in one room.

The other elements were panned between the extremes of the guitar and drums. I centered the bass and lead vocal tracks and panned the vocal harmonies on either side, at 11:30 and 12:30. The resulting basic mix had good separation and sounded full.

Next I worked on compression settings for each track or pair of stereo tracks. I settled on a 2.5:1 compression ratio for the lead and harmony vocals, with medium-slow attack and release settings. Also, even though the harmony vocal tracks were clean, I gated them to keep out extraneous noise.

I compressed the bass with a 3:1 ratio, a medium-fast attack, and a medium release. Guitar and drum tracks were treated lightly. The guitar got only 1 to 2 dB of gain reduction at a 1.5:1 ratio—just enough to fill out the sound. The drums got 4 to 6 dB of gain reduction at a 1.5:1 ratio with a fast release. This helped control the volume of the cross-stick hit, allowing for the cymbals and hi-hats to be brought up in the mix. With time to spare, I would probably have been more finicky with the dynamics processing; however, these settings worked well and tightened the over-

all sound without squeezing the life out of the performances.

Equalization of the bass and guitar tracks was next. Because these instruments are tonally similar and share a good portion of the frequency spectrum, it can take some work to balance the frequencies so they sound distinct from one another in the mix. Typically, it's helpful to roll off some low end and gently boost the high end of the acoustic guitar. I ended up adding 3 dB at 4 and 12 kHz and cutting 6 dB at 220 Hz and 3 dB at 80 Hz. For the bass track, I used subtractive EQ only: a 12 dB cut at 12 kHz (to get rid of hiss), a 3 dB cut at 6 kHz, and a 2 dB cut at 230 Hz.

Equally important was tuning the kick drum so it worked musically in the mix. The patch was stock from the "Dry Drums" kit on the Roland TD-7; to that I added 2 dB at 80 Hz, 4 dB at 220 Hz (note how this fills the "hole" left by the low cuts from guitar and bass), and 2 dB at 4 kHz.

After setting EQ and getting a nice balance between the instruments, I began introducing effects. I typically start with the lead vocal, processing it with my best general reverb or plate patch. To better hear what's going on,



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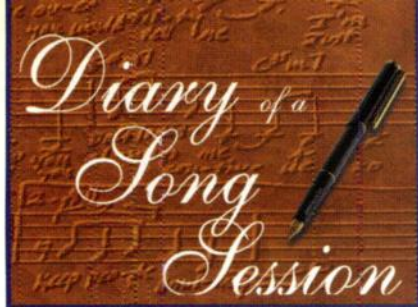
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I'll keep the effect-return level high initially, waiting to finalize the amount of return during a later mix stage.

I had three effects processors for the mix: Lexicon LXP-1 and LXP-5 (MIDI-controlled by a Lexicon MRC) and an Alesis QuadraVerb. Knowing that I

wanted to process the bass with a chorus patch from the LXP-5, I began with the LXP-1's Small Hall on the lead vocal. From there, I increased the reverb time from 2.1 to 2.9 ms and the predelay to 90 ms. Also, I darkened the reverb a bit by lowering the high-cut filter from 4.11 to 2.34 kHz. After getting a sound I liked, I applied the same reverb to the harmony vocal tracks. I then went back and equalized the back-up vocals a bit, boosting 1 or 2 dB at 12 kHz. (The lead vocal and drum tracks received no equalization.)

For the bass chorus, I used a stock internal setting called "Jaco Cho" from the LXP-5. The only trick here was that, during the final mix, I increased the amount of chorus return during the 4-bar bass solo, which helped highlight the solo. Also, I returned a touch of the same chorus to the harmony vocal tracks, to slightly thicken the sound.

For the drums, I went back and forth between the QuadraVerb's Small Hall and Large Room presets, settling finally on the Large Room. I also added some of the same effect to the nylon-string guitar, though considerably less than was on the drums. This made the sound fuller and helped the instruments blend.

Next I routed the mix through the DAT mixdown deck (monitoring through the 2-track returns on my Mackie 8•Bus board) and set the DAT levels to get a "zero" reading on the peaks. With the nearly finished mix up, we took a 15-minute break so we could come back with fresh ears to do the final balancing of instrument and effects levels.

#### 1:00-2:00 A.M.

Setting the right amount of bass and lead vocal is one of the critical, final stages in practically any mix. I find that it helps to monitor at several different volume levels, especially very low ones. I also listen back through a cheap boom box fed from my DAT deck.

Another trick is to listen to the mix from a different room. Are all the instruments clearly audible? Is the lead vocal loud enough or too loud? Also, is the vocal level consistent between sections of the song? Is the bass present enough to support the other instruments without overwhelming the mix? These are some of the questions I ask myself during the final mix stage.

After satisfying ourselves that the mix was right, I printed it to DAT and listened back. At that point it became obvious that Laudi's vocals seemed low during the bridge sections, so I rehearsed the mix a few times more and printed it again, this time riding the vocal fader during the bridges. Finally we had our mix. I dubbed six cassette copies of "Dear Mickey" for Kriss, and we called it a night.

*Associate Editor Brian Knave has learned why people so often become unhappy as they grow older.*

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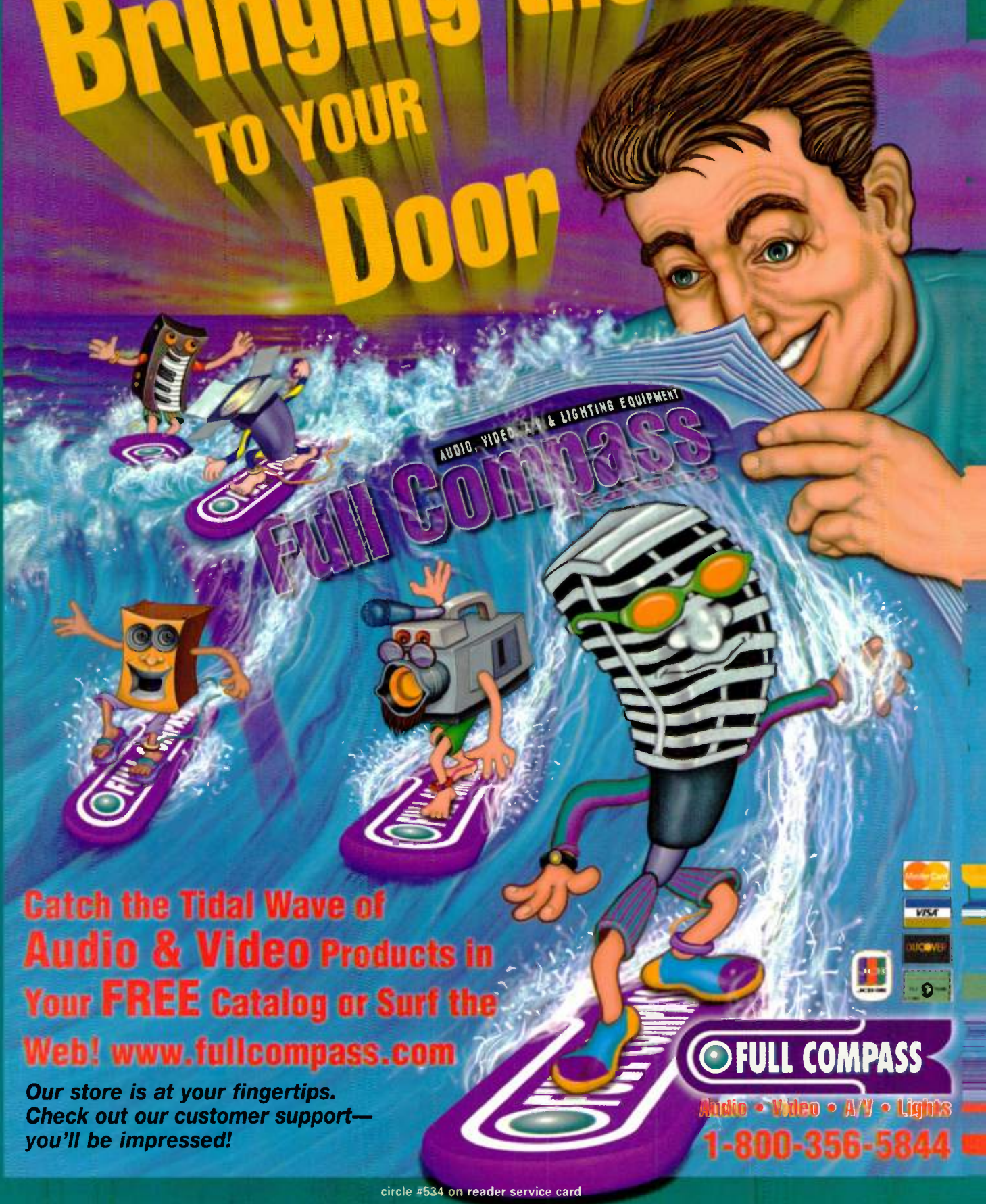
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# Opener

I DON'T RECALL WHO SAID THAT CHANGE IS THE ONLY CONSTANT, but there's a great deal of truth in this Darwinian notion. Religious arguments aside, it seems plain that evolution is a fundamental process at every level of the universe.

Certainly this process applies to music and the music business. Musical styles constantly evolve, even in "traditional" musical genres. Bands evolve musically—at least, they do if they stay together long enough. They often evolve personnel-wise, as well. Music technology also changes, of course. In most cases, failure to change means professional stagnation and death.

Of course, some evolutionary changes are unsuccessful in the long run and lead to extinction, whether of a species, a society, a band, or a technology. Even a product that is technologically superior can become extinct because it is outcompeted in the jungle—er, market. The classic example here is the defeat of Beta video technology by VHS.

Evolutionary change can happen slowly over eons or with stunning speed. Classical music evolved slowly over a few centuries; rock 'n' roll went through incredible changes in its first three decades. (Then again, rock itself evolved from other forms of music, such as country and the blues.) In many cases, one doesn't notice the changes at first; then, they seem to appear as if from nowhere. It's sort of like an "overnight sensation" who actually has been building a career in obscurity for ten years before achieving notoriety.

This issue's Headliner is an interesting case in point. Tuning a guitar and setting its intonation seem so straightforward that deciding to do them a different way would appear to be like changing to the metric system: a lot of people simply wouldn't accept it. Yet it appears that Buzz Feiten's dramatically different tuning system—it's described as being somewhere between equal temperament and just intonation—is being widely embraced by such accomplished 6-string wizards as Eddie Van Halen, Joe Satriani, Scott Henderson, and Steve Vai.

Here we have an example of relatively rapid change (Feiten researched his system for some six years) following a period of much slower evolution. The system apparently works; only time will tell whether musicians will accept it.

While we're on the subject of change, *JAM* is evolving, too. This month's Headliner is our first *JAM* feature story since May 1997, but Headliner is back to stay. And that's just the beginning: the August *JAM* will be a major step forward, and there's more to come later in the year. Some of the changes you'll see over the next few issues of *JAM* may appear to be sudden, but in fact, they will simply be another stage in the supplement's planned evolution.

In fact, *EM's JAM* "session" is just getting started. We hope you'll make it a point every other month to bring your axe and join us!



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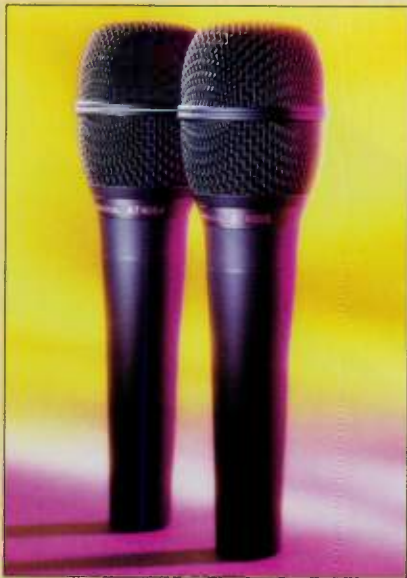
The innovative **JMA Series** is designed to be a workhorse. Power supply filtering, along with an oversized toroidal transformer ensure sonic purity and smooth, noise-free power delivery. Full thermal, surge, short circuit and tension load protection, as well as power-up and power-down transient muting, provide trouble-free operation.

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# for the BUCK

# tools

By Rick Weldon



## ▲ AUDIO-TECHNICA AT4054/AT4055

Audio-Technica has used the capacitor element and large-diaphragm design of its AT4050 studio condenser microphone in two new handheld stage mics, the AT4054 and AT4055 (\$499 each). The AT4055 has a frequency response of 20 Hz to 20 kHz. The AT4054 has a frequency response of 60 Hz to 20 kHz with a low-frequency rolloff at 80 Hz and a 12 dB/octave filter. Both are cardioid mics with a maximum SPL of 147 dB, a 129 dB dynamic range, and a signal-to-noise ratio of 76 dB (all at 1 kHz). Both microphones run off 48V phantom power. Audio-Technica U.S.; tel. (330) 686-2600; fax (330) 686-0719; e-mail pro@atus.com; Web www.audio-technica.com.

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## ▲ XWIRE DIGITAL WIRELESS SYSTEM

Xwire Corporation's Xwire X905 digital wireless system (\$895) includes an 8.4-ounce UHF transmitter (with batteries installed) and 2U rack-mount receiver with 20-bit A/D and D/A converters. According to Xwire, the digitized signal carries a wider frequency range (10 Hz to 20 kHz) than analog wireless systems.

The transmitter embeds a digital "signature" into the datastream; the receiver only recognizes data that contains the signature, eliminating interference. The receiver is designed to prevent

dropouts by incorporating the company's Quadiversity antenna system, which comprises two complete, internal diversity systems that operate in tandem.

The system has a range of up to 300 ft. (line of sight) and offers five selectable transmission frequencies for multiple Xwire use. Both unbalanced 1/4-inch and balanced XLR connectors are included. S/N is rated at >120 dB. Xwire Corporation; tel. (916) 929-9473; fax (916) 924-8065; e-mail info.xwire@mail2.quirknet.com; Web www.xwire.com.

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## ▼ SABINE POWER-Q ADF-4000

Get the functionality of nine separate digital processors in the Sabine Power-Q ADF-4000 (\$1,799.95). Each channel on the 2-channel unit has a 12-band parametric equalizer with high- and lowpass filters, a 31-band graphic equalizer with adjustable filter widths, a real-time analyzer that runs concurrently with all other Power-Q functions, a compressor-limiter/expander-gate, and an 83 ms digital delay. The unit has 24-bit A/D and D/A converters and uses Analog Devices' SHARC floating-point processor.

Also included is Sabine's patented FBX

Feedback Exterminator technology, which reduces feedback by automatically isolating and removing problem frequencies in real time using extremely narrow filters. The Power-Q is 2U rack-mount and offers an LCD and LEDs for clip, signal, gate, limiter, and bypass on the front panel. Serial and network ports, reference mic input, and balanced XLR ins and outs are on the rear panel. AES/EBU digital I/O is optional. Sabine; tel. (904) 418-2000; fax (904) 418-2001; e-mail sabine@sabineinc.com; Web www.sabineinc.com.

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## ➤ D.A.S. AUDIO PF SERIES

The PF Series has just been introduced by D.A.S. Audio; it consists of five 2-way passive speaker systems and a subwoofer. All six loudspeaker systems include a constant-directivity horn and the company's Active Safety Circuit for overload protection. The woofers use 3-inch voice coils spun on high-temperature formers.

The PF-112 (\$530) delivers 250W RMS into 8Ω (500W peak). It has a 12-inch low-frequency transducer and an M-3 1-inch exit compression driver with a 2-inch, pure titanium diaphragm. Its voice-coil and diaphragm assembly is designed to provide high power handling, low distortion, and maximum sensitivity.

The 300W PF-115 (\$580) has a 15-inch woofer and the higher-efficiency M-5 compression driver. The same features are available in two wedge monitors, the PF-012 (\$530) and PF-015 (\$580). The PF-215 (\$800) has two 15-inch woofers and the M-5 compression driver. It delivers 500W RMS into 4Ω (1,000W peak).



Finally, the SUB-15 (\$440) uses D.A.S.'s CT-1 active, stereo, 2-way crossover for full range or active 2-way use. Designed to get superior bass response from a small enclosure, it is more easily transported than the

company's earlier SUB-18. D.A.S. Audio; tel. (860) 434-9190; fax (860) 434-1759; e-mail [jalexander@sennheiserusa.com](mailto:jalexander@sennheiserusa.com); Web [www.dasaudio.com](http://www.dasaudio.com).

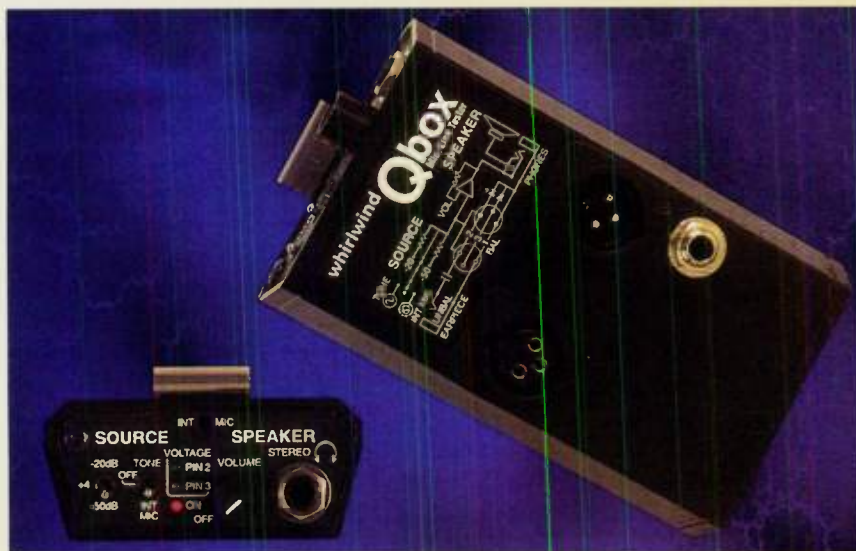
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## ▼ WHIRLWIND QBOX

Whirlwind's Qbox line tester (\$189) allows you to monitor audio, test for phantom power, send a test tone, and verify the operation of microphones without powering up the sound system. The device offers a built-in microphone and test-tone generator that can operate at -50, -20, or +4 dBu output levels. It also has a speaker, a headphone amp, and voltage-presence LEDs.

Inputs and outputs are on parallel-wired, balanced XLR connectors. A capacitor-isolated, line-level ¼-inch jack can serve as a line input or a high-impedance output for an earpiece. A ½-inch headphone output is also provided. Whirlwind; tel. (888) 733-4396 or (716) 663-8820; fax (716) 865-8930; e-mail [sales@whirlwindusa.com](mailto:sales@whirlwindusa.com); Web [www.whirlwindusa.com](http://www.whirlwindusa.com).

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## ▲ FENDER AMP CAN

Fully self-contained and self-powered, Fender's Amp Can amplifier (\$249.99) is designed to be used anywhere by buskers and partygoers alike. The Amp Can delivers 15W RMS power to a 6-inch speaker and has two ¼-inch inputs, one at mic level and the other at line level. It has a distortion switch for the line-level Guitar input and independent volume and tone knobs for each channel. The unit is powered by a battery that can be recharged with an included AC adapter. Fender; tel. (602) 596-9690; fax (602) 596-1384; Web [www.fender.com](http://www.fender.com).

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## ➤ MTX POWER H SERIES

**M**TX has introduced its Power H Series loudspeaker systems with three models. All three offer a horn-and-speaker combination. The P12H (\$319.95) has a 12-inch speaker and handles up to 150W RMS (600W peak) into 8Ω impedance and produces up to 122 dB SPL. The P15H (\$399.95) has a 15-inch speaker and handles 200 to 800W into 8Ω, pumping out up to 124 dB SPL. The P215H (\$479.95) uses two 15-inch speakers and handles 300 to 1,200W into 4Ω to deliver up to 124 dB SPL.

Each model features a 90 x 90-degree, constant-directivity horn coupled to a 1-inch compression driver with a variable horn-attenuation circuit (+3 dB to -∞) so you can customize the frequency response. The low-frequency drivers are designed for superior thermal handling, using 2-inch and 2½-inch, high-temperature voice coils and an oversized motor structure. The crossover frequency for each model is fixed

at 2.5 kHz. Frequency response is rated at 36 Hz to 20 kHz for the P12H and P215H and 35 Hz to 20 kHz for the P15H.

The 10-degree trapezoidal cabinet is constructed of ¾-inch Orientated Strand Board plywood with interlocking construction, covered with black, aviation-grade carpet. The unit has interlocking protective corners and a pressure-tension mounted, 1-piece, 19 gauge steel grill. Both ¼-inch inputs and 5-way binding posts are provided. MTX; tel. (602) 438-4545; fax (602) 438-8692; e-mail [technical@mtxaudio.com](mailto:technical@mtxaudio.com); Web [www.mtxaudio.com](http://www.mtxaudio.com).

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## ➤ GALAXY FAR OUTLET

**F**ire up your amp and play music for up to twenty hours anywhere, without a generator! At 34 lbs. and slightly larger than a lunchbox, Galaxy Audio's Far Outlet (\$399) provides 60 Hz, 110 VAC at 250W continuous and 400W peak power. The Far Outlet contains a sealed, lead-acid battery that



can be charged from a wall socket or even from a car's cigarette lighter and incorporates Galaxy Audio's own Digi-Scrub digital filtering circuitry to remove line-level interference. Galaxy Audio; tel. (316) 265-9500; fax (316) 263-0642; e-mail [galaxy@southwind.net](mailto:galaxy@southwind.net); Web [www.galaxyaudio.com](http://www.galaxyaudio.com).

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## ➤ SOUNDMX REMOTE MX

**W**ith SoundMX's RemoteMX system (\$1,499; \$500 for additional control unit), musicians can tailor their own monitor mixes directly from the stage, up to 1,000 feet from the house

mixing station. The system consists of a controller unit that can be mounted on a microphone stand and a 1U rackspace mixer interface unit.

Each of the controller unit's eight channels includes a 7-band graphic

equalizer and a 10-segment LED level meter. The user interface consists of a Mode button and cursor keys with which you navigate between channels and set equalization and gain levels. Each channel can be muted by navigating to the desired channel and using the Mute button. Also included on the controller unit are two unbalanced ¼-inch outputs.

The mixer interface has eight ¼-inch stereo TRS jacks that connect to the house mixer's insert points. The interface connects to the controller using a standard XLR microphone cable; one interface can feed a signal to two control units. SoundMX; tel. (650) 328-5479; fax (650) 328-5480; e-mail [sales@soundmx.com](mailto:sales@soundmx.com); Web [www.soundmx.com](http://www.soundmx.com). ♦

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For starters, let me say this is *not* a guitar-only article. Sure, Buzz Feiten is a great guitarist. Yeah, he has played guitar with Stevie Wonder, the Rascals, and his own Feiten/Larson Group. He's gigged at Woodstock with the Paul Butterfield Blues Band and, oh yeah, jammed with Hendrix. Yes, his revolutionary tuning system *is* for guitar (and bass), but being in tune

T h e

# BUZZ

O N

# Tuning

**Buzz Feiten  
reinvents  
guitar  
tuning.**

and aware of pitch relationships and intonation is something we can *all* benefit from, although we guitarists need more help than most.

The world of intonation is not flat. According to Feiten, it's a lot rounder than we've been led to believe. So if you deal with pitch at all, read on and get ready for a major tune-up.

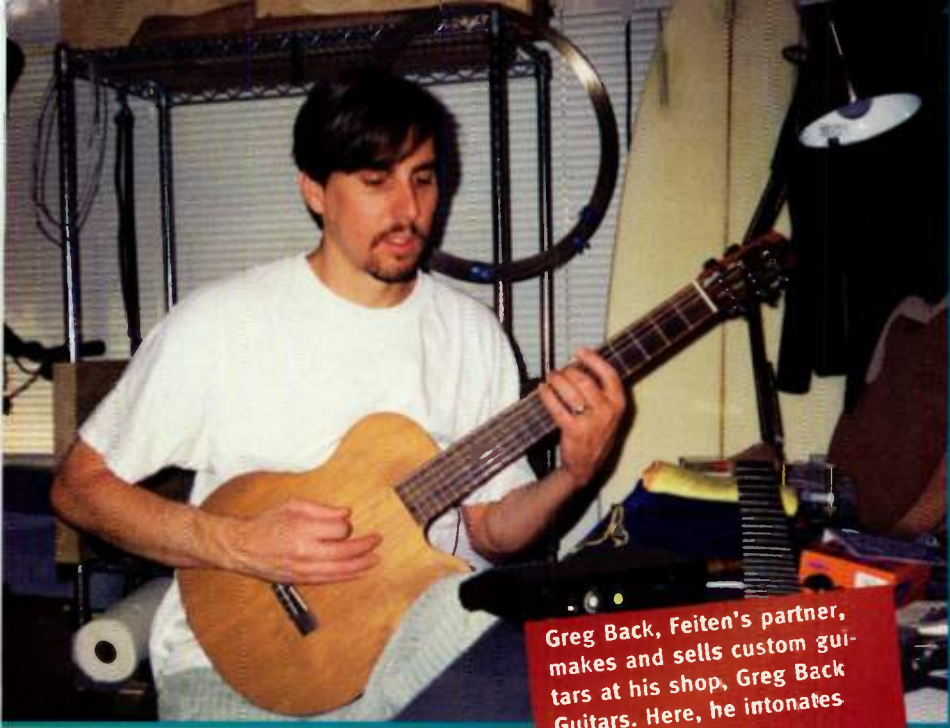
• B Y M A T T B L A C K E T T





Photo Courtesy Washburn USA

World Radio History



Greg Back, Feiten's partner, makes and sells custom guitars at his shop, Greg Back Guitars. Here, he intonates one of his guitars.

## TUNING: A BRIEF HISTORY

In the beginning, there was *just intonation*. The math and physics of just intonation (or any other kind of intonation) are beyond the scope of this article, but for now, let's just say you know it when you hear it. (If you really want to dig

into this fascinating subject, check out **EM** Contributing Editor Scott Wilkinson's *Tuning In: Microtonality in Electronic Music*, published by Hal Leonard Books.) When you hear two vocalists singing sweet harmonies, that's just intonation. They make subtle, almost instantaneous pitch adjustments

at each harmonic change to bring the overtones in tune. These adjustments keep the notes from "beating" in a way that we perceive as dissonant.

Along with all other microtonal instruments (e.g., fretless stringed instruments and trombone), the human voice can do this all day long. The catch is that a lot more than twelve notes per octave are used to accomplish this. So what's a fixed-pitch guitarist or keyboard player to do? Are we doomed to playing out of tune forever?

Just intonation was used until sometime around the year 1600; it is characterized by in-tune thirds, fourths, and fifths in certain keys related to the root note of the scale. These intervals sound "sweet" or "pure" in just intonation, while others sound very "sour." As a result, you can't modulate into different keys without sounding horrible.

Just intonation is fine for Gregorian chant and other forms of early music that don't modulate into distant keys, but during the sixteenth century, composers were beginning to write music that did just that. As a result, they started detuning some of the pitches in just



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intonation so they could modulate into different keys; this process is called *tempering*, and the result is called a *temperament*.

One of the first temperaments was called *mean-tone temperament*. It ameliorated the modulation problem somewhat, but a few intervals were still very out of tune. (The sour intervals were called "wolf" tones because they were likened to the howling of wolves. These tones sounded "mean," which is how this temperament got its name.)

In the latter part of the seventeenth century, other temperaments were devised and named for their inventors, such as Werkmeister and Kirnberger. Their aim was to kill the wolf and give composers more freedom to modulate



**Feiten has recently joined forces with Washburn USA in an attempt to get his well-tempered message across.**

into different keys. In fact, Johann Sebastian Bach wrote a collection of keyboard pieces called *The Well-Tempered Clavier* to demonstrate that musicians could play in all keys using one of these temperaments.

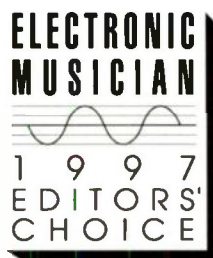
This process ultimately led to *equal temperament*, in which all twelve notes in the chromatic scale are equally spaced from each other. This lets you play in any key with impunity, but none of the intervals (except the octave) are perfectly in tune. Nevertheless, Western music has used this temperament exclusively for the last 200 years.

Equal temperament seems to be the only practical solution for fixed-pitch instruments. To get around the creepy by-products of equal temperament (e.g., sharp major thirds and flat minor thirds), guitarists have resorted to some pretty impractical scenarios. They've retuned for certain sections on recordings and put vibrato on *everything* to camouflage out-of-tune notes. Some have even avoided thirds altogether and based

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Feiten, Bill Asher, and Ed Fierro (from left) in Asher's Santa Monica shop, Guitar Traditions, holding guitars retrofitted with the Feiten system. Asher and Fierro train guitar repair techs in the system and have retrofitted hundreds of guitars.

He gives an example: "Normally, if you play a root and fifth on the G and B strings, [an E at the 9th fret of the G string and a B at the 12th fret of the B string], it sounds in tune. Now play a root and major third on those same two strings [both at the 9th fret]. The G# sounds *wildly* sharp to the E." With the Feiten system, a small amount of pitch is "borrowed" from the fifth to sweeten the major third. Although it doesn't seem possible, the major third does sound more in tune, while the fifth does not seem to be changed.

According to Feiten, "The revolutionary aspect of what we've done is that we've identified the precise amount of tempering you can get away with. No more and no less. That's what took six years to figure out."

## BUT WAIT, THERE'S MORE!

When asked to judge the significance of this system, Feiten responds, "I knew this was extremely important after having used it for about a year. I realized I hadn't fussed with my tuning or intonation for a whole year. I was concentrating on parts, on music, on the songs. I knew I wasn't the only guy who would want this." And clearly, he's not. The list of guitar players using the system is growing rapidly and includes the likes of Eddie Van Halen, Liona Boyd, Joe Satriani, David Crosby, Scott Henderson, and Steve Vai. After having Feiten retrofit an acoustic, Van Halen said, "I've got to say that with this tuning system, it's the best acoustic guitar I've ever heard." Scott Henderson concurs, saying of his guitar, "It's in tune all over the neck now."

Of course, top pros like these can always get the cool stuff. What about the rest of us? Well, many guitar repair techs and luthiers are also getting into the act. Before they can retrofit a guitar with the system, however, they must take a 4-day course to get certified by Feiten. San Francisco repair guru Gary Brawer, whose clients include Satriani, Metallica, and Counting Crows, has gone through the course. He comments, "I've never seen a guitar that couldn't benefit from this system." That's a bold statement, but one that major guitar manufacturers are beginning to agree with.

their careers on power chords. It was just the nature of the beast—until now.

## BUZZ TEMPERAMENT

Enter Buzz Feiten (pronounced *fee-ten*). Feiten has been painfully aware of the shortcomings of guitar intonation for quite some time. In fact, he finally took the law into his own hands and modified his guitar with a hacksaw. After shifting the nut slightly toward the bridge, he found that his guitar sounded noticeably more in tune.

"The first thing was the hacksaw," says Feiten. "It sounded better, so I started doing that to all my guitars." But moving the nut alone wasn't good enough. "I was on the road with Bette Midler," he continues, "and there was a piano tech named Will Jennings who tuned the piano every night by ear. This guy's intonation *by ear* was better than my intonation with a strobe tuner." So Feiten threw away his tuner and sat down at the piano bench. "I started to take a microscopic look at what I do when I tune by ear."

## OFFSET THIS

In addition to moving the nut, he developed the Buzz Feiten Tuning System (two patents and a third pending), which incorporates intonation offsets to com-

pensate for the evils of equal temperament. "I started doing intonation modeling," Feiten explains. "I'd model this shape, I'd model that shape. It took a long time—six years." The formulas that grew from all those calculations earned him one of his patents and completed his system.

Most guitarists set their intonation by matching the pitch of the harmonic at the twelfth fret (which is one octave above the pitch of the open string) with the pitch of the note fingered at the same fret. In the Feiten system, however, the strings are tuned so that these two pitches are not identical.

As Feiten explains, "We've borrowed the philosophy of piano tuning. We make our guitars deliberately out of tune by a very small amount so they sound good regardless of chord shape, regardless of where you put the third of the chord, regardless of hand position, and against any open string."

## WHAT'S IN IT FOR ME?

This looks good on paper, but how does it translate to the real world? "If you're not in tune, I don't care what \$2,000 guitar or boutique amp you have; you're just going to sound bad," Feiten states. "Conversely, your \$175 Strat copy is going to sound fabulous with this tuning system."

# SM58

Roger Daltrey Guns N' Roses Live  
Fugees Boyz II Men Beck Prodigy  
Iggy Pop Sheryl Crow 311  
Michael Brecker No Doubt  
Jethro Tull Beastie Boys  
Gorky Park Pretenders  
Pete Townshend Maná  
Little Feat Cyndi Lauper  
Herbie Hancock Ramones  
Alice Cooper Erykah Badu  
LeAnn Rimes Motörhead  
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Blues Traveler Skunk Anansie  
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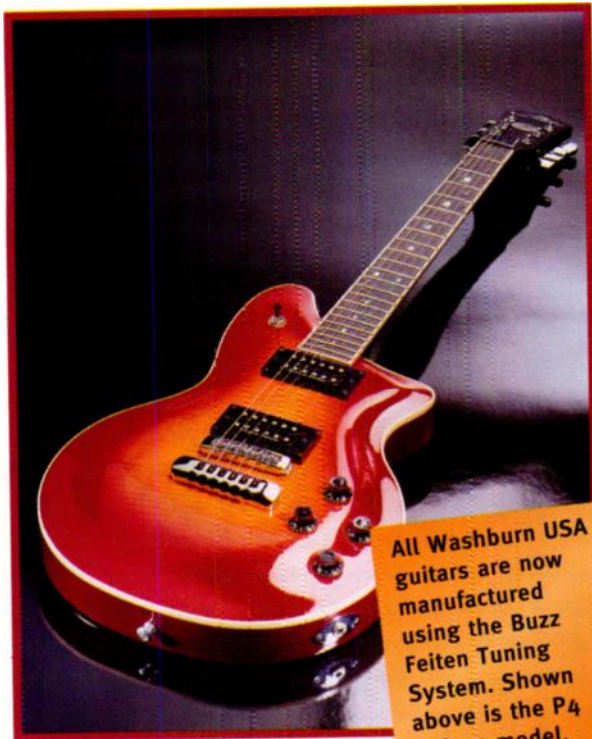
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All Washburn USA guitars are now manufactured using the Buzz Feiten Tuning System. Shown above is the P4 Deluxe model.

## FEITEN MEETS WASHBURN

Tom Anderson Guitar Works was the first guitar maker to see the genius in the Feiten system. After Anderson heard Feiten's own guitar smoke a higher-priced Tom Anderson model, he changed the way he built guitars that very day. He began using this system exclusively.

Continuing on his quest to change the world, Feiten has joined forces with Washburn USA in an attempt to get his well-tempered message across. Larry English, director of manufacturing for Washburn USA, comments, "All of our USA guitars will use this system. We're very excited about it."

However, sweeping changes do not happen overnight for a company of Washburn's size. Even though English liked the system instantly, he and Washburn were not about to rock the intonation boat without doing some preliminary market research. According to English, "We put together a survey in eight geographical areas with 61 retailers. We asked consumers what they thought, and we were overwhelmed by the results." He says that not only could 77 percent of those surveyed *clearly* hear the difference but a whopping 89 percent felt there was an inherent problem with guitar intonation. Not a bad little customer base.

Feiten couldn't be happier with the Washburn connection. "This is extremely important," he says, "because we've finally got a major manufacturer acknowledging that this is a better way to build guitars. I have to give great credit to Washburn because admitting a thing like that takes a tremendous amount of courage on a company level."

This company had another gutsy idea a few years back when it introduced the Stephen's Extended Cutaway, a functional neck joint that permits great access to the upper frets. However, it thoroughly overwhelmed the very conservative guitar-

buying public. Any fears that this could happen again? English doesn't think so. In his opinion, the reason the cutaway didn't catch on was mainly cosmetic. "The Stephen's looks so different, but it works and we still use it. The Feiten system *looks* the same, but it sounds so much better."

## NEW TRICK, OLD DOG?

So let's talk about this conservative consumer, the guitarist. We're not the most forward-minded people in the world. (I offer as proof the fact that we like things that were built in the 1950s, and we still use tubes.) Some people are just not going to get it. What do you say to them? Feiten responds, "Those people should continue doing what they're doing. I'm a big fan of letting folks arrive at their own conclusions."

This is not much of a hard sell from a man who wants to change the world, but Feiten has that one covered, too. "Our job as a company is to get tempered guitars into players' hands. Period. We don't have to give them a sales pitch. All we have to do is make them available to people so they can hear what's going on." (Feiten recently made it available to Adrian Belew and Robert Fripp. Their initial impressions were very positive.)

Some players might be wary. They might think you need a special tuner or

that you can't play with another guitarist who is *not* using this system. "Not true," says Feiten. "You do not need a special tuner to tune up. Just tune by ear or with any electronic tuner, and it will sound better than a normal guitar." If you want to set your own intonation, though, you'll need a tuner precise enough to do the offsets, such as the Korg MT1200. As for playing with another guitarist, no problem there, either. If anything, according to Feiten, "You'll just sound more 'focused' than the other guitar. You'll sound tighter with the keyboard."

## FORGIVE AND FORGET

You do not have to be fussy about your tuning with this system. It is amazingly forgiving, especially with capoing or detuning, which normally wreak havoc on a guitar's tuning. If you do take the time to tune carefully, the results can be truly spectacular. Chord shapes that were once unthinkable (or at least ill-advised) sound glorious.

You can also go longer between tune-ups. The strings can slip more before they start sounding creepy. Feiten gives one last bit of tuning advice: "Tune to the attack, not to where the note settles. The ear does not care what happens three seconds later."

## STAY TUNED

Something is definitely going on here. And although the effect may be subtle to some, it is real. However, any explanation falls short of conveying the impact of this system; the only way to fully appreciate it is to try it. The look on a player's face when they "get it" is undeniable.

Buzz Feiten really is making the world a better place, a couple of cents at a time. Anyone who has ever fretted (pun intended) about the guitar's inability to play pleasingly in tune might want to try this system. It doesn't do everything, but it does something, and that something sounds very cool. Who can fault a guy for trying to bring the world more in tune with itself?

(For more information on the Buzz Feiten Tuning System, contact Buzz Feiten; tel. 213/937-0820.)

Guitarist and instructor **Matt Blackett** is a regular **EM** and **JAM** contributor. He grooves with his band *Loveland* in the San Francisco Bay Area.

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World Radio History

# Vox

BY JOANNA CAZDEN

## Tune In, Sing Out

MAYBE YOU'VE HEARD THIS OLD JOKE: How do you know when there's a singer at the door? He can't find the key, and he doesn't know when to come in.

Yeah, right. Very funny. Normally, I would strap on my Xena outfit and set out to defend the honor of Clan Vocalista against such dastardly expressions of disdain! But it fries my hide as much as anyone's when a singer dares to blare out notes from a different

Take 6 is famous for vocal harmonies that are exquisitely in tune.



planet than what the rest of the band is playing. Who cares if opera legend Maria Callas was able to seduce her audiences into not caring that she was off pitch? It doesn't work on me.

Singing in tune is a fundamental part of getting a clean, professional sound. But it isn't always easy. The voice is the ultimate "fretless" instrument; it has no built-in pitch reference. This freedom allows singers to bend, shape, and ornament notes in subtle and stunning ways. However, it also contributes to the stereotype that singers are not real musicians because we are so susceptible to being out of tune.

Fortunately, there are some proven techniques that can rescue us from danger. The human brain is conveniently wired with direct links between one's voice and one's hearing. If you listen carefully enough to what the other instruments are playing and hold a strong mental image of the sound you want to produce, there's a pretty good chance that your voice will follow.

**Target practice.** The most reliable, time-tested way to ensure that each note you sing starts exactly on the right pitch is to *imagine the note you're going to sing before you sing it*. In archery, as every Amazon knows, the archer learns to focus on the target rather than on the path of the arrow. So identify a cue note in the instrumental parts for each of your entrances, and listen to it with a clear and receptive mental focus. Hear the target pitch internally, and then trust your voice to hit it.

You can practice this at home with a keyboard, pitch pipe, or electronic tuner. Start by matching single notes in the middle of your range. At first, record yourself or ask another musician to give you feedback on whether you tend to be sharp, flat, or generally wobbly. Each vowel puts your voice box in a slightly different position, so use a variety of syllables.

PHOTO BY DAVID ROTH



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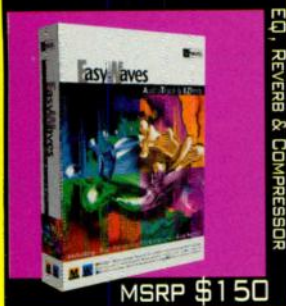
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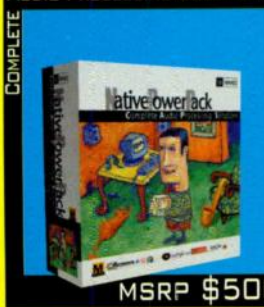


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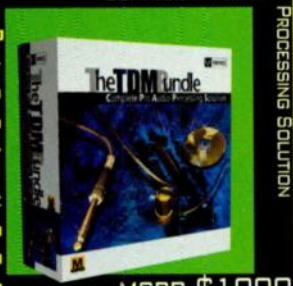
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Next, play an arpeggiated interval, and match both notes. Or play one note and imagine, then sing, a different note in the scale. After a while, you'll find the mental "Zone" in which your voice and your ear are linked, and you'll be able to start any song on the correct pitch.

Be sure to judge your accuracy from the actual onset of the note rather than guessing and then trying to fix the pitch in midstream. Many singers slide or scoop into notes, starting each phrase on a lower (sometimes indeterminate) pitch and then correcting it. They might end up in the right place, but they didn't start there, and the result is a lazy, imprecise sound.

Of course, there are some situations in which singers choose to slide into a note. Blues, crooning, and traditional country styles often deliberately use this effect as an ornament. Just be sure you have enough skill *not* to slide most of the time.

**Endurance training.** Once you've learned to begin notes on pitch, the next challenge is to stay there. As you might have already discovered, if you push the voice too hard, you're likely to go sharp; if the breath support drops, you're apt to go flat. So don't sing louder or longer phrases than you can control.

Just as an army must plan its resupply routes, so singers must plan ahead to support each phrase to the end. When learning a new song, your first scouting mission should be to look for good places to breathe—Xena doesn't face her destiny unprepared, and neither should you. Even a dramatic, long note at the end of a phrase needn't leave you gasping or your audience cringing from your pitch problems. Just find a strategic spot before the climax to grab an extra breath, and practice that phrasing as you master the song.

Of course, performing live raises the stakes for any pitch-conscious warrior. There might not be adequate monitors, and the demands of fronting a band bring about many distractions. In addition, there's the peril of getting pumped with adrenaline, which fragments the concentration and tends to tighten up the vocal muscles, increasing the risk of singing sharp.

Once again, focus and careful listening are your best defenses. Choose one instrument that's easiest for you to hear in the mix—keyboard, rhythm guitar, or bass—and let that player know he or she is your anchor. Go over your entrances

and trouble spots with that player until you can find reliable cues no matter what the rest of the band is doing. Many singers also cup a hand behind one ear, which makes it easier to monitor themselves.

**Tribal unity.** Whether harmony vocals are a major part of your band's image or just an occasional spice, tuning them precisely is a worthwhile investment of rehearsal time. However, singers cannot tune to what they cannot hear. As my high school choral director used to say, "If you can't hear yourself, you're singing too softly. If you can't hear the people around you, you're too loud."

There are many choral training methods to help singing groups stay in tune. For example, go through harmony sections slowly and without words, using the syllable "doot." This turns any harmonic line into a series of short, separated chords and makes the pitch easier to hear and correct.

One unusual rehearsal technique is to position singers back-to-back instead of facing each other. This formation requires sharp listening and can pay off in a tighter group sound. When you find a training maneuver that works, include it in your regular warm-up or sound-check routine.

Speaking of sound checks, this often-rushed activity can make or break your pitch accuracy during the gig. Get together with the bandmates you need to tune to, and make sure you can hear each other acoustically, in the monitors, or from the P.A. Above all, if you get lost and feel unsure of your pitch, avoid the panicky impulse to sing louder; instead, sing at a moderate level and listen carefully. If you increase your own volume, the pitch you drown out might be the cue you need to sound your best.

If you're still having trouble after you try these suggestions, look for an ear-training class at a local college. In addition, private voice lessons can help correct individual weaknesses. Just don't let your concern for pitch become so intense that you lose your enjoyment of the music; when learning to trust your ears and voice to work together, anxiety will just get in the way.

This is but one small chapter in the epic quest for that legendary Zone where precision and passion synchronize, where vibratos are perfectly parallel, where even drummers sing in tune, and where Amazons can take a joke. ♦

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BY GLENN LETSCH AND  
FRED SAMPSON

## Intonation Regulation

Knowledge of effective tuning techniques is one of those things that separates the amateur players from the pros. There's more to it than just kicking down \$80 for your basic guitar tuner and tuning up. Once you learn how to get your guitar or bass in tune and make it stay there, you can deal with the easy stuff, like blinding chops and impeccable taste.

**Stringing along.** Good tuning starts with quality strings. Not all strings are created equal. The overall gauge may be the same between two sets of strings, but one brand may have a smaller center core (like DR Strings), so they will behave differently. Similarly, stainless steel and nickel strings will not intonate the same way. Whatever type of strings you

favor, find a brand that offers consistent quality and stick with it. You'll do less tweaking in the long run.

Most guitarists find that heavier-gauge strings hold their tuning better than lighter ones. There are exceptions, including James Burton, guitarist for Ricky Nelson and Elvis Presley, who has made history using 0.008s. Burton pulls it off with a great ear and very light touch—mere mortals beware!

**Lube 'em up.** Before you start stringing your bass or guitar, lubricate the nut slots with pencil lead or automotive graphite powder. Over time, a string's windings will create tiny divots in the nut slots, and the graphite will keep the string from catching on those divots. If your guitar has string trees, dab some Chap Stick or Vaseline under the tree "wings" using a toothpick.

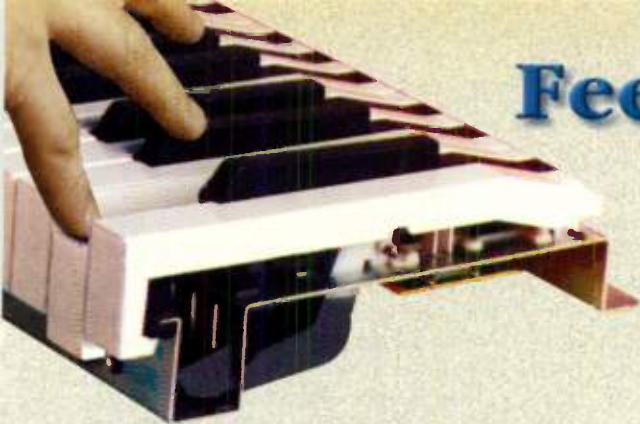
You should also check to be sure that your nut slots are cut wide enough. If the slot is too tight and is pinching the string, you will hear a "plinking" sound while tuning. Find a competent guitar tech or widen the slot yourself by carefully filing it with a wound string or a proper nut file.

**All wound up.** Some guitarists make the mistake of not attaching their strings to the tuning pegs securely. To put a new string on your guitar, stick it through the peg shaft, and then wind it toward the center of the peg head, halfway back around the shaft. Next, guide it under and over itself (see Fig. 1). On guitars with locking pegs, pull the string tight through the peg before tightening the set screw, but do not overtighten the screw. In either case, trim the excess only after you've bent or locked the string. Otherwise, the windings will come loose.

The legendary James Burton (left, with son Jeff) uses a lighter gauge string than most guitarists do, but he has the ears and the touch to pull it off.



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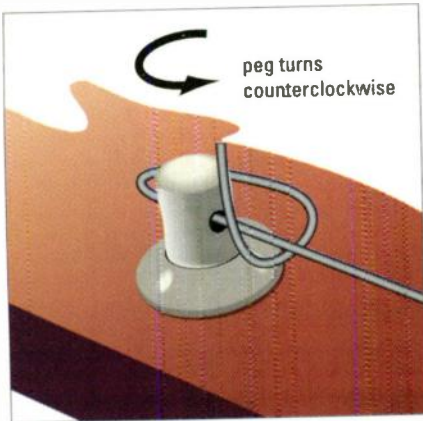


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**FIG. 1:** Make sure your string is properly secured to its tuning peg by winding it under and then over itself, as shown. After attaching the string to the peg, be sure to wind it no more than three or four times around the shaft.

Securing strings properly is just as important on a bass. Wind counterclockwise on a Fender-style headstock; on a two-plus-two bass headstock, wind the E and A strings counterclockwise and the D and G strings clockwise. Cut any excess length from the string. Next, shove the string down the center of the post and

wrap it downward. As you tune up, the tension will draw the string down and prevent it from slipping out of the nut.

You want to have as few string winds on the peg as possible. If the windings overlap, they will cause the strings to "slack out" as you play and slowly go flat. On a guitar, allow no more than two or three winds for wound strings and three or four for unwound strings; on a bass, wind each string approximately three times.

**Quality control.** Once the strings are installed correctly, check for defects by observing the plucked open strings. Use this technique with caution when you're under fluorescent lights. These lights flicker at a rate of 60 times per second and create a strobe effect when you observe a vibrating string. As a result, a good string may appear to vibrate erratically. However, any string that vibrates erratically under incandescent light may have loose windings and should be replaced.

**Tune up, stretch out.** Always tune up going from flat to pitch. Never tune down from sharp to pitch because the string will bind up on either the post or the nut and go flat when you start playing.

Believe it or not, a lot of folks forget to stretch new strings. With a soft cloth wrapped around your thumb and index finger, gently stretch each string every few inches up and down the neck. Retune. Repeat. Retune. Repeat. It may take a few yanking sessions, but keep it up until the strings stay in tune.

**Intonation.** Intonation is simply the process of adjusting the length of a string so it is "in tune with itself." Each open string must be in tune with its octave at the twelfth fret. Granted, the laws of physics and the rules of equal temperament determine that your instrument can never play perfectly in tune all over the neck. But with the right equipment, you can get pretty darn close. (For a look at an interesting approach to guitar intonation, see "The Buzz on Tuning," p. 84.)

In order to be dead on the money, most luthiers recommend using an electronic strobe tuner or equivalent. A regular, inexpensive tuner won't be as accurate. The strobe tunes within one-third of one percent of a semitone. The newest models from Peterson Electro-Musical Products (tel. 708/388-3311) are

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even more accurate (one-tenth of one percent of a semitone).

Old strings can be very difficult to intonate. Strings lose their uniform consistency as well as attract hand oil and dirt. Frets also put small dents in them. So buy new ones as needed.

**First things first.** According to luthier John Jordan of Jordan Music (based in Concord, California), "Intonating is the very last thing you do when setting up your guitar because *everything* affects intonation. Be sure to make all other necessary adjustments first. Any later changes that you make will invalidate the intonation process."

You may want to adjust the truss rod to attain proper neck relief or move the bridge for proper string height. Your playing style (aggressive or light) will dictate the correct settings. Remember to adjust in minute increments. You do not want to blow past the ideal settings for your playing style. Work it until the action feels right; then, and only then, begin to intonate.

It is important to recheck your intonation every couple of days because strings tend to go flat with age. When

you intonate, be sure that your guitar is in its usual playing position. Don't lay it flat on its back unless you're Jeff Healey or a Thumbs Carlisle impersonator. Otherwise, when you go back to your usual playing position, gravity will skew all your careful adjustments.

**Reasons to fret.** With the instrument tuned to pitch, pluck a twelfth fret harmonic and compare it to the actual fretted note on that string. Be sure to use just enough finger pressure to sound the note clearly. Avoid pressing the note sharp.

If the fretted note is *flat*, the string is too long and the bridge saddle must be adjusted forward. Turn the saddle screw counterclockwise to shorten the string and raise the pitch of the fretted note. (You may need to force the screw inward as you turn because it can get stuck when loosening.) If the fretted note is *sharp* compared to the harmonic note, the string is too short. To lengthen the string, adjust the bridge saddle back slightly by turn-



Luthier John Jordan has intonated hundreds of basses using his strobe tuner.

ing the screw clockwise. Retune the string to pitch and compare and adjust until the fretted and harmonic notes agree. Now adjust the rest of the strings.

The twelfth-fret system covers the needs of most guitar and bass players. But if you frequently play above the twelfth fret and find that the pitch is off, you can fudge your intonation a bit. Shift your intonation point from the twelfth to the nineteenth fret, and then proceed as above.

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**Fretless bass.** When you intonate a fretless bass, it is crucial to use proper fingering technique. Place the center of the end of your finger pad just *behind* the twelfth fret line. The point of contact should be just in front of the center point of the finger (the front third of the finger). Jordan advises, "Do not straddle the middle of your finger over the fret line. The string will make contact in front of the fret line, so you will be playing the note sharp."

If you own a fretless bass that does not have fret lines, intonate using the midpoint of the double-dot octave marker on the side of the neck (twelve semitones from the nut).

**Magnetic attraction.** Make sure your pickups are not too close to the strings. Their magnetic fields can pull your strings sharp and deaden string vibration, killing your sustain. Check the distance between the pickup pole pieces and the strings by fretting the highest and lowest strings at the top fret and sighting across the guitar. Seymour Duncan recommends adjusting single-coil pickups at least one-sixteenth of an inch away from the string on the treble side and one-eighth of an inch on the bass side. Humbuckers, with their more diffuse magnetic fields, are slightly more forgiving.

**In tune outdoors.** Giggling outside can be very tough on tuning, especially in direct sunlight. To avoid problems, always gig with a tuner hooked up to your signal chain. You can use an A/B box or a dedicated parallel tuner output from your amp to check your tuning quickly and silently. This ensures pristine tone by removing the tuner from the signal path when it is not in use.

Besides messing with your tuning, the bright light of a daytime, outdoor show can make it nearly impossible to decipher the LEDs on most tuners. You can try constructing a "tuner tent" out of a cardboard box to shade the display.

Whether you're playing indoors or outdoors, try acclimating your guitars to the venue's temperature for at least 30 minutes before the gig. Strings tend to expand or contract when confronted with sudden changes in temperature. Steve Miller tours with graphite and composite-neck guitars because they resist temperature and humidity changes.

**Tuning out.** Playing in tune is the result of many small steps executed properly, and adding even one or two new tricks can make a big difference in your quest to play and stay in tune. ♦



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# bang

BY JOHN XEPOLEAS

## Snaring the Tone

A POORLY TUNED SNARE DRUM can effectively ruin the sound of a drum kit. No matter how good your kick drum, tom-toms, or cymbals sound, if the snare is below par, no one is going to notice what the rest of the kit sounds like. Let's face it, the snare is a prominent part of every song.

So how do you get a great snare sound that has a crisp, full tone with a solid crack when the drum is struck? Do you need to buy an expensive Noble & Cooley and

bottom heads should be free of dents. If you have had the same old batter (top) head on your drum for over a year, you can bet that it probably needs to be relieved. Don't cut corners: old and worn heads will contribute to a dull and lifeless drum sound.


**Bottoming out.** Once you're sure that both heads are in satisfactory condition, you can begin tuning, starting with the bottom head. You'll need to either remove the snares completely or at least disconnect one side so they won't affect the head's tone. First, loosen all of the bottom lugs with a drum key. Then, hand tighten them using two fingers wrapped around the shaft of the lug. This will ensure that all of the lugs start out at the same tension.

Next, look at your drum and picture a clock, the top lug being at twelve o'clock, the bottom at six o'clock, and so on. When tuning a drum I always use two drum keys, one in each hand. This is a useful technique that I learned from Bob Gatzen, one of the foremost product designers in the drum industry. (Check out his excellent video *Drum Tuning*, available from DCI Music Videos.)

Place one hand at twelve o'clock and the other at six o'clock. Move both hands around the drum clockwise, and tighten each lug approximately half a turn. After going around the drum a few times, press your thumbs into the head. You should find that it gives a little. If the head is too tight (say, as hard as a table), loosen all of the lugs a quarter turn or so. If the head feels too spongy, tighten the lugs a quarter turn. Now, check for uniform pitch by tapping at the head about an inch from each of the lugs. Make any

spend hours tuning it? Not necessarily. Here are a few tips that can drastically improve the sound of your existing snare and get you rocking in a few minutes.

To start off, make sure your drum heads are in good shape. Both top and



Author John Xepoleas demonstrates Bob Gatzen's 2-handed technique for evenly tuning a drum head.

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adjustments needed to establish a consistent pitch around the drum. Finally, reconnect the snares, but leave them in the "off" position for now.

**Batter up.** Unless you are playing really hard, a medium weight white-coated batter head typically works best. My personal favorite is Aquarian Accessories' Satin Finish (tel. 714/632-0230). If you play extra hard and need a more durable head, check out some of the double-ply or power-dot types.

Again, start by evenly hand tightening the lugs. With a drum key, go around

the head, turning each lug a half turn at a time. For the batter head, you will probably need to go around the drum at least three or four times. Check the tone of the drum. If it sounds too low, crank all of the lugs up an eighth or quarter turn each. If it sounds too high, loosen the lugs a bit.

I personally like having the tension on the top head somewhat tighter than the bottom. I find that this is the quickest and easiest way to get a full, bright, usable sound. However, there are a number of options for establishing a rela-

tionship between the top and bottom heads. For example, by keeping both heads tight, the snare will generate a "pop" (similar to Stewart Copeland's sound). If the bottom head is tighter than the top, you'll get a crisp response, which is typically heard on jazz recordings. And, by leaving both heads loose, you'll get the traditional rock sound (à la John Bonham).

After you've decided what sound you're after, finish by tapping the edges of the head, checking for a consistent pitch. Don't worry about tuning your drum to any particular note; simply go for the tone you like.

**Tension's tight.** Put the snares back to the "on" position. At this point, the drum should be sounding pretty good. Now you need to check for proper snare tension. To do this, loosen the snares until they are almost "off." Then, gradually tighten them, checking the sound of the drum with each adjustment. For the best sound, the snares should be loose enough to vibrate but not so loose that they rattle. Don't make the common mistake of overtightening the snares. As you strike the drum with each adjustment, you'll notice how the drum's tone will start to choke as the tension increases. When you hear the tone choking, back off the snare tension until a crisp, open tone returns.

**Keep it quiet!** Although a snare will sound best without any muffling, it is sometimes necessary to pad the drum to eliminate unwanted vibrations. First of all, if your snare has a built-in drum muffler, take it out. These aberrations are notorious for either rattling or choking the tone of the drum. Instead, go to your local music store and pick up a drum-muffling ring. A muffling ring is a doughnut-shaped piece of plastic that sits on the batter head. It is designed to get rid of unwanted overtones and excessive ringing. If you would like to save a little money, you can easily make your own muffling ring by cutting one out of an old drum head.

If you are close-miking the snare in a studio and need a very controlled sound, a muffling ring is probably the way to go. However, if you want a more open sound, cut a 2- or 3-inch piece of the ring and tape it to the outer edge of the drum head using small strips of gaffer's tape. Adjust the size of the ring relative to the amount of muffling you desire. Now you should be ready to rock with a great-sounding snare! ♦

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— Paul Errico *The Music Paper*

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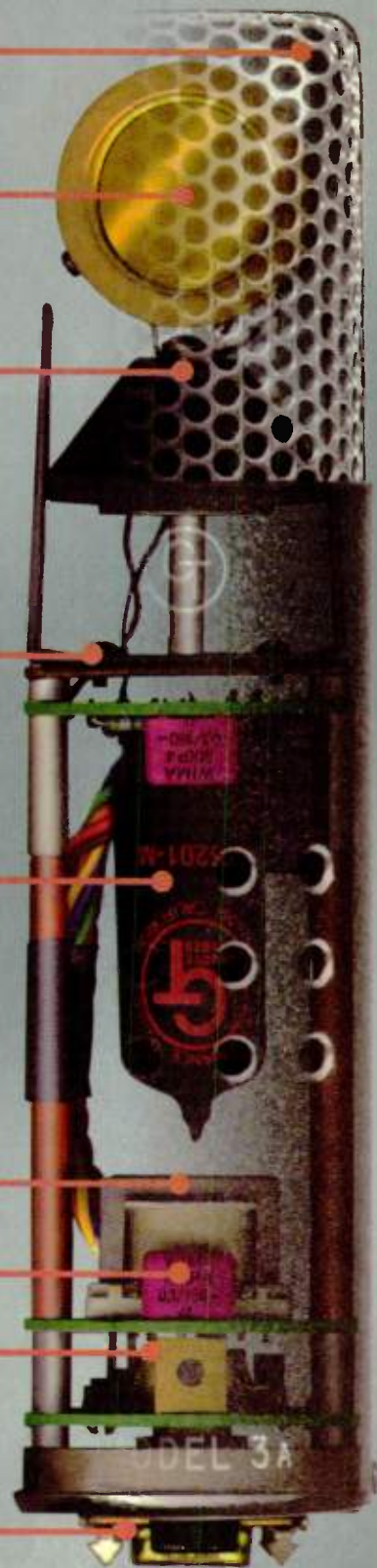
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# tech

## A Soft Touch

BY BEAN

IMAGINE CREATING A SOUND collage by waving your arm. With a flick of your wrist, the pitch modulates, and when your fingers bend, the notes' duration changes. The voice changes entirely at the touch of a fingertip. Playing meaningful, melodic or rhythmic musical arrangements in this manner requires a state of awareness that allows instantaneous action and reaction to every sound and motion you make.

Laetitia Sonami models her Lady's Glove, a lightweight, flexible gestural controller made of sensors attached to a fine Lycra mesh glove.

Although it may sound futuristic, this technology exists today in the Lady's Glove, developed by French composer Laetitia Sonami (e-mail [laetitia@cnmat.berkeley.edu](mailto:laetitia@cnmat.berkeley.edu)) with the sponsorship of the STEIM Institute (STudio for Electro-Instrumental Music; Web [www.xs4all.nl/~steim](http://www.xs4all.nl/~steim)). For Sonami, the physical experience of making music is an integral part of the performing and composing process.

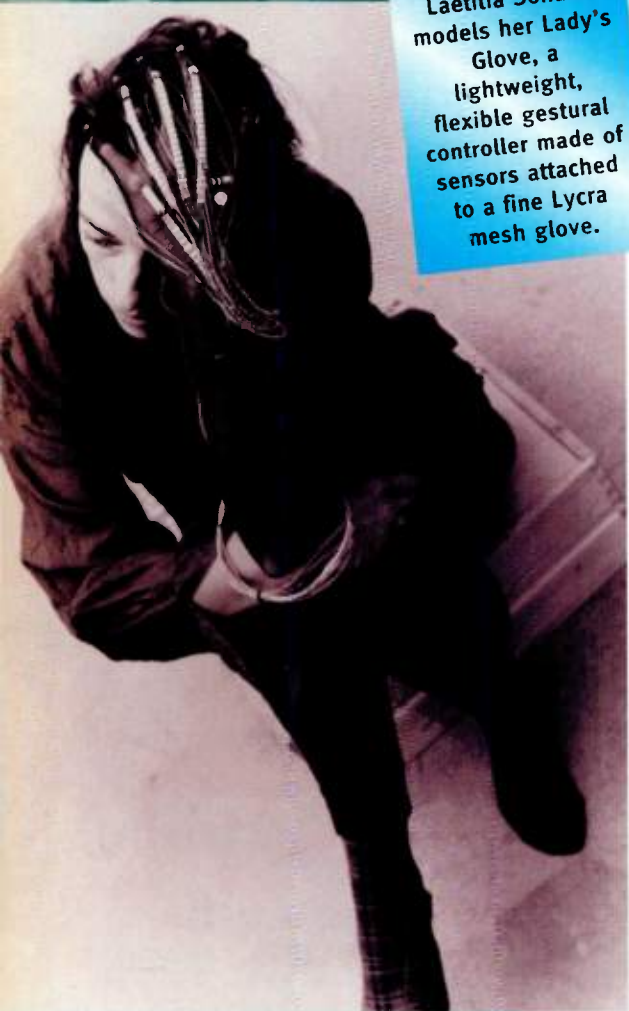
**A brief history of airplay.** In the early 1980s, Tom Zimmerman wired up a cloth glove that, when used as an input device to control the on-board synth in an Atari computer, allowed him to play air guitar. A few years later, Zimmerman and Jaron Lanier invented the DataGlove by adding tracking devices to this controller. Their company, VPL Research, patented and manufactured the hand-gesture recognition device for controlling computer interaction. The DataGlove sold for approximately \$8,000.

VPL also licensed the hand-gesture recognition technology to Abrahms Gentile Entertainment, which in turn worked with toy maker Mattel to create the Mattel PowerGlove. After *Byte* magazine published the "secret" pin-outs of the \$89 PowerGlove, it wasn't long before musicians were experimenting with the high-tech toy to explore new ways of making music.

**From latex to Lycra.** Around 1991, Laetitia Sonami developed electronic gloves made of latex rubber, similar to the gloves you may have used to wash dishes. Sonami glued Hall Effect sensors onto the fingertips and a magnet onto the thumb so that when her fingers touched the magnet, a signal was generated. She used a converter to derive MIDI information from this analog signal, which allowed her to trigger sounds. (Hall Effect sensors are a product of American Electronic Components, Inc., a manufacturer of custom sensors, industrial switches and relays, and other electromechanical devices; Web [www.aec-echlin.com/sensors/halleff.htm](http://www.aec-echlin.com/sensors/halleff.htm).)

Finding Mattel's inexpensive PowerGlove big and bulky, Sonami decided to create a lighter, more responsive controller. The name "Lady's Glove" was meant to be more of a joke than a fashion statement, but on stage it's the ultimate in cyber *haute couture*.

In collaboration with Bert Bongers, Sonami tailored the Lady's Glove of fine Lycra mesh. The skeletal framework of the glove is composed of turquoise blue plastic rods. All the wiring and circuitry is exposed; ribbon cable runs the length of the performer's arm, connecting to microswitches embedded in the glove's fingertips. Many of the Lady's Glove's resistance strips and components originally





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came from cannibalizing a Mattel PowerGlove, to which Bongers and Sonami added ultrasound, pressure, and motion sensors.

Using ultrasound emitters and receivers to decorate her shoes and pad the palms of the gloves, Sonami is able to modulate pitch as a function of the distance between her hands. As Sonami changes the distance from her hand to the floor, the length of the beat cycle is modified in real time. A miniature circuit board that was originally designed to launch emergency airbags in automobiles detects speed and motion, producing a variable voltage from Sonami's gestures that gets converted into audio.

**Mysteries revealed.** On the inside of the glove, Hall Effect sensors produce varying voltages that correspond to a preprogrammed set of algorithmic probabilities created in Opcode's MAX, an

❖

**Sonami  
gracefully  
choreographs her  
unique hand-dance  
creations.**

object-oriented programming language. Sonami uses MAX to set a threshold so that whenever her fingers pass a certain distance, they trigger an immediate response. That way, she doesn't have to actually press a mechanical switch. According to Sonami, because of a response limitation of two inches, the Hall Effect devices are difficult to use if you want to measure distance, but they work well for switching.

STEIM's SensorLab analog-to-MIDI converter belt-pack translates the electronic and ultrasound signals into MIDI data and relays them to a computer on the side of the stage. Sonami also uses the SensorLab to tune the sensors' voltage regulation, response time, etc., and to channel them to whatever MIDI controller numbers she needs.

For years, Sonami has been using a Macintosh PowerBook 180 and MAX to handle all the music programming. For example, she wrote an editor to control the parameters of her synthesizers as

functions of her movements. She recently upgraded to an Apple Power Mac G3 with MAX, Cycling 74's MSP, and a Korg SoundLink DRS 1212 I/O card. This new system will eventually be the source for all of her sampled, FM, and additive synthesis sounds.

**Harnessing reality.** Coordinating the numerous muscular combinations necessary to master the Lady's Glove is no small feat. Playing in tune requires the concentration of the entire body, with continual motion adjustments for fine-tuning. Sonami gracefully choreographs her unique hand-dance creations, inspired by a cross between East Indian singers and sign language. Watching her constantly adapt to the music she makes, you can clearly see that every composition requires a balance of prearranged physical movement and spontaneous improvisation.

Sonami's performances interleave sonic layers of industrial, ambient, and rhythmic textures with spoken word to form a provocative, transformative journey. Her onstage freedom is made possible by the programming of parameters she determines with the computer beforehand. By establishing the relationship between the gestures and the sounds in the software, she is able to listen, shape the sounds, and feel as if she is modeling the air in performance.

Sonami admits that the glove has its share of limitations, but like any other instrument, once you learn to use it, these limitations become part of your musical vocabulary and expression. Ultimately, Sonami hopes to transcend technology altogether for both herself and the audience.

For a listing of her upcoming performances, check out the Electronic Music Foundation's home page (Web [www.emf.org](http://www.emf.org)) and the Center for New Music and Audio Technologies (CNMAT) Calendar (Web [cnmat.cnmatt.berkeley.edu/Calendar](http://cnmat.cnmatt.berkeley.edu/Calendar)).

**Keep your eyes on the sun.** A recent announcement from Sun Microsystems could bode well for electronic glove technologies in the future: Sun has acquired the rights to the patent portfolio and technical assets of VPL Research from Thompson CFS and Greenleaf Medical. Sun plans to incorporate the technology protected by the VPL patents, including human-body based input, in its Java 3D Application Program Interface (API) and in networked 3-D graphics products. ♦

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## DESKTOP MUSICIAN

# Streaming MIDI

*Instant playback for your Web-based MIDI files.*

By Scott R. Garrigus

If you've been surfing the Web lately, you may have noticed that most of the content consists of text and graphics. With the Internet's currently limited bandwidth and the standard modem speed still revolving around 28.8 kbps, many people fear putting anything in the form of multimedia on their sites, because it may cause visitors to leave in disgust if the files take too long to load. Of course, audio content has always taken a back seat to its visual counterpart, but in spite of bandwidth limitations, the use

of MIDI and digital audio on the Web has been rapidly gaining in popularity. The reason for the increased prevalence of audio on the Web is a fairly new technology called *streaming*.

When you come across a MIDI, AIFF, or WAV file on someone's Web site, you are usually required to click on the file and wait until it has been completely downloaded to your computer before you can begin listening to it. Depending on the size of the file, that can take anywhere from 30 seconds to 30 minutes or more. With streaming technology, on the other hand, as soon as a small portion of an audio or MIDI file is downloaded (usually within a few seconds), you can start listening to it. This provides almost instantaneous playback, and you can continue to listen as the rest of the file is downloading.

The benefit of streaming in terms of audio is obvious—most sound files are very large and, therefore, take a long time to download. By nature, MIDI files are typically small in size, but even a 100 KB file can take from 30 seconds to a minute to download, depending on the quality of your Internet connection. With streaming, that time is cut to only a few seconds. Unfortunately, there is no standardized format for streaming MIDI, so your online visitors will have to download yet another Web-browser plug-in to play your files. In addition, you have to pay for the file encoder



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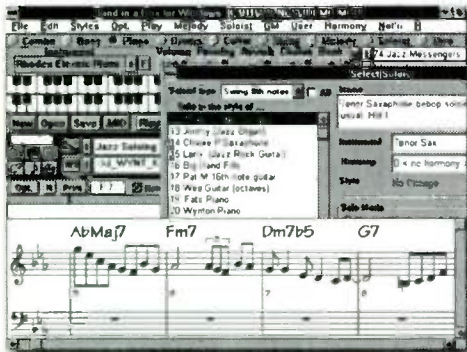
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**Band-in-a-Box breaks new ground with over 60 new features!**

This major upgrade includes over 60 new features. We've added a new feature called "Automatic Soling". Choose the type of soloist you'd like (from 100 available) and the program creates and plays a solo in that style, along to any song! Or create your own soloists. This is hot! These solos are of the highest professional quality, rivaling solos played by great musicians! And there's lots more in 7.0 - improved notation, step time/notation edit of StyleMaker patterns, style changes at any bar, scroll ahead option for notation, improved synth support, over 60 new features in all!

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FIG. 1: This is the playback control panel for LiveUpdate's *Crescendo* plug-in.

needed to prepare streaming MIDI. No free file encoders are available.

### WHO'S ON FIRST?

At the time of this writing, I have only encountered two participants in the streaming MIDI field: LiveUpdate and Wildcat Canyon Software. LiveUpdate's streaming MIDI product is called *Crescendo*. It comes in the form of a plug-in for Netscape *Navigator* and Microsoft *Internet Explorer*, and it runs on both the Mac and PC. *Crescendo* comes in a basic version and an advanced version called *Crescendo Plus* (see Fig. 1).

The basic *Crescendo* plug-in is available as a free download from LiveUpdate's Web site. On its own, it acts simply as a MIDI playback utility rather than a streaming-MIDI playback engine. *Crescendo Plus* costs \$19.95, but it can stream any Standard MIDI File (SMF) from any Web site. *Crescendo* and *Crescendo*

*Plus*, however, are playback-only solutions for Web surfers. If you want to post streaming MIDI files on your own Web site, you will have to purchase a *Crescendo Streamsite* "key file" (\$49.95 for use on a personal site). The key file activates the streaming capability that is locked in the free, basic version of *Crescendo*. Once you unlock the software, surfers using any version of *Crescendo* can hear MIDI files streaming from your site.

Wildcat Canyon's streaming MIDI software is called *WebTracks*. Like *Crescendo*, *WebTracks* comes in the form

of a Web-browser plug-in for *Navigator* and *Internet Explorer* and runs on both the Mac and the PC. The *WebTracks* plug-in is available as a free download on Wildcat Canyon's Web site, and like *Crescendo*, it is a playback-only utility for Web surfers.

To stream MIDI files from your own Web site using Wildcat Canyon's *WebTracks*, you have to purchase the company's *Internet Music Kit* (\$79; \$49 if ordered online). This program provides a fast and elegant method for putting streaming MIDI files on a Web site (see Fig. 2). Unfortunately, the *Internet Music Kit* only runs on the PC, so Mac users are left with LiveUpdate's streaming system. According to Wildcat Canyon, the company has no plans to create a Mac version of the *Internet Music Kit*.

### CREATE THE MUSIC

Both *Crescendo* and *WebTracks* can handle any SMF, so there really aren't any special techniques needed when it comes to creating the music for a streaming MIDI file. You can use any MIDI sequencer to produce your music in any way that you'd like, as long as

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● **DESKTOP MUSICIAN**

you can save the output to a Type 0 or Type 1 SMF. *Internet Music Kit* even includes a copy of Roland's *DoReMix* program to help you get started right away (see Fig. 3).

*DoReMix* provides a library of hundreds of musical phrases in a number of different styles, which you can mix and match to produce a finished piece of music. You begin by choosing a tempo and a musical style (everything from classical to rock is available) and then add various musical phrases to the song by dragging and dropping

them onto the 6-track Song Map. After you have finished piecing together your song, you can save it as a Standard MIDI File.

**CONVERT THE MUSIC**

If you decide to go with LiveUpdate's *Crescendo* solution, the creating and converting part of the streaming-MIDI process is finished as soon as you save your sequence to a Standard MIDI File. That's because *Crescendo* streams MIDI files in their native format. The program acts essentially as a MIDI play-

back sequencer for the Web. There is still one thing, however, that you should consider to make your files stream better with *Crescendo*. Just as a regular MIDI sequencer must step through each track in sequential order during playback, so too does *Crescendo*. This means that the lower-numbered tracks get higher priority during playback. Therefore, you may get better results with *Crescendo* if you keep the crucial rhythmic material on track 1 of a sequence.

Wildcat's *WebTracks*, on the other hand, uses its own proprietary format for streaming MIDI. The only way to encode SMF files to this format is with the *Internet Music Kit*. The encoding process is very simple. Just click on the Convert Music button, select an SMF, and confirm your choice. Your Standard MIDI File is then converted to and saved as a *WebTracks* file. In addition to being optimized for streaming playback, the file is also compressed, which helps save some Web space.

When it comes to the amount of compression, however, your mileage may vary. Although I generally got compression ratios ranging from 80 to 90 percent, occasionally the compression ratio went well outside the norm. One 25 KB MIDI file crunched down to about 7 KB, but another 47 KB file actually "compressed" to 60 KB. The compression amount appears to depend on the content of your file—for example, controller data and number of tracks—and sometimes works in your favor but other times does not.

One definite advantage of the proprietary *WebTracks* format is that your MIDI sequences get a little more protection from prying eyes. There is

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**INTERNET MUSIC KIT**

- 1 Create music**  
Step 1 Create the music to put on your web page
- 2 CONVERT MUSIC**  
Step 2 Convert the music to the WebTracks format
- 3 Embed Music**  
Step 3 Put the music on your web page.

FIG. 2: Wildcat Canyon's *Internet Music Kit* provides a simple 3-step process for creating and posting streaming-MIDI files to a Web site.

For manufacturer information, please see Contact Sheet, p. 163.



no way to open or edit a *WebTracks* file. Of course, if someone is really interested in dissecting your music, they can easily record the output from the *WebTracks* player into a separate MIDI sequencer because it's all still MIDI data.

### EMBED THE MUSIC

After all of the composing and converting is completed, it's time to put your music up on the Web for everyone to hear. In the case of *Crescendo*, all you need to do is place your MIDI files and your special key file into the same file directory on your Web site. Then just set up links on your Web page to each of the files like so:

```
<a href="http://www.mywebsite.com/
mymidifile.mid">Click here
to listen to my MIDI file!</a>
```

When someone comes along and clicks on the link, his or her copy of *Crescendo* (if it's already downloaded and installed) will launch, detect your key file, and then begin streaming the MIDI file.

You can also present your music in a more elegant manner by having it automatically start playing when a user hits your Web page. To do this, you have to embed the *Crescendo* player into your Web page with the following HTML code:

```
<EMBED TYPE="music/crescendo"
SONG="yourmidifile.mid" PLUGINS-
PAGE="http://www.liveupdate
.com/dl.html" AUTOSTART="true"
WIDTH=200 HEIGHT=55>
```

You can also specify other options such as having the file loop over and over with the LOOP="true" parameter. LiveUpdate provides a good deal of *Crescendo* authoring information on its Web site. Unfortunately, you do have to "get your hands dirty" and do all the HTML coding yourself.

*WebTracks*, however, eliminates all hand coding of HTML. With the *Internet Music Kit's* Embed Music function, the proper HTML code is automatically added to your Web page. Selecting Embed Music opens the *Internet Music Kit's* Embed Wizard. A set of dialogs takes you through all of the options available for embedding your *WebTracks* file into your Web page.

You first must choose the HTML file in which you want to embed your music. Next, you choose which MIDI file to embed (there can be only one per Web page) and whether or not it should



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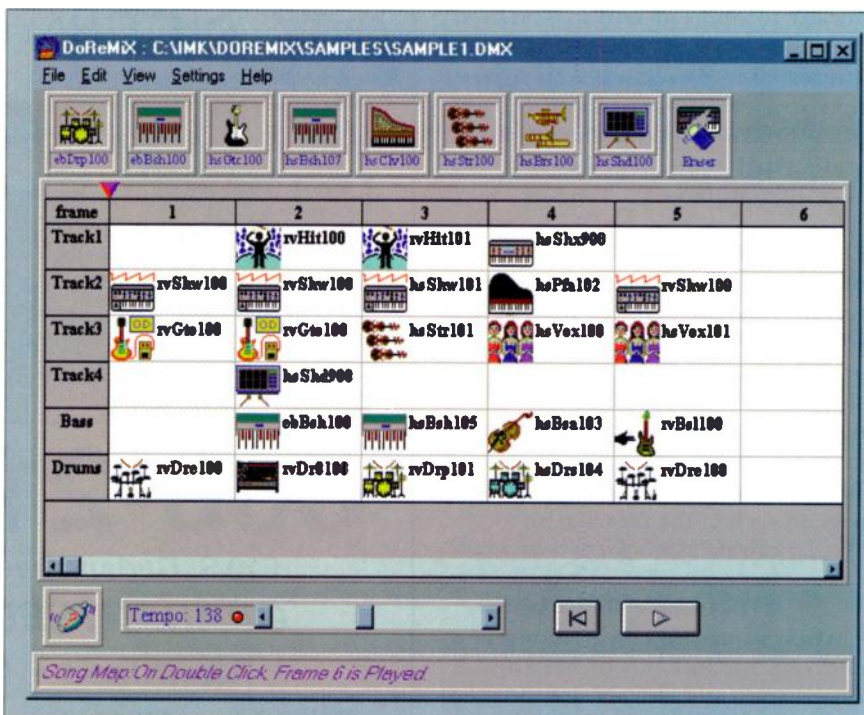


FIG. 3: Roland's *DoReMix* lets novices and nonmusicians easily create MIDI music by piecing together prerecorded 4-bar phrases.

loop. You can also select whether the *WebTracks* player will be a part of the Web page or float above it so the user can move the player around the screen. The position where the player initially pops up can also be set to top right, top center, top left, bottom right, or bottom left. The look of the player can be altered, and you have a choice of which components (globe, level meter, and status bar) will appear. The final step is to tell the Wizard where you'll be uploading your Web page (so it can create the right link format for your MIDI file). Your Web page is then saved (with the proper HTML code included for *WebTracks*) and is ready to be uploaded.

Of course, you can also add the HTML code for *WebTracks* to your Web page by hand if you want. Just take a look at the Embed Wizard output and you'll easily be able to figure out the different parameter codes available. One little trick that works with both *Crescendo* and *WebTracks* is to use the HTML parameters for width and height to hide the embedded player. Just set both width and height to zero and the player will not show on the Web page. It will still stream your MIDI file in the background, but it will be invisible and, therefore, won't obstruct the design of your page.

### WHAT THE FUTURE HOLDS

Lack of bandwidth will more than likely always be a problem with the Internet. No matter how much more we can squeeze out of the existing network (or even a brand new network), there will always be bigger and bigger files to download. With their smaller size, MIDI files offer an important edge over digital audio—compressed or otherwise. In the future, MIDI's benefits will shine even more as the MIDI file format is modified to include such things as downloadable audio samples.

We will also soon see streaming MIDI that is synchronized with a variety of other media formats, such as digital audio, video, and animation. In addition, there will be established conventions for copyright protection as well as pay-per-play content, so artists can easily exhibit and sell their works on the Web. Musicians are in for some exciting new Web-related developments, and streaming MIDI will definitely be a part of them.

Scott R. Garrigus wishes to thank Bill Moline of *LiveUpdate* and Evan Gilbert of *Wildcat Canyon Software* for their help in preparing this article. To hear some examples of streaming MIDI in both the *Crescendo* and *WebTracks* formats, surf on over to Scott's Web site at [www.pan.com/garrigus](http://www.pan.com/garrigus).

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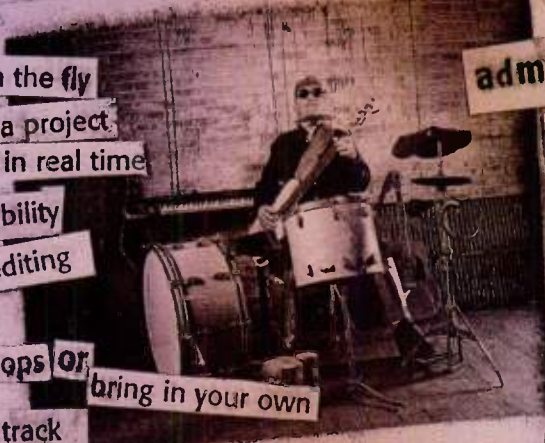
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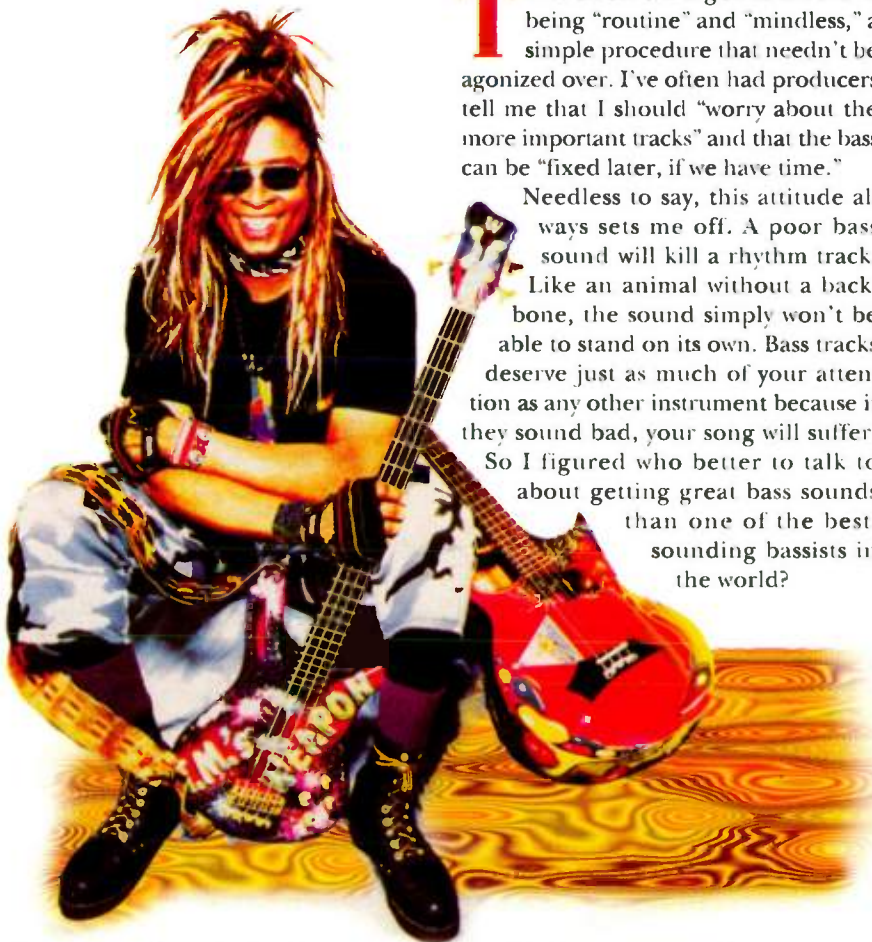


## RECORDING MUSICIAN

# Rolling Thunder

*Nailing a bass sound that rocks!*

By Jeff Casey



One of the most versatile bassists in modern music, T. M. Stevens has established a name for himself playing with the Pretenders, James Brown, Steve Vai, Tina Turner, and a host of others. His latest solo album, *Sticky Wicked*, will be available in the U.S. this year.

**T**he process of recording electric bass tracks often gets dismissed as being “routine” and “mindless,” a simple procedure that needn’t be agonized over. I’ve often had producers tell me that I should “worry about the more important tracks” and that the bass can be “fixed later, if we have time.”

Needless to say, this attitude always sets me off. A poor bass sound will kill a rhythm track.

Like an animal without a backbone, the sound simply won’t be able to stand on its own. Bass tracks deserve just as much of your attention as any other instrument because if they sound bad, your song will suffer.

So I figured who better to talk to about getting great bass sounds than one of the best-sounding bassists in the world?

Known for his animated playing style and punchy, slapping sound, T. M. Stevens is a studio legend. He has played with countless heavyweights, from Billy Joel and the Pretenders to Miles Davis and David Sancious. A self-professed “sonic maniac” in the studio, Stevens knows exactly how to get the bass sound he wants—a sound that rocks!

### MIKING VS. DIRECT BOXES

You need to start by determining what sound will be most appropriate for a particular song. Confer with the producer (or artist) to find out what kind of tone they’re looking for. Many variables can affect the ultimate sound of the bass, so you should have a clear idea of your final goal well before you start.

Electric bass can be either recorded from a miked cabinet or routed directly to tape through a direct-injection (DI) box. Both methods produce distinct sounds that tend to favor certain arrangements. Says Stevens, “I find that the miked track usually produces more low end and dirtiness, while the direct box offers a cleaner, high-end sound.”

Although many people choose to record only with a direct box for simplicity’s sake, good engineers often use a combination of both methods, sending each signal to a separate track on tape. Miking an amp can often be a nuisance (especially if you have to worry about loud volume levels), but having both sources will ultimately give

● RECORDING MUSICIAN

you much more flexibility, because you can pick and choose any combination of the two.

How you blend those signals will again depend on the tone you're after. "In the case of Billy Joel's *River of Dreams*," Stevens explains, "I used more of the cabinet sound and blended in a little of the direct-box track for clarity. On the other hand, for a thumb-popping funk record—like my own material—I always use more of the DI signal and blend in the miked cabinet track to balance out the bottom."

**SIZE DOES MATTER!**

A seasoned bassist will probably have several different amplifier rigs. However, it's usually the engineer's responsibility to determine which one will yield the tastiest results for the song.

A large setup with many different-sized cabinets is usually more versatile than a combo amp. Stevens likes to use this type of rig when he's hired to play on a full album, where the bass tone may need to vary from song to song.

"I use a stack with selectable cross-overs," he explains, "so I can contour

the frequency response for any given song in relation to how the cabinets are miked. I find that this setup can generate everything from a glassy, high-end popping sound down to a beefy, warm tone. It's the rig I use when I want people to say, 'Wow, the bass sounds killer on this track!' I generally use a speaker configuration of a double 15-inch cabinet, a 4 x 10-inch cabinet, and a bright box (4 x 5-inch cabinet). If the 4 x 10 cabinet has a horn or high-end bullet enclosed, then I won't bring the 4 x 5."

Sometimes, however, a smaller rig can produce a more appropriate sound. Stevens often uses an Ampeg B-15, a staple from the Motown era. "I'll use this setup if the producer only wants a tight bass with no high frequencies or harmonics," he says. "It's always good for sessions in which the bass needs to be more of a backdrop to the song. The Ampeg B-15 delivers a classic, killer sound with a more rounded tone."

Always work on the amp's sound until you get it as close as possible to what you want to hear on the final track. Granted, a fair amount of processing might still be applied going to tape (and again during the mix), but unless you have a good sound to start with, you're going to have a hard time polishing it later. Stevens relates, "I have been a victim of the 'we'll fix it in the mix' scam, in which the engineer insisted that he was going to beef up the sound after I left. However, when the record came out, nothing had been done, and the bass still had a lame tone! So I always make sure that I'm happy with my amp sound before recording a note."

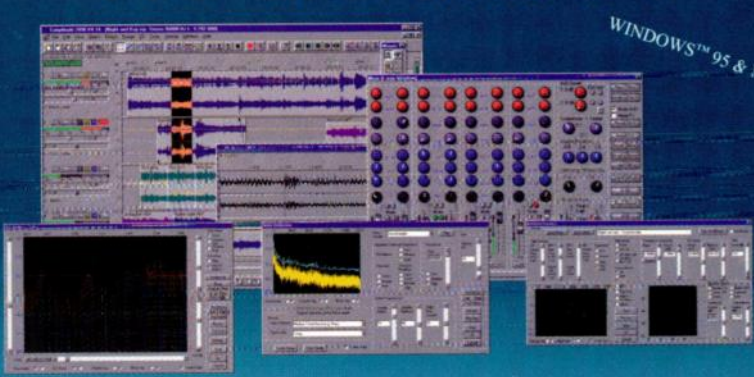
**CATCHING THE THUNDER**

Once you're satisfied with what's coming out of the amplifier, you'll have to figure out the best way to capture that sound. The techniques involved in miking a bass cabinet are quite different from those you would use with a guitar stack, and different laws of acoustics apply.

In order to accurately capture the rumbling nature of an electric bass, you'll need to place the amp in a bass trap. Basically, a bass trap is a small room that is heavily lined with absorbent material. A converted walk-in closet padded with cushioning can serve as an excellent environment for recording electric bass.

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performance doesn't stand out. But by cutting some of the competing frequencies, the same thing gets accomplished, only with no sonic garbage added.

Stevens tries to address any sonic flaws even before the signal leaves his amp. "If I hear a frequency that I don't like," he says, "I'll tweak the EQ on my rig. By EQing at the preamp, you're processing the signal before it gets amplified, rather than trying to subtract from a much louder signal." You can also try some other approaches, such as repositioning the mic. Often, subtle tonal balances can be achieved by tilting the capsule and altering its perception of the sound source. This is certainly more appealing than adding unwanted gain and noise to the signal path.

When an equalizer is necessary, Stevens and I agree that Pultec's EQ-P is a great way to go. It uses a passive filtering network, so no noise-generating components are present. However, the Pultec EQ-P is a vintage processor and can be somewhat difficult to find. If you can't locate one, check out TL Audio's EQ-1 processor, which also contains a very clean (but active) circuit. Stevens has used the EQ-1 for a variety of tracks on each of his own albums. This tube-based unit can operate in stereo (4-band, semiparametric) or mono (8-band, semiparametric), and it contains a microphone preamp section, as well.

### SQUEEZE BOX

Because the dynamic range of an electric bass is so large, you'll probably need to apply some amount of compression to the signal. The amount of compression you use should be relative to the playing style of the bassist.

For example, Jaco Pastorius played



A pro-audio staple, the Summit TLA-100A Tube Leveling Amplifier is a great choice for smoothing over tracks that have a lot of dynamic motion.

with a mystical feel that provided the effect of natural compression. Engineers, therefore, didn't need to apply much processing to his signal. The Who's John Entwistle, on the other hand, has a very aggressive playing style, which warrants a fair amount of squeezing. "Many engineers simply use a formula method for applying compression without listening to what the player has to offer," Stevens notes. "However, every bassist plays with different nuances. You should approach each player—and style—from scratch, and play around with the compressor to see what works best."

For his own style, Stevens subscribes to the "less is more" philosophy. He says, "I always tell the engineer to kiss my track with just enough compression so that it blends with the song. I play very hard on the strings, which causes any compressor set to a low threshold and heavy ratio to squash my sound. This inevitably produces a choked, nasal effect. However, if you back off enough to catch only the red-line peaks, then the sound becomes really pure."

To complicate things further, there is yet another issue to consider when miking a cabinet: at which point do you apply the compression—at the amp or going to tape? Although compressing at the preamp can tighten up the signal before it's amplified, the compressors commonly found on bass rigs can't compete with high-end, dedicated units. I often use a combination of both compressors, but I do the majority of the processing with the outboard unit.

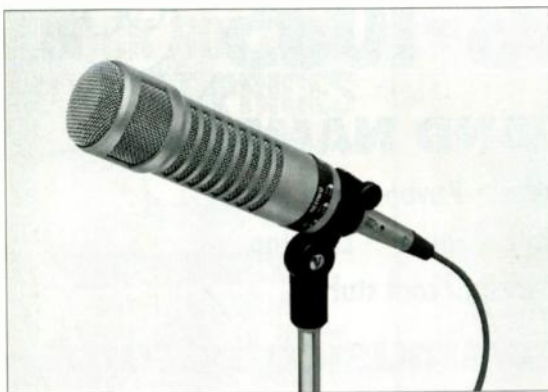
That's because I like to have the complete dynamic range delivered to me in the control room, where I can make adjustments while listening through the monitors. I will then tweak the amp's compressor accordingly, making only minor corrections.

Some of my favorite outboard units are the illustrious Teletronix LA-2A, Summit's TLA-100A, and TL Audio's C-1 compressor. In my opinion, nothing beats the sound of a tube processor (especially if you're recording on a digital deck). All three of these units are studio staples that give you a fair amount of control over the parameters and provide subtle amounts of tasteful dynamics processing. Surprisingly, I also really like the dbx 166A. It offers two channels of compression/limiting/gating, gives decent parameter control, delivers a smooth sound, and is very affordable (\$329.95!).

### PROBLEMS AND SOLUTIONS

I have yet to work on a session where we didn't have some sort of problem with one or more of the guitar amplifiers. I recently worked at a studio where we were getting an enormous AC hum from a DI box that was running parallel to the bass amp. No matter what outlet we plugged the amp into, the noise would not go away. We tried everything, including running a 100-foot power cable into another control room, but nothing worked. We didn't want to filter out anything at 60 Hz, because that would have directly affected the tone of the bass. We were at a total loss—until we thought of the Ebtech Hum Eliminator.

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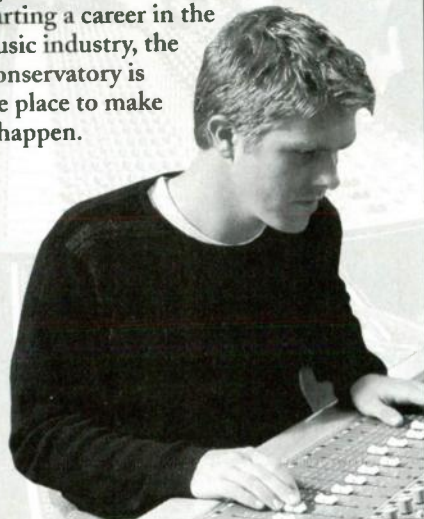
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so if you want to see how the thing works, you will have to break the case.) Believe it or not, the Hum Eliminator really works! You simply plug your 1/4-inch guitar cable into the unit before it gets sent to the direct box. *Voilà!* Problem solved.

RF interference is another tricky one. The only real solution is to have the player move around until the interference stops. Basically, anything coming in contact with the preamplified signal (the 1/4-inch guitar cable, the guitar, the musician, etc.) can act as a giant antenna. Just as you would adjust your radio antenna to get a good signal, move the components of the bass chain around until the offending signal disappears.

This may seem like a no-brainer, but if the strings on the bass sound lifeless, replace them! I've mixed tracks where it was very apparent that the bassist had played using dead strings. Don't be afraid to tell the musician what you think the problem might be—everyone will appreciate it in the end.

Or perhaps you simply recorded a track that just doesn't sound good. Is there any way you can fix it? Stevens relates a story: "Once I recorded a bass track on a hard rock song through a DI. As you would expect, the sound of my track was very thin in comparison with the rest of the song. The engineer called me back a couple days later and asked me to rerecord my bass tracks through an amp. But after trying a few passes, we realized that the magic was on my initial track, and I wasn't going to re-create it. So we took the sound that was already down on tape, pumped it through the amp setup, miked the cabinet, and recorded it back to the multitrack. It was a great idea—and we got a great sound!"

## ROCK 'N' ROLL

T. M. Stevens has a reminder for all of us: "This is an art, and there are no rules!" EM agrees. We're just here to offer some guidance. But whatever you do, *don't* let the bass track get passed over by a producer who is too preoccupied with getting a great vocal track. Give your animal the backbone it deserves—and make sure the song sounds great!

EM Associate Editor Jeff Casey has yet to capture the perfect bass sound, but he has come pretty close on a couple of occasions.

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6. All entries and requests become the property of Intertec Publishing and participating manufacturers and will not be acknowledged or returned.

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8. All entrants release Intertec Publishing and participating manufacturers, their respective affiliates, subsidiaries, directors, officers, employees, and agents, and all others associated with the development and execution of this sweepstakes from any and all liability from injury, loss or damage of any kind resulting from participation in this promotion or acceptance or use of any prize.

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# Buried Treasures

*How to dig up gigs in the hidden areas of composing.*

By Mike Levine

**W**hen people think about pursuing commercial composing gigs, their thoughts typically turn to the high-profile areas of the business, such as film and television scoring or writing music for national television ads. While these are arguably the most prestigious and high-paying areas of the work-for-hire composing world, there are other, more obscure sectors of the business where those skilled in writing, arranging, and scoring to picture can ply their trade. There isn't as much money to be made or recognition to be earned, but the

work is often easier to get and is a good way to build up your credits as you work your way toward more glamorous gigs. Let's take a look at some of these lesser-known areas and examine what you need to do in order to obtain work in them.

## **A SOLID FOUNDATION**

It would be helpful to begin with some general ideas about getting and successfully completing *any* type of composing work. For one thing, you must be able to write music on demand, not just when the inspiration hits you. You also need to be able to write music that sets the appropriate mood for the project you're working on, which means you must be well versed in a variety of musical styles. Another essential skill you'll need for much of this work is the ability to score to picture. The more comfortable you are working with picture, the less you'll have to think about the mechanics of it and the more you'll be able to concentrate on the musical aspects. Finally, you must be able to handle the fast turnaround times and heavy deadline pressures that are endemic to the business.

As a commercial composer, you won't have control over your own work; instead, you'll need to take direction from and communicate regularly with those who hire you. What's more, you'll be expected to produce the demos—and often the final versions—in your



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### ● WORKING MUSICIAN

the arrangement progresses. When composing these pieces, you're usually asked to submit a full mix as well as a mix with rhythm tracks only. Some producers of music libraries even ask composers to give them the individual instrument tracks, which allows them to offer many alternate mix combinations on their CDs.

If you want to compete as a composer for music libraries, your tracks must be pristine sounding as well as realistic. It's best to emphasize your musical strengths when looking for this kind of work rather than trying to be a jack-of-all-trades. There is no standard pay scale for writing stock music. Some library companies will buy the rights to your composition, whereas others will give you no money up front but will pay you a royalty each time the piece is used by a client.

You'll find listings of companies that produce library music on the Internet as well as in directories, such as *The Songwriter's Market* by Cindy Laufenburg (published by *Writer's Digest*) and the *Recording Industry Sourcebook*. The reel that you send out to get this kind of work should consist of (at least some) full-length, library-style pieces to show that you not only have composing chops but also know what's expected arrangement-wise.

### LOCAL ADVERTISING

Quite a few steps down from the glamour of national advertisements are the ads aired for local businesses. These spots typically have much smaller budgets and, as a result, much lower production values. Library music is used most of the time, but composers are brought in to write jingles and occasionally to do underscoring.

Local ads are almost always *buyouts*, meaning that the composer makes only a one-time fee and does not earn residuals if the spot runs for a long time or if the music is reused. Though they are often produced by local advertising agencies, some businesses bypass the agency route and go directly through a video- or music-production company. Cable television companies and radio stations also get involved in producing local ads.

One way to obtain this kind of work is to approach the businesses directly. (Do some homework first, and observe which companies in your area tend to advertise on TV or radio.) You can also

try to get the work through cable TV companies as well as ad agencies and music-production companies. (For an in-depth look at breaking into composing for commercials, see "Working Musician: Going Commercial" in the June 1994 issue.)

### MULTIMEDIA

Just about every business has a Web site these days, and as the delivery of music over the Net becomes easier and faster, the demand for music and sound design will grow. From opening themes to loops that play when various windows open, more opportunities are developing in composing music for the Web. (For a look at the types of opportunities on the horizon in music for the Web, see "Working Musician: Sonic Web Weavers" in the May 1998 issue.) Furthermore, plenty of CD-ROMs are published both commercially and for industrial and educational markets, and many of these will need the services of composers for themes, underscores, and sound effects.

To get this type of work, you can try contacting multimedia producers just as you would video producers or ad agencies. If you have access to a CD burner, you should consider creating a CD-ROM version of your reel (make sure it's compatible across platforms). Directories of multimedia producers are available, and a good place to find them is Music Books Plus. You might also try contacting Web design firms; you can usually find their names and e-mail addresses listed at the bottom of sites they've worked on.

Because recommendations are very important for getting this type of work, you can start generating word of mouth for your multimedia composing abilities by volunteering to do some music for your friends' Web sites. It's a good way to get experience, and you never know who might visit the site.

### PUTTING TOGETHER A REEL

No matter what kind of commercial composing work you're pursuing, you'll need a demo tape (known in industry jargon as a *reel*) in order to show your stuff. Generally speaking, you can get by with an audio reel, but a video version is often preferable because it demonstrates your ability to score to picture.

Depending on what type of work you're going after, you'll need to tailor

For manufacturer information, please see Contact Sheet, p. 163.



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● **WORKING MUSICIAN**

your reel accordingly. If you're pursuing jobs in multiple areas, you'll ideally have a number of reels specifically tailored for the different types of work. Here are some general guidelines that apply to just about all reels.

**Keep it short and sweet.** You can be sure that the people who are listening to (or watching) your reel are inundated with tapes and videos from composers and will only pay attention to yours if it grabs them right away—so put your best stuff first! With audio reels especially, it's effective to use relatively short segments of your various pieces (figure 30 seconds as the maximum length) that are edited tightly together with crossfades in between.

**Fake the experience.** If you don't have any commercial work to put on your reel, you can use examples of your songwriting (in an edited form), or you can write and produce material specifically for the reel. Some people even tape commercials off TV, write music for them, and use them on their video reels. Although it's preferable to show actual jobs that you've done, the most important thing is to be able to demonstrate your ability to write and produce good quality music.

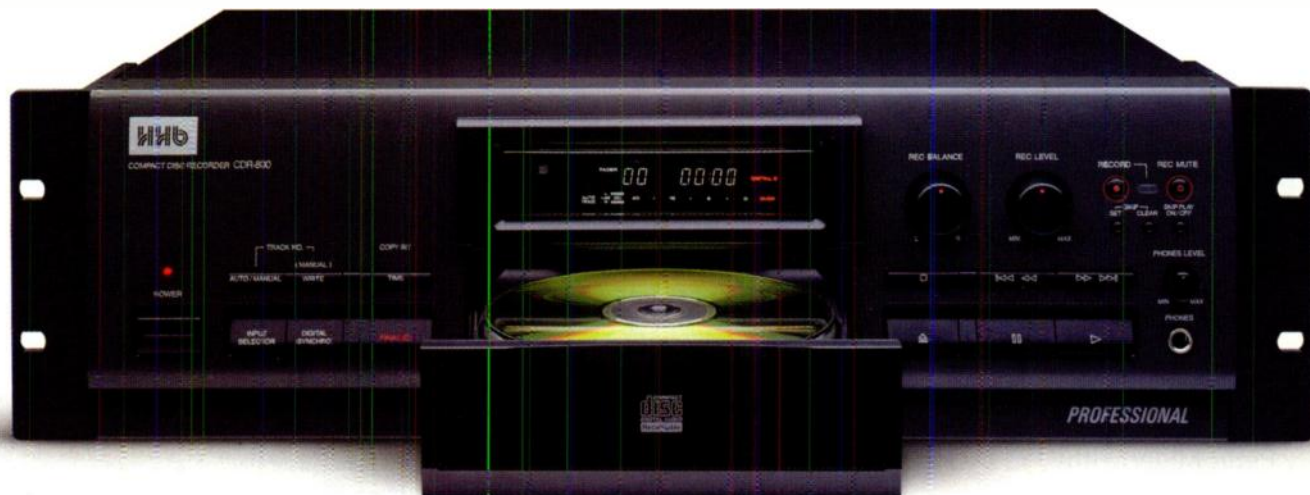
**Format considerations.** Audio reels can be on cassette, but CDs sound better and make you look more happening. As for video reels, some production companies and ad agencies will request that you send them in 3/4-inch (U-Matic) format, but these are quite costly to duplicate, and you can get by with VHS copies most of the time. Whatever type of reel you're sending out, make sure that you put printed, professional-looking labels on them with your name and contact information prominently displayed.

**FADE OUT**

In the highly competitive world of commercial composing, you can initially increase your odds of succeeding by aiming at the lower-profile areas of the field. Once you get your foot in the door, you can then begin to build your contacts and your reel so that eventually you can go after the more glamorous work.

*Mike Levine is a composer, session player, and author of four books, including How to Be a Working Musician, recently published by Billboard Books. Visit his Web site at [www.mikelevine.com](http://www.mikelevine.com).*

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**SERVICE  
CLINIC**

# The Big Picture

*When it comes to servicing gear, it pays to get organized.*

By Peter Miller with  
Paul Howard

**T**he most important task repair-shop owners and managers face is achieving an adequate level of organization. Personal-studio owners who do their own repairs face some of the same problems, albeit from a different perspective. We technical people, by nature and training, tend to take a "micro" view of things, meaning we focus on details. This is an effective strategy for troubleshooting an electronic circuit. It's not as useful, though, for running your business or organizing your personal studio's maintenance and doing your own repairs. Being organized requires you to step back and take a "macro" view of your operation.

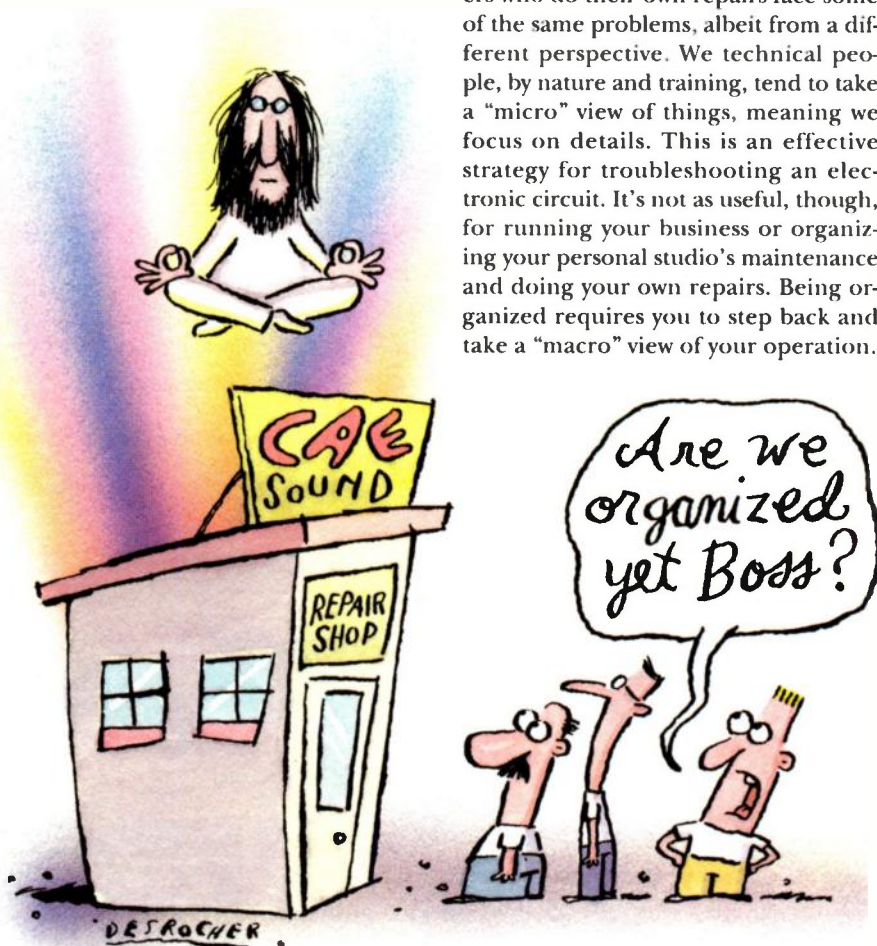
By stepping back and taking a broad view of my service operation at CAE Sound, I have developed an effective, long-term organizational plan that keeps me from spending too much time on unnecessary and frustrating details. Proper shop management greatly expedites the repair process. This approach allows us to complete at least five repair jobs in a working day.

Those of you who are doing your own repairs can benefit from seeing how professionals approach service. Although it's hard for the do-it-yourself servicer to achieve the dispassionate perspective we cultivate at a pro repair shop, many of our organizational principles can nevertheless be adapted to DIY service. You might also like to know what happens when you bring gear in for repairs.

## TOP OF THE CHART

The first step in organizing repairs is to develop a written overview of the repair process (see Fig. 1). Constant interaction between at least three highly qualified professionals is critically important. The shop manager, service writer, and repair technician each possesses specific skills.

Our service writer is an accomplished musician who currently plays in a band and therefore speaks the language of musicians. He has excellent conflict-resolution skills and presents himself professionally in person and on the



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telephone. Our bench technician has a varied technical background and is university educated. This gives him a broad perspective. I am the owner and shop manager and have the benefit of 30 years of experience in the college of hard work and the humpy road of the businessman. We work as a team and believe in our ability to solve almost any problem.

**FIRST ORDER OF BUSINESS**

The first (and last) person to make contact with customers is the service writer, who puts a human face on what can be an intimidating world for them: technology and electronics. The service writer initially interviews the customer to determine the nature and scope of the difficulty and then tests the equipment to verify the problem. This is necessary because the customer works and lives with the gear and may have a biased perspective on what the problem actually is. The service writer, with objective eyes and ears, provides an accurate, scientific perspective.

For every device, the service writer creates a printed work order. Our operation could not function a single day without work orders, which follow the equipment throughout the repair process. They are the gear's shadow. The service writer keeps a tight rein on costs by tracking work orders through the various stages of the repair process.

The work order gives a service technician an effective starting point for quality repair work. It contains a concise description of impressions from both the customer and service writer. Did the instrument ever work? Did the problem come about suddenly or gradually? Was the instrument subjected to mechanical shock such as dropping? Was there chemical contamination due to spills? How long has the problem existed? Has anyone, including the customer, attempted repairs?

The work order includes written authorization from the customer to perform repair work and states our flat repair rates for a given type of instrument. It also serves as a permanent

record of repairs. We keep this information in a shop database so we can review it if the instrument is returned to the shop two weeks or two years later.

In addition, the information from the work order allows us to consult our database to determine whether we have worked on the customer's instrument before. Sometimes a problem recurs, perhaps due to a design flaw. On the other hand, symptoms in the customer's equipment may suggest that there is a totally new problem.

**DEFINING THE PROBLEM**

After all of these preliminaries are taken care of, the electronic musical instrument reaches the service technician's bench. Even then repairs must wait until the instrument is carefully tested to verify what has been written on the work order.

Repeated testing also helps to clarify problems. The most difficult question is the most important: what exactly is wrong with the instrument? Defining the problem is the greater part of finding a solution.

Why do we go to this trouble? Because checking and rechecking all of the reported symptoms might reveal previously unknown problems. Each of our staff members has a different background and perspective, so they often catch each other's oversights.

The service writer may be involved yet again if the technician finds additional, hidden problems. If original flat rates are insufficient, the customer must be contacted to authorize additional charges.

**FIX THIS THING!**

At long last, when all the above steps have been completed, repairs can begin. The art and science of troubleshooting will be addressed in later articles.

Once repairs are done, we update the work order. What repairs were performed, and which parts (if any) were replaced? This is an excellent opportunity for the bench technician to voice any concerns about the customer's equipment. Are there underlying problems that should be addressed? Are there hidden signs of damage or abuse about

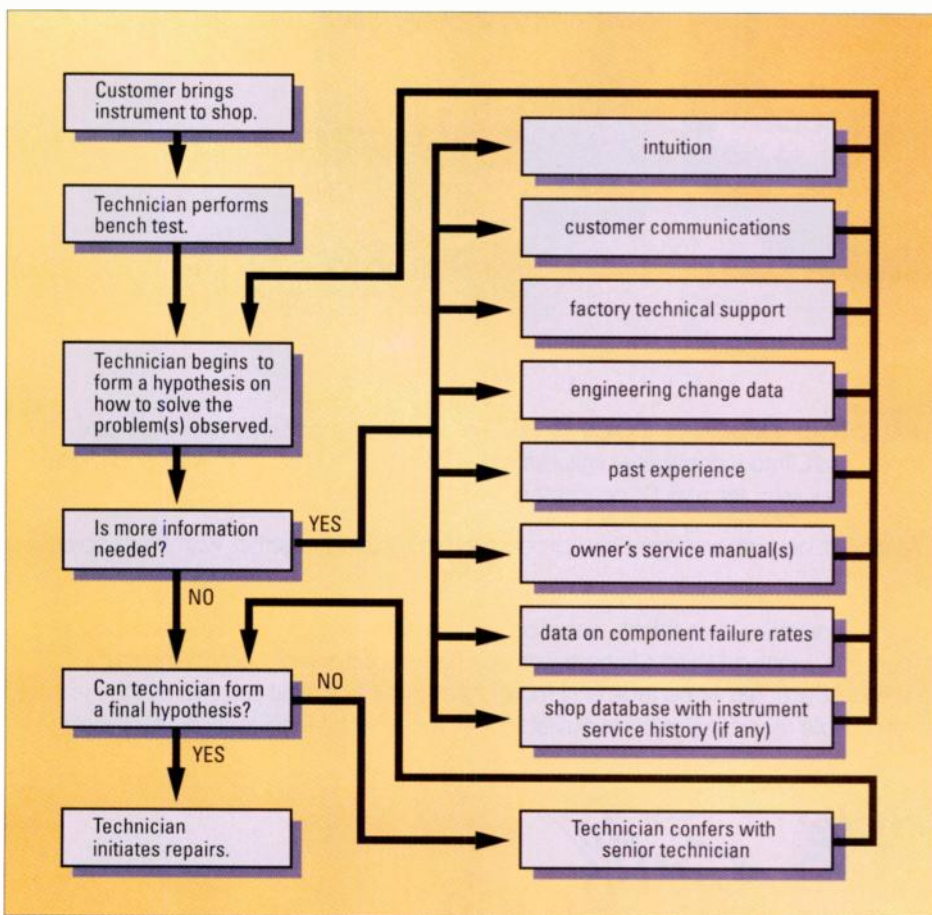


FIG. 1: This flowchart provides a framework for organizing the repair process. Even those doing their own repairs can benefit from such a system.

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● SERVICE CLINIC

which the customer should be informed? The technician's impressions at this crucial point can save considerable grief in the future.

**BACK AT THE OFFICE**

When the technician thinks the repairs have been completed, the device is tested yet again by the service writer, who verifies that the reported problems have been resolved and no new problems have been created in the course of repair work. (Whenever we work on an instrument, there is a

chance of causing new problems despite our best efforts.)

If you have been keeping count, you've probably realized that a full repair cycle involves testing the equipment at least three times, maybe even four or five times in the case of intermittent or subtle problems. All this checking and rechecking might seem too picky, but it ensures complete repairs. Even the most experienced professionals are subject to human error.

Finally, the repair is done—properly and completely. We collect payment

from the customer and enter the contents of the work order into our database for future reference. The service writer once again touches base with the customer by describing what was done to the gear and the results.

Despite our belief that we can solve almost any problem, we occasionally have a case where it might not be possible to fix a device within the agreed-to cost. In such a case, the unit is returned to the customer. Obviously, we hate admitting failure, but we—and the customer—have to be practical and honest about these situations.

**SERVICE WITH A SMILE**

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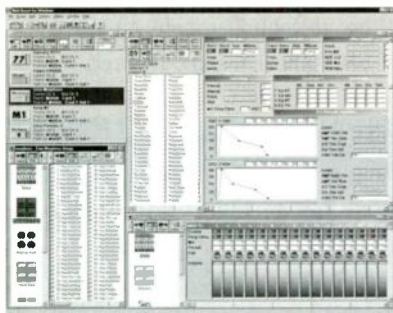


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*Peter Miller has specialized in the repair of electronic musical instruments for over 30 years. He has owned and operated CAE Sound (in San Mateo, California) since 1980 and has designed custom audio electronics for groups such as Tuck and Patti, Counting Crows, and the Grateful Dead. Paul Howard is a staff service tech at CAE.*



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# REVIEWS

## F O S T E X

D-90

*Hard-disk recording with  
the feel of an analog tape  
recorder.*

By Rob Shrock

Over the last year or so, the Fostex D-series hard-disk recorders have garnered a loyal following of users looking for reliable, stand-alone multitracks. With the release of the D-90, Fostex has gone a step further and addressed those people who want to combine the speed and editing capabilities of hard-disk recording with the convenience and inexpensive tape storage of the ADAT Super-VHS format. Designed to be an ADAT's best friend, the D-90 offers eight tracks of uncompressed recording, along with digital ADAT and S/PDIF interfaces, all in an easy-to-use, self-contained package that operates like a simple tape recorder.

### INSIDE OUT

Following in the footsteps of Fostex's D-80 and DMT-8 (and most current digital recorders), the D-90 is 16-bit linear with sample rates of either 44.1 kHz or 48 kHz and a frequency response of 20 Hz to 20 kHz. Recorded data is stored on an internal, removable 3.5-inch IDE hard disk, which can easily be interchanged with other drives by detaching the front panel and sliding out the disk tray.

146	Fostex D-90
156	Sonic Foundry Acoustics Modeler (Win)
166	Akai MPC2000
171	Event Electronics Gina (Win)
175	Musician's Ear Chord Transcriber (Mac/Win)
178	Quick Picks: Sampleheads NYC Percussionworks; East-West Communications Electronica; Spectrasonics Liquid Grooves; AMG Steve White: On the Beaten Track



The D-90's removable control panel presents all of the unit's control functions in an ergonomic package.

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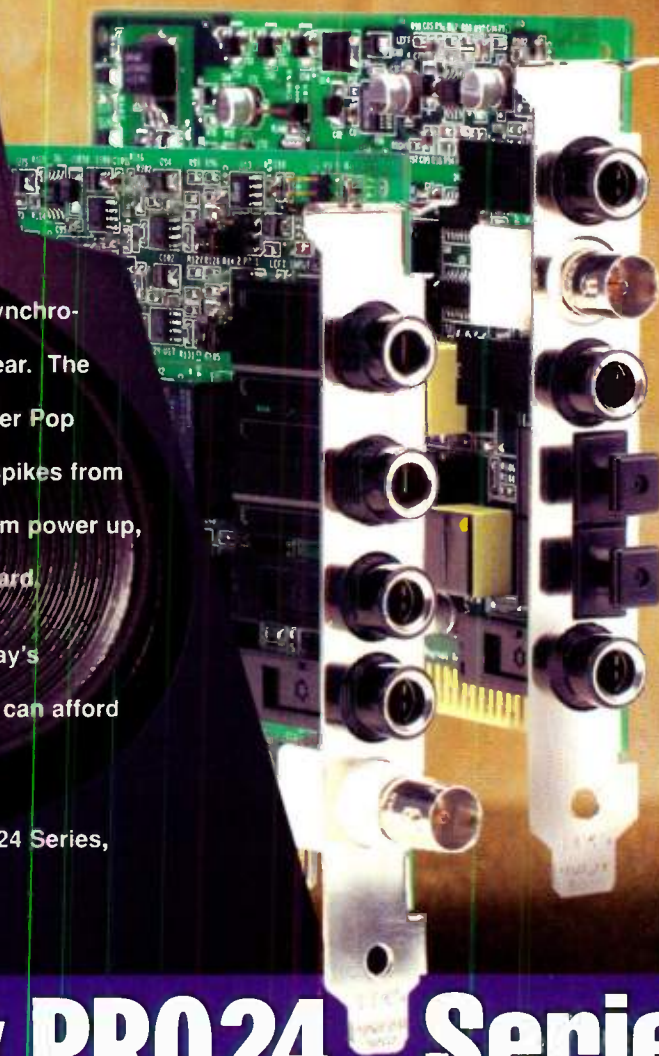
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- Word Clock Synchronization
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- Word Clock to AES (& S/PDIF) Clock Conversion



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The unit ships with a 2.5 GB drive installed, which provides approximately 60 minutes of 8-track recording at 44.1 kHz. Fostex claims that internal drives as large as 8.6 GB have been successfully installed, and there is no design limitation to the D-90 that would prevent even larger drives from being used. An optional Model 8338 SCSI interface (\$365) provides access to additional drives for backup purposes but not for real-time recording.

Analog connections are made via -10 dBV unbalanced RCA jacks, but a +4 dBu balanced XLR I/O option can be purchased separately for \$365. The digital audio converters in the D-90 are excellent and of higher resolution than those in original ADATs. The A/D converters are 18-bit, 64x oversampling and the D/A converters are 20-bit, 128x oversampling. Theoretically, tracks recorded on the D-90 and digitally transferred to an ADAT could sound slightly better on playback than they would if they had been recorded directly into the ADAT. In practice though, I heard no sonic distinctions that I could strictly attribute to the difference in converters between the D-90 and my ADAT.

The removable front panel also serves as the D-90's remote control, giving you quick access to all transport and editing functions in addition to



In addition to eight analog ins and outs, the D-90 offers digital I/O that can be switched between ADAT optical and S/PDIF formats.

channel LED meters. The controller is connected to the main unit by a 5-inch cord, which can be piggybacked with an additional 16-foot, 5-inch cable, allowing you to place the controller in a convenient location. This feature should not be underestimated. Inconvenient, nonergonomic designs are a shortcoming of many multitrack recorders.

Overall, the D-90's control surface strikes a perfect balance, providing a lot of easily accessed information without being heavy and cumbersome. Anyone who is familiar with conventional analog recorders will immediately feel at home with the D-90's control panel. All of the machine's functions and parameters have dedicated buttons, making operation a breeze, and a giant jog wheel lets you fly through editing pages.

Some of the text indicators are small, and a few of the parameters are difficult to read (the D-90 uses block LEDs for text), but it's easy to get around once you spend some time familiarizing yourself with the visual layout of the controller. Although there are no menus of buried parameters to wade through, the trade-off with the D-90 is a limited parameter set compared to other hard-disk workstations or computer-based recorders (more on this later).

#### HERE AND THERE

The Fostex D-90 is a fine choice for recording sessions where a stable and efficient work environment is paramount. The unit provides the instant access of hard-disk recording with the reliability and familiar interface of a linear tape machine. No matter how fast transports get, tape-based recorders always have a rewind/fast-forward shuttle time that slows the recording process. Although computer-based hard-disk recording systems are becoming more reliable, most of the current crop are still not quite dependable enough to make me feel comfortable when recording in a situation with no margin for error. That's largely because desktop computers have the added overhead (and associated risks) of a more complex operating system—not to mention that different applications on the same computer can cause conflicts and crashes.

All of the D-90's processing power, however, is dedicated strictly to hard-disk recording. The unit never sputtered or crashed during the entire evaluation period. In my estimation, it does a fine job of avoiding many of the pitfalls of computer-based and tape-based systems while offering most of the advantages.

The D-90 can jump to a location or sync to MIDI Time Code (MTC) in less

## D-90 Specifications

### GENERAL:

Sampling Frequency	44.1 kHz/48 kHz
Quantization	16-bit linear
A/D Conversion	18-bit, 64x oversampling, delta-sigma
D/A Conversion	20-bit, 128x oversampling, delta-sigma
Number of Tracks	8 (simultaneous record)
Frequency Response	20 Hz–20 kHz
Dynamic Range	92 dB
Analog Inputs/Outputs	8 (RCA)/8 (RCA)
I/O Level	-10 dBV
Digital Data Format	optical S/PDIF or ADAT (switchable)
Dimensions	3U x 13"
Weight	approx. 17 lbs. 7 oz.
Power Supply	120 VAC, 60 Hz; 230 VAC, 50/60 Hz
Power Consumption	approx. 25W

### OTHER CONNECTIONS:

MIDI	In, Out, Thru
Punch In/Out	¼" phone jack
Remote	D-sub 15-pin

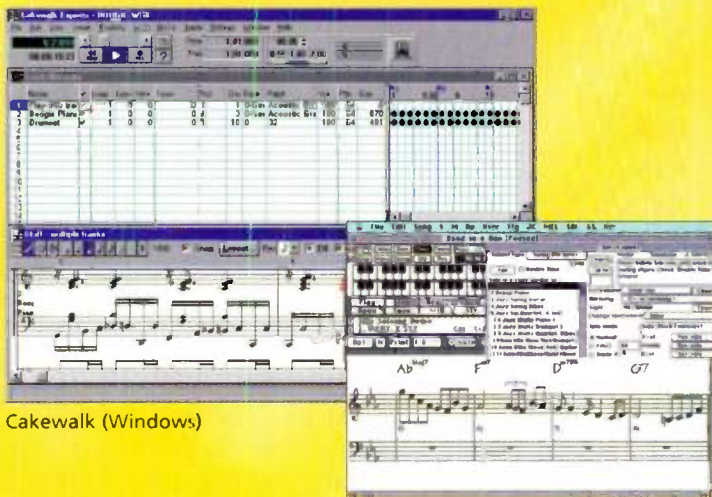
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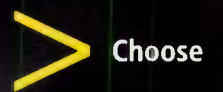
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than two seconds. It has a modest selection of locate points, including Absolute Zero (beginning of the hard disk), Absolute End (end of the recorded area on the disk), Auto Play/Return (to loop sections for review), Auto Punch In/Out, and an additional, user-definable location.

Each location has a dedicated button that is conveniently placed and clearly labeled on the control panel, which makes punch-ins a snap to execute. You simply identify your In and Out location points, and then you engage the Auto Punch feature in either Rehearse or Take mode. After the recording is completed, you can use the D-90's single-level Undo function if necessary.

## ON THE PROGRAM

A Fostex D-90 formatted hard disk can be divided into a maximum of nine Programs (or songs). Each Program stores all of a song's audio information in addition to nonaudio data such as locate points and sample-rate settings (which can be different for each Program).

I was initially concerned when I learned about the nine-Program limit. In application, however, I found that unless you are doing numerous short recordings (such as a string of 30- or 60-second jingles), the Program limit should not pose a problem when using the 2.5 GB drive. If you choose to install a larger drive, however, you may eventually bump your head with only nine Programs. Fostex says that there is no plan to change the operating system to accommodate more Programs in the D-90, but the 16-track D-160 holds up to 99 Programs (see sidebar, "The Big Kid: Fostex D-160").

## MAKING THE CUT

Although the D-90 is a hard-disk recorder, it is not overflowing with elaborate editing features, such as those found in the E-mu Darwin or Roland VS-880. The feature set is limited to simple cut, copy, delete, move, and paste operations (with a single level of Undo), and you cannot record multiple virtual tracks as you can with a Darwin or VS-880.

As with a computer-based system, audio can be selected and pasted onto a clipboard and then moved. By simultaneously pressing the Stop and Play buttons, you can audition the clipboard audio for verification of its contents. As long as you don't need to make level or pitch changes to phrases, rudimentary comping and rearranging of tracks is a simple procedure.

In addition, several tracks can be manipulated simultaneously, allowing for complete rearrangements of musical phrases (much like block MIDI editing). An Over Time Monitor feature lets you know when you have attempted to execute a paste that is too big for the available disk space. The Monitor will then display how much time you need to trim from the selection in order to complete the action. This is a handy feature indeed.

I loved using the D-90 for vocal sessions. On one tune, I was able to quickly edit together four vocal takes onto a master track without losing any data from my original tracks (which I then archived to an ADAT tape). The Undo feature also helped me out when two phrases didn't match well in the edit: I simply hit Undo and tried another phrase. And the Move feature was a god-send for shifting some vocal phrases to improve the feel of the performance.

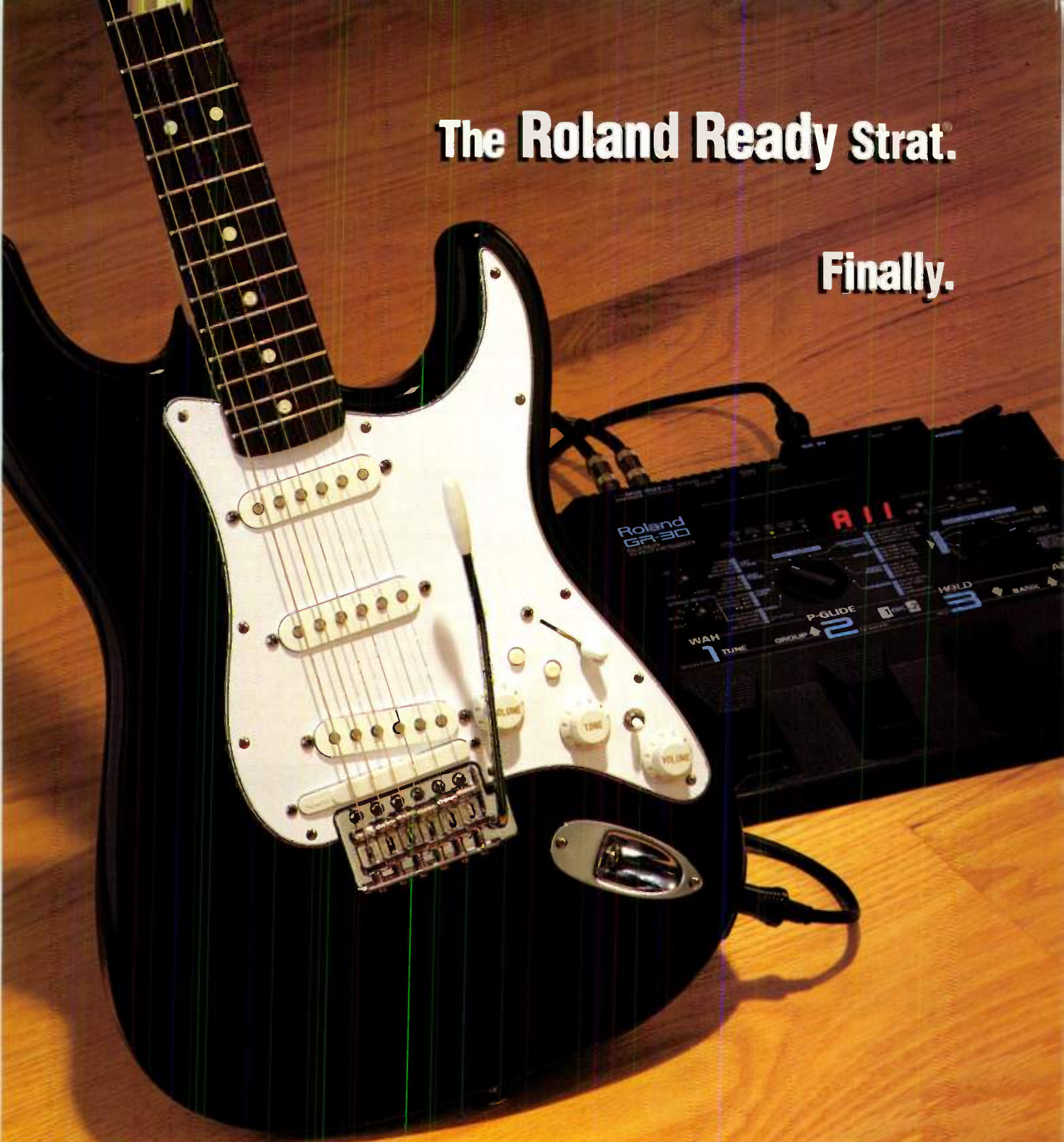
## THE BIG KID: FOSTEX D-160

In addition to being a 16-track recorder, the D-160 (\$3,995) addresses some of the limitations of the D-90. The number of allowable Programs is raised to 99. The SCSI interface is built in, allowing immediate access to additional hard drives without having to purchase an option. All time code rates are supported (including 29.97 fps) through an optional time-code expansion board (\$895) that also includes word clock.

The D-160's balanced analog I/O option is slightly more expensive (\$545) than the one for the D-90. A set of ADAT Lightpipes for each group of 8-track I/O (tracks 1 to 8 and 9 to 16) allow simultaneous transfer of all sixteen tracks between the D-160 and two ADAT-compatible recorders. Although more expensive than the D-90, the D-160 provides a superior combination of professional features.

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While I could have done all this on my computer-based software editor, the process would have taken far more time. By using the D-90, I was able to transfer the comped vocal to a single track on the ADAT master tape in not much more time than it took to record the four tracks initially. And the time I spent creating the comp in the D-90 was more than made up for by not having to wait for an ADAT to repeatedly rewind while I was recording in the first place.

The Fostex D-90 does not offer waveform editing; the unit is not intended

for that purpose. In addition to being a stand-alone recorder, the D-90 is primarily designed to interface with an ADAT, providing speedier recording, safer and more controlled punches, and the ability to do basic editing without a BRC. Actually, the lack of detailed editing features may not even be a problem. Regardless of what format my tracks are originally recorded to, I always prefer to do any involved editing on my computer, where I can see the waveform in a specialized environment.

Thanks to its ADAT Lightpipe interface, you can use the D-90 with a Lightpipe-equipped audio card to export your tracks to a computer. The D-90 can also switch its ADAT optical I/O to an S/PDIF digital signal and transfer two tracks at a time synched with MIDI Time Code. Furthermore, there are several new computer audio cards that provide simultaneous digital import/export of eight ADAT tracks for precision editing.

#### TIME AFTER TIME

The D-90 supports 24, 25, 30 drop, and 30 nondrop fps time code. There is no provision for word clock. It also does not support 29.97 fps time code; if you're doing video-post work, this will present a problem. According to Fostex, the D-90 was primarily designed for music production, whereas the D-160 hard-disk recorder has full synchronization capabilities.

Besides synching to external MTC, the D-90 can internally generate a fairly elaborate time signature and tempo map. This allows the D-90 to serve as master in a setup with a sequencer, an ADAT, or another hard-disk recorder.

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**CONS:** Allows only basic move, copy, paste, and delete editing. Hard drive limited to nine Programs (songs). Does not support 29.97 fps time code. No word clock. External SCSI interface and balanced I/O sold separately.

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D-90

Track 8 can also output an audible click as a guide. The time base for the D-90 can be switched to display either ABS (Absolute Time), bar/beat/click, or MTC.

### FINAL TRACK

Sonically, the D-90 is a superb recorder, but it may not be right for everyone. Due to its limited editing capabilities, the D-90 might not appeal to those people who want an all-inclusive recording environment or need lots of virtual tracks. The Program limit may also be a problem for anyone working on multiple short pieces. And the lack of support for 29.97 fps time code knocks it out of contention for video-post work.



**Anyone who is familiar with analog recorders will feel at home with the D-90's control panel.**

It's a fine stand-alone recorder, however, and a wonderful companion for an ADAT. It also works great as a front end for a computer-based system: its editing features far surpass the capabilities of an original ADAT; recording without tape-wind time means more productivity; recording outside of a computer means more reliability; the ability to archive data to an ADAT makes for very inexpensive backup; and the S/PDIF and ADAT optical connections open the door to interfacing with a wide variety of products.

Although digital workstations are becoming extremely competitive, with more features, not all of them are good at interfacing with the rest of the recording world. Fostex is making sure its recorders can connect with a large portion of the market. With the D-90, they've made a solid, 8-track hard-disk recorder that can capture great-sounding tracks with no muss and no fuss.

*Composer and producer Rob Shrock is the arranger and keyboardist for Burt Bacharach and Dionne Warwick. He has worked with Al Jarreau, LeAnn Rimes, Stevie Wonder, and a host of others.*

it's been called  
a **techno** synth  
a retro **analog** synth  
a sound modeling **dsp** synth...

# forget labels.

"The architecture of this baby is extremely impressive. I was especially thrilled that you could have models interacting with other models in this synth; I haven't seen this before. This is going to be a killer sound-design tool, and I think it was easily the most innovative and exciting product at the show."

-EM

"My first impression, regardless of the nature of the sounds I selected, was one of class...the Z1 sounded good.

In the context of its competitors, it is well-specified, and a great value. ...More importantly, the Z1 passes the essential test: it makes me want to play."

-SOUND ON SOUND

It carries the quirky responsiveness of a 30-year-old analog board.

It also boasts more advanced digital sound-modeling technology than any

"next big thing" keyboard...ever. It is at once vintage and futuristic.

It responds.

It expresses.

It throbs, quacks, thunks and chirps.

It feels natural. What's more, **it feels right.**

Its synth repertoire is shamelessly vast,

while its modeled sounds are frighteningly realistic and organic.

Thanks to its abundant realtime control, you can tweak,

blend, distort and create on the fly.

And the polyphonic arpeggiator... don't even get us started.

**Z1** is the most evocative, expressive, well-conceived synthesizer we've ever created.



**Z1**  
MULTI OSCILLATOR SYNTHESIZER

You should play it. **KORG®**

version of your sound shortly after the processed version begins.

The high- and low-shelf settings allow you to tailor the frequency content of your sound, and I found the high-shelf particularly useful for boosting the upper partials of some dull-sounding samples. There's also a Quality/Speed setting (1 to 5) that allows you to preview at low resolution if your system can't keep up with a full-bore preview. On my Pentium Pro 200, I was able to run consistently at level 5 with no problem, but of course, your results may vary.

For more detailed processing effects, you can move to the Envelope page and determine exactly how the impulse will be applied over time. It's easy to fade the impulse in or out, though for some reason, the graph cannot display impulses longer than around ten seconds. (The program allows you to use impulses up to twelve seconds in length.) You can also simply truncate the impulse at any point by setting an endpoint in the envelope graph.

The final two parameter pages are Summary, the purpose of which seems to be to provide a place where you can

display graphics or comments about an impulse, and Recover. The Recover page is where you create your own impulses (see Fig. 2). See the sidebar "Room Recovery" for a description of that process.

Not surprisingly, Sonic Foundry has provided parameters that you can use to tweak the plug-in for your system. Right-click on the main page title bar and you'll find an option called Preview Configuration. It offers settings that can alter the way *Modeler* allocates buffers during playback. If you increase the number of buffers per second, changes you make to parameters will update more quickly, but your system's CPU will have more work to do. Depending on the speed of your processor, that could cause gaps and glitches while previewing. You can probably leave the settings at their default, but if you do experience problems, be sure to read the on-

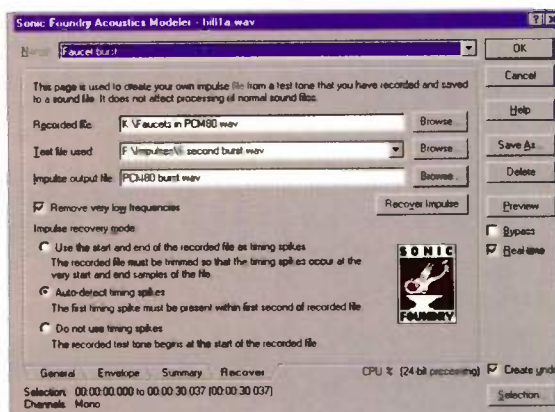


FIG. 2: To create your own impulse responses, specify the files you used to create your sound and the name for the new impulse.

line Help file about how to tweak this setting and the other preview options.

### SOUNDS LIKE...

Sonic Foundry provides hundreds of impulses, and their quality, with few exceptions, is extremely high. The mic impulses, for example, are uncanny. (Audio-file examples of the sounds *Acoustics Modeler* can produce can be

For manufacturer information, please see Contact Sheet on p. 163.

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# have you seen?



From the moment you get a musical idea...until you've finished the final mix...the new **ZR-76** has everything you need to write your next hit. The 76 weighted-action keys are perfectly matched to the 1200 incredible sounds inside. In fact, the included 16 meg Wave Expansion Board, *The Perfect Piano™* by William Coakley, sounds and feels so good, you may find yourself tickling the ivories into the wee hours of the night.

If you perform your music live, the **ZR-76** has you covered, too. The "Favorites" buttons under the display give you instant access to the sounds you use most. An easy-to-use sequencer, built-in drum machine and a 24-bit effects processor completes the package.

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**Over 1200 Sounds** – From realistic instrument sounds to our unique second-generation TransWaves, from analog emulations to evocative digital timbres, plus over 70 drum kits, made up from more than 750 fully programmed drum elements.

**Perfect Piano** – The ZR-76 comes with our new EXP-4 ROM Expander installed. This 16 meg expander features William Coakley's acclaimed "The Perfect Piano™", along with two practically perfect electric pianos.

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**16 Track Recorder** – A powerful 16 track sequencer with advanced quantization options (featuring our exclusive Delta Quantization™), Song Editor, dedicated FX and Mixdown sections, MS-DOS-based disk format, and support for Standard MIDI Files.

**24-Bit Effects** – Featuring our powerful 24-bit ESP-2 digital signal processor. You also get 6 stereo busses, including 3 global reverb busses, a chorus bus, a dry stereo bus, and an insert effect bus with 40 great-sounding algorithms.



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downloaded from EM's Web site, [www.emusician.com](http://www.emusician.com).) You can experiment with different types of condenser, ribbon, and dynamic mics, but the "old high-school principal mic" impulse may turn out to be what your project needs. The "tube mic" also has a distinct personality.

Another set of impulses model Head Related Transfer Functions (HRTFs), which are used to simulate sounds in a 3-D environment. There are several dozen such impulses that let you place your sound in very exact positions. Unlike some 3-D sound-modeling systems, these functions work particularly well with headphones and also produce convincing effects with loudspeakers.

Surprisingly, I didn't find the Outdoor impulses to be very effective. Though the Barn Echo had a nice response, neither the Valley nor the Forests brought any vivid images to mind. On the other hand, the Bridges and Tunnels are very realistic and proved useful for a racing game I'm working on. (Rumor has it that the Sonic Foundry engineering team hauled all of their high-end gear in a canoe to get under the bridges they recorded!)

## ACTING ON IMPULSE

Why would you want to use *Acoustics Modeler* if you already have a top-of-the-line effects box in your studio? Let's say you love the sound of the attic in your granny's home or maybe the character of a local concert hall. You could spend hours trying to simulate



## The Acoustics Modeler can replace a rack full of effects units.

the sound of those spaces using a Lexicon or TC Electronic device. Even with an intuitive reverb such the one found in Synoptic's *Virtual Waves* (where you can choose the absorbent materials on each of the four walls independently), you may never get the sound you want. Though it is not a simple process, you could record a test signal in the space, bring the sample into *Acoustics Modeler*,

and by comparing the tone "dry" with the sound of the tone in the room, *Acoustics Modeler* will "recover" the impulse response. You would then have the room signature available to apply to any sound you wish.

You can also create an impulse from an electronic device such as an effects processor. There's no real advantage to doing this with a processor if you own the unit, but you could borrow a friend's Lexicon PCM 80, for example, and create impulse responses from a few of your favorite Lexicon effects. You might also want to recover impulses from an effects unit that didn't have digital I/O. That would save you a conversion stage when you process your audio, but keep in mind that you would need thousands of different impulse responses to re-create every possible setting of even a modest unit.

## CROSS DRESSING

In addition to applying environmental signatures to a sound, you can use the *Modeler* to cross or "convolve" two different audio files. This creates fantastic vocoder-type effects in which one sound can take on the characteristics of

## ROOM RECOVERY

Creating your own impulses is not a trivial task, but with a little time and care, you can open up a universe of possibilities. You'll need a professional-quality mic and recording device and a playback unit to generate the impulse. That shouldn't be a problem, however, for most modern desktop musicians. Fortunately, Sonic Foundry provides detailed directions to help you create successful impulses.

Rather than record a room, I tested the Recovery feature by playing one of the test signals into my Lexicon PCM 80 effects processor and recording the output directly to my hard drive. I used a fairly simple reverb with a short reverb time as my model. First, I deleted the silence at the beginning and end of the Lexicon-processed sound file so that the spike at the beginning lined up perfectly with the spike in the original test tone. I then let *Acoustics Modeler's* Recovery program create an impulse by comparing the original

test tone with the processed version, which I named and saved to disk.

The next step was to apply the new impulse to the original signal, which involved loading the original tone into *Sound Forge* and dialing up the impulse in the *Modeler*. I experimented with the settings and auditioned each using *Sound Forge's* Preview function. After pulling back the Wet/Out setting (my recording was fairly hot), I let the program go to work. Figure A shows the original Lexicon recording on the top and the impulse-processed version on the bottom. As you can see, the files look remarkably similar, and indeed, they were very close in sound, as well.

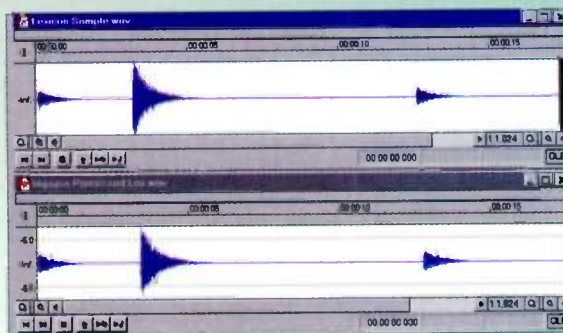


FIG. A: At the top of this screen you can see the sound after the test signal was processed on the Lexicon PCM 80. The bottom waveform depicts the sound of the signal after it was processed in *Acoustics Modeler*. The sound and appearance of the two files are remarkably similar.

Keep in mind that the best test signals are broad spectrum sounds. This ensures that your impulse will contain the room response characteristics across a wide frequency range. You'll find a number of suitable test tones for this purpose on the *Acoustics Modeler* CD.

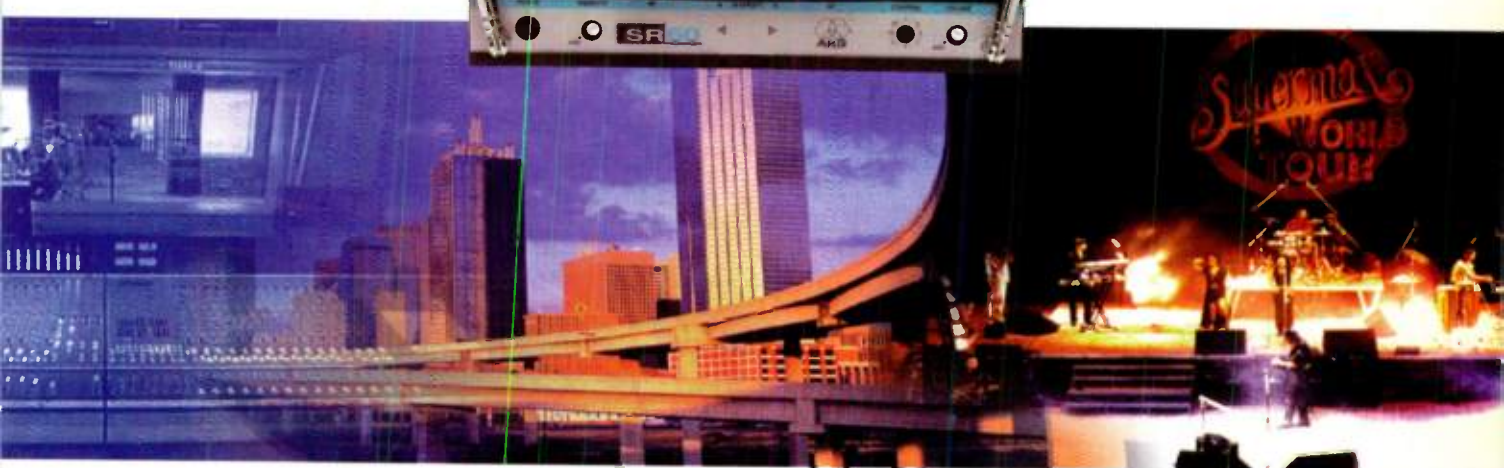
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The WMS 60 is a VHF system that offers microcontrolled antenna

diversity for superior selectivity and reception. Available in handheld, portable bodypack and instrument configurations, its standard features include an LED battery strength indicator, an output volume control and adjustable squelch to eliminate interference. Best of all, the WMS 60 offers the most user friendly frequency selector for operating multiple interference free systems. So before you appear in front of an audience again, remember AKG studio quality wireless systems are priced light enough to carry on the road.



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516	535	554	573	592	611	630	649
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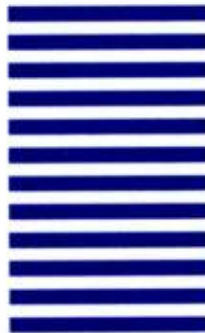
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## Working Musician: Buried Treasures

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## Reviews

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another. A simple example of this would be to take a steady tone like an "ooh" or "ahh" vocal sample and then select a drum loop as the impulse. The vocal sample will take on the rhythmic characteristics of the drum loop; in effect, it will be "animated" by it. This

also works well with single string notes or even chords, especially on lower pitched instruments, such as a cello. (Be aware that the best "matches" are often those sounds whose spectra overlap.) You can also reverse the files and use the cello or voice as impulses to get even more interesting variations.

Another favorite of mine is the effect of running water through a cymbal. I loaded a file containing the sound of a faucet that I'd recorded and then applied a cymbal sample as the impulse. The effect was very cool. I could list dozens of other interesting combinations, but you'll simply have to try this technique yourself to believe how useful it can be. I only wish you could use impulses longer than the fixed 12-second limit, though I suspect the real-time preview option would be very hard to implement at that point.

#### PACK IT UP

There are few programs I've seen recently that are as versatile and useful as *Acoustics Modeler*. For placing your music in specific stereo locations or simulating the sound of classic and very ex-

#### Acoustics Modeler System Requirements

Pentium 120 processor or better for non-real-time preview, Pentium Pro or Pentium II recommended for real-time preview; 24 MB RAM; 5 MB hard-disk space for program installation, 300 MB or larger hard drive for temporary storage; Windows 95 or NT 4.0 or later; CD-ROM drive; Windows-compatible sound card; DirectX Audio-compatible host application.

pensive microphones, *Acoustics Modeler* is just right. Its use for designing totally new and unusual sounds that "cross" the characteristics of two files is more than worth the program's reasonable cost. It's also a blast to use.

Even if you never create your own impulses, you'll find endless applications for this software. This is one program you shouldn't be without.

*Associate Editor Dennis Miller lives in the suburbs of Boston.*

#### SONIC FOUNDRY Acoustics Modeler (Win) \$249

FEATURES ■■■■■  
EASE OF USE ■■■■■  
AUDIO QUALITY ■■■■■  
VALUE ■■■■■  
1 2 3 4 5

**PROS:** Easy to use. Affordable. High-quality room simulations. User-defined cross-synthesis features.

**CONS:** Twelve-second hard limit on length of impulses.

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Basically, the ZA2 packs in more features than we can cover in an ad. Check it out at <http://www.zefiro.com> or call 714.551.5833 and find out how affordable the right card can be.

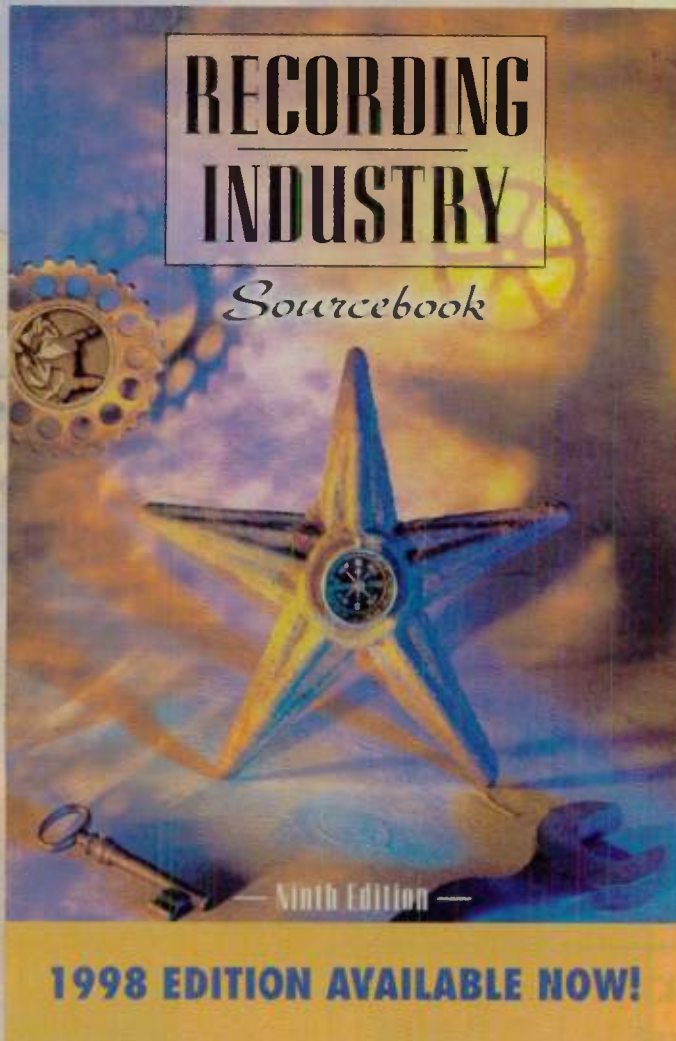
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MPC2000



FIG. 1: The rear panel includes stereo audio inputs and main outputs, a headphone jack, a SCSI port, and two sets of MIDI In and Out jacks. Optional expansion boards can add S/PDIF digital I/O and eight more analog outputs as well as SMPTE sync I/O.

up the RAM to 32 MB, allowing you to increase sample time to 348 seconds in mono and 174 seconds in stereo. RAM is cheap these days and well worth the investment. The MPC2000 reads many different sample formats, including AIFF and WAV files, Akai S1000 and S3000 sounds, and E-mu and Roland CD-ROMs. And don't throw out your MPC60/MPC60II samples and sequences; you can load those, too.

Once you've recorded a sample, you can automatically delete it and try again—the machine provides a prompt upon sample capture—or you can place it in one of the Pad Banks for editing and playback. Sample editing is one of the best features of the MPC2000.

Waveforms are treated and placed using two respective modes: Trim and Program. Within Trim mode, you can select the start and end points, assign and fine-tune the loop points, and

do detailed editing on the Zone Edit (zEdit) screen. Here, sounds can be copied, pasted, deleted, silenced, or reversed. Although the MPC2000's screen is small, Akai makes the most of the unit's waveform-editing features (see Fig. 2). Those of you seduced by nondestructive editing on hard-disk recording systems should be aware that all edits are *final*, so you should back up your samples before you take the knife to them. Also, the MPC2000 is not as speedy as a modern computer when it comes to crunching numbers, so screen redraws seem glacial.

Because Akai knows a majority of users will be sampling breaks or other rhythm phrases, they've borrowed the Beat Loop Function from the Akai Remix16. Beat Loop allows you to synchronize the tempi of two looping samples. Essentially, by pitch-shifting one or both loops, it's possible to lock

### MPC2000 Specifications

Audio Inputs	(2) 1/4" balanced
Audio Outputs	(2) 1/4" unbalanced; 1/4" stereo headphone
Other Ports	SCSI (on DB25); (2) MIDI In and Out; 3.5" floppy-disk drive (2HD/2DD)
Display	248 x 64-dot graphic LCD
Max. Samples (RAM)	128
User Programs	24
Sounds per Program	64
Simultaneous Voices	32
Sampling Resolution/Rate	16 bits/44.1 kHz
Sample RAM	2 MB (expandable to 32 MB with 72-pin SIMMs)
Drum Pads	16 (Velocity- and Pressure-sensitive)
Sequencer	99 sequences, 64 tracks per sequence; 20 songs, 250 steps per song 100,000 note max.
Options	SampleVerb 4-bus effects processor; IB-M208P expansion board (8 analog outs and S/PDIF digital I/O); FMX008M Flash ROM card; IB-M20T SMPTE sync board
Weight	14 lbs.
Dimensions	16" (W) x 13" (D) x 5" (H)

material together. The feature is not perfect, however, and it may take some experimentation to really lock the samples. (I found that it works best with shorter samples as opposed to longer phrases.) But it's a worthwhile feature to experiment with and won't add extra points with me.

Once samples and loops have been edited, you can assign sounds to individual drum pads and outputs in Program Mode. In this mode, you can customize the performance of the MPC2000 by programming filter and amplitude envelopes and by assigning Velocity to control attack, sample start, volume, filter envelope, and pitch. In addition, you can adjust the MIDI settings of the internal sampler to work in conjunction with an external MIDI device. All settings for the pads can be saved as a complete Program, with a total of 24 Program locations available in memory.

#### IN SEQUENCE

Stocked with a 100,000-note sequencer, the MPC2000 really comes alive as a base of operations. Its design favors two working styles: pieces can be composed as a long sequence or as several sequences linked together into a Song. (The memory supports twenty Songs.) You can create up to 99 sequences, each with a maximum of 64 tracks. Recording can be done in a linear fashion, though I preferred the standard rhythm-programming approach of layering tracks in Loop mode, often in 2- or 4-bar segments, building parts that could be edited later.

The MPC2000 sequencer is quite flexible. As you record, you can hop between Pad Banks and move from track to track without interruption. If you are unhappy with a particular pass, you can always press the Undo Seq button and return to the previous version of a sequence. Erasing in real time is supported, as is MIDI filtering, auto-punching, and detailed step editing. You can quantize down to 1/2-note triplets, and the swing quantize feature really shines. If necessary, any timing adjustments can be made to the tracks in a Timing Correct window.

A definite improvement from the MPC60 is the Note Variation data slider, which previously controlled only hi-hat decay. Now it's a performance controller, affecting the decay, tuning, or filter value of any sound in real time.

It's one way to get some wicked effects without any extra hardware.

One performance feature that's hit or miss is the Tap Tempo/Note Repeat function. Note Repeat does just that: it repeats a given note according to the time signature and auto-correct information you designate. It's a great feature for rapid-fire treatments and is



**Sample editing is  
one of the best  
features of  
the MPC2000.**

definitely worth exploring in conjunction with the data slider. Tap Tempo, on the other hand, is a good idea but yields inconsistent results. It is designed to match sampled beats with the tempo you tap into the MPC2000. The average rate of your taps is then computed and

displayed. However, depending on how accurately you tap the tempo, you may still have to nudge numbers to nail it. This can be a chore, so if you're mixing beats, I wouldn't depend on this feature.

#### MIDI LAND

As with any software sequencer, you can record MIDI Control Change, Pressure, Program Change, and SysEx messages. If you have a MIDI sustain pedal, you can convert its data into note-duration data and add sustain effects that coexist with note information on a track. Also, MIDI footswitches are supported for controlling transport, Tap Tempo, and Pad Bank selections.

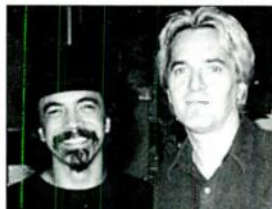
All recorded tracks can either trigger the internal sounds or be assigned to one of the 32 MIDI output channels. Simultaneous recording on 16 MIDI channels is possible. And if you like using Standard MIDI Files, the MPC2000 will read them, as well.

MIDI Time Code and MIDI Machine Control are both supported, as is the MIDI Sample Dump Standard (SDS), which allows you to transmit and receive sample data via the MIDI cables.

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FIG. 2: The MPC2000's graphic window displays a surprising amount of information.

You can also use audio-editing software by saving your files to a DOS disk (a godsend for the squinting minions who are working with waveforms on a small screen). However, both of these alternatives (saving to disk and using SDS) are painfully slow transfer methods; support for SMDI, which allows much faster transfers over SCSI, would be helpful here.

**OPTIONS AROUND**

The MPC2000's graphic mixing screen does various duties, providing sixteen individual gain and pan assignments and assigning effects (and send levels) to each pad. Optional onboard effects come in the form of Sample Verb (\$399), a 4-bus, 6-stage, programmable effects package that includes algorithms for reverb, delay/echo, distortion, ring modulation, chorus, flanging, phase shifting, 4-band filtering, and rotary speaker emulation.

The four buses include two dedicated reverb processors and two multi-effects processors, and you can assign one effect per pad. These effects are decent (not great), and I was able to milk a lot out of them.

My first purchase would be the optional IB-M208P expansion board (\$299), which provides eight parallel outputs and S/PDIF digital I/O. You can also get the FMX008M Flash ROM card (\$499, dramatically reduced since last year). This will allow you to store sounds from a floppy disk in the MPC2000 without reloading them every time you shut the machine off. Finally, if you need to sync up using SMPTE, you can get the IB-M20T board (\$299). Frames rates of 24, 25, 29.97 drop, and 30 are supported.

**DON'T MESS WITH A WINNER**

Even though I'd been an MPC60 user for several years, I wasn't sure what to expect from the MPC2000. But after several sessions of sampling percussion, guitar, bass, and the kitchen sink, I came away impressed. The speed with which I could sketch a musical idea made it ideal for catching impulses that might have been lost when working in some DAW environments.

If there ever was a reason not to mess with a good thing, the MPC series is a textbook example. Akai clearly took this to heart with the MPC2000 and left well enough alone, providing enhancements that didn't deviate from the original spirit of the design. The MPC2000 is a drum sampler and makes no pretense of being anything else. Used for its intended purpose, it compares favorably with much pricier samplers. Hopefully, this fourth generation of MPC will receive the recognition and support it deserves. That would be a tribute to Roger Linn, and it makes good sense, as well.

Alex Artaud is editor of the Spanish Edition of Mix magazine.

**AKAI**  
MPC2000 sampling drum machine  
\$1,495

AUDIO QUALITY ■■■■

EASE OF USE ■■■■

DOCUMENTATION ■■■■

VALUE ■■■■

1 2 3 4 5

**PROS:** Excellent drum pads. Intuitive sequencer interface with improved mixer environment. Superb sampling with waveform editing. Programmable slider. Reads a number of file formats.

**CONS:** No multitimbral operation. No SMDI. Does not support continuous controller information for real-time pitch, volume, and envelopes. No LFOs.

CIRCLE #439 ON READER SERVICE CARD



# EVENT ELECTRONICS

GINA (WIN)

## A well-rounded recording system for the PC.

By Dennis Miller

With the massive influx of pro and semipro Windows audio cards that have appeared on the market recently, it is more difficult than ever for a manufacturer to distinguish its card from the rest of the pack. Event Electronics stands a good chance of doing just that, however, with the release of its Gina multichannel PCI audio card. High-quality specs, flexible I/O options, and a reasonable price make Gina a good choice for desktop musicians at all levels.

Gina is a half-size, multi-output audio card with two analog ins and eight outs on 1/4-inch unbalanced connectors as well as stereo, 24-bit digital I/O on standard coax (RCA) connectors. The card attaches to an external breakout box that provides the analog connectors, though the 20-bit, 128x oversampling A/D/A converters are inside the computer on the card itself. An onboard Motorola 56301 DSP chip delivers very good performance even on a moderately fast Pentium PC.

Though Gina is a PCI card, there are currently no Macintosh drivers available. Event claims that soon after the forthcoming release of its Layla card, Gina's "big sister," unified drivers for all of its audio cards will be available for both the Macintosh and the PC. The Macintosh driver will be ASIO compliant. (ASIO, which stands for Audio System In and Out, is a multi-channel audio standard developed by Steinberg that is gaining acceptance from many of the major audio developers.)

Layla will add word clock, MIDI ports, and external A/D/A converters (eight in and ten out). Darla, the younger sibling of the trio, is an entry-level card with two ins and eight outs and no digital I/O. ASIO drivers for *Cubase VST* on the PC are also scheduled to be available with the release of Layla.

### UP AND RUNNING

As advised by the manufacturer, I first ran the included *Echo Reporter* utility to ensure that my system was suitable for use by Gina. (You can download this

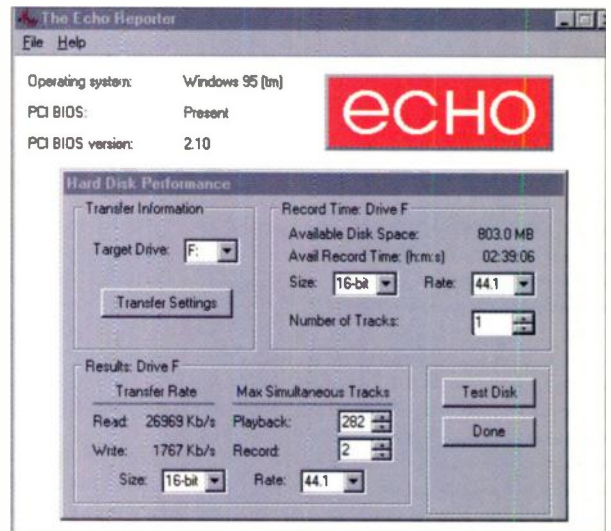
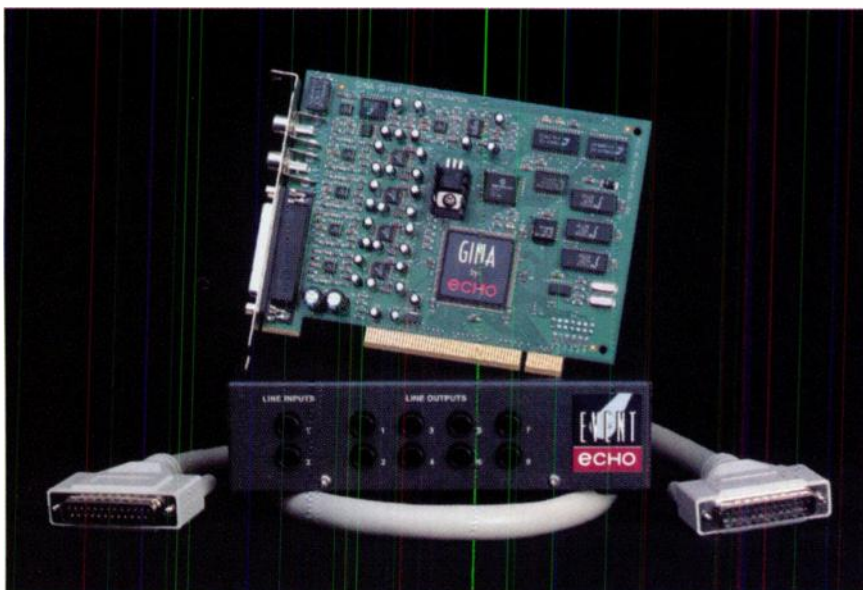


FIG. 1: *Echo Reporter* analyzes your system to ensure compatibility with Gina. On my Pentium II/266, it indicates that I will get 282 tracks of 16-bit, 44.1 kHz audio playback.

free utility from Event's Web site to check your own system before purchasing the card.) Event is concerned with the potential track throughput that your system can provide and the version number of your PCI BIOS (2.1 or newer is required). Happily, the *Reporter* informed me that I had the required BIOS and that I would enjoy an amazing 282 tracks of simultaneous audio (see Fig. 1). I assumed that this number was a bit inflated, and sure enough, the *Reporter's* documentation warns that the utility can sometimes be a bit generous.

Getting the card to run in my oftentimes difficult system was a breeze. Not only is my dual processor, Pentium II/266 motherboard a problem for some manufacturers, but I run a dual-boot system (Windows 95 and NT). Though I didn't get a Plug and Play prompt when I first installed the card under Windows 95, by simply choosing Add New Hardware from the Control Panel and pointing Windows to the driver disk, I was up and running in no time. Unfortunately, there are no Windows NT drivers available at this time. As with some other hardware makers, Event has opted to wait until the unified Windows 98 and NT 5.0 driver model is in place. That will allow the same driver to be used in both operating systems.

After rebooting my system, I looked in my Control Panel and discovered that Gina appears to Windows as multiple stereo WAV device drivers. (Internally,



The Event Electronics Gina audio card provides ten outputs and four inputs simultaneously.

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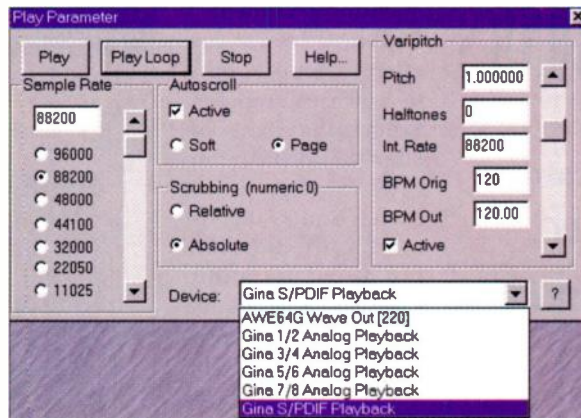
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**FIG. 2:** Gina's ten outputs appear as five stereo pairs in the audio setup screen of your editor. In SEK'D's *Samplitude 2496*, you simply select which tracks should be routed to which physical output.

the pairs are synched.) This gives the user a great degree of flexibility because you can determine which tracks in your digital audio sequencer or multitrack audio editor are routed to which outs. In *Cakewalk*, for example, simply select any of the four stereo pairs for each track's Port setting. If you use SEK'D's *Samplitude*, just press P to bring up the Play Parameters screen, and you'll find each of the drivers listed (see Fig. 2). You can also assign inputs and outputs in *Samplitude*'s Mixer window. (I will cover some of the uses for the multiple outs later.)

### SPEC IT OUT

Gina is a full-duplex card and allows you to use all the ins and outs at the same time. That will give you four ins (two analog and two digital) and ten outs (eight analog and two digital), which should prove to be more than adequate for most projects. In addition, the card has excellent audio

specs—as good as those of any card I have had in my system. Gina's 98 dB S/N rating as well as my own listening tests led me to this conclusion: Gina is very quiet. Even when I raised the record level on my DAT machine to 10, it didn't produce so much as a blip on the DAT's level meters, which remained fixed at  $-\infty$  dB.

It is unfortunate that many high-quality audio cards do not provide an all-in-one solution by including a MIDI interface onboard. As it

stands, you will need another sound card or an external interface to include MIDI in your productions. Even though an external device should not present any problems, a second card, especially a PCI card, could be a potential source of resource conflicts. (Check out "Desktop Musician: Solving Sound Card Mysteries" in the January 1998 issue of *EM* for advice on installing multiple cards.) Although I did not have any problems using Gina along with a Creative Labs ISA-based Sound Blaster AWE Gold 64 for both MIDI and audio, I'd prefer to have MIDI on my audio card, even if it meant an additional cost.

### WHO'S DRIVING?

Although the Gina card appears to Windows as multiple output devices, it does not perform automatic "routing" like the multi-out Antex StudioCard does. The Antex card allows you to start a new audio program while another is

## Gina Specifications

Card Type	PCI
Analog Inputs	2 (unbalanced 1/4")
Analog Outputs	8 (unbalanced 1/4")
Digital I/O	stereo S/PDIF (RCA)
D/A Converters	20-bit, 128x oversampling
A/D Converters	20-bit, 128x oversampling
Sample Rates	11 kHz–48 kHz at standard intervals
Frequency Response	20 Hz–22 kHz, $\pm 0.25$ dB
THD + Noise	0.005%, 20 Hz–22 kHz, A weighted
Dynamic Range	98 dB

playing in the background, at which point it sends the new audio to the next available output port.

Gina gives control of all I/O resources to the first application you load to ensure that all the audio streams stay synched. That can be essential in various situations, but it means you can only run one program at a time.

According to the manufacturer, with an upcoming release of Gina's audio driver, the user will be able to determine how the card operates when multiple audio programs are used.

### FREE GOODS

In addition to the *Echo Reporter*, Gina bundles a copy of Syntrillium Software's *Cool Edit Pro*. The included version is missing most of the processing features of the full retail version and has a limit of ten stereo tracks. This may be suitable for many projects, but you'll probably want to upgrade to the full 64-track version if you like the feel of the program. Of course, having the software provided allows you to get up and running with no lag time. There are also demos of many other audio and MIDI programs on the accompanying CD.

Gina ships with another utility called *EasyTrim* that analyzes a signal coming into your system and automatically recalibrates your recording levels (see Fig. 3). This ensures that your source audio won't overload the system and maximizes your signal for the best signal-to-noise level. When you use *EasyTrim*, just be sure that you let it analyze the loudest spots in your incoming signal. The utility is accessed from the Advanced page of the Input Level settings of Gina's Mixer application and works as advertised.

### REAL WORLD TESTS

I used Gina in a number of situations, and I found it to be an excellent performer in all cases. First, I gave it a workout using my multitrack audio program, SEK'D's *Samplitude 2496*. Much of

my music has a dense texture, and I often use ten or more tracks simultaneously. Gina easily whipped through one recent project that had twelve audio tracks, several of which use automation. Though I'm not sure Gina should get all the credit for the track throughput I achieved—the host system, after all, does do some of the work—Gina's bus mastering feature takes much of the load off the CPU, which definitely results in more tracks of audio.

I also used a "test bed" file that came with a version of *Cakewalk* some time back. The file contains ten distinct audio tracks that you enable one at a time until you start to get dropouts or other grunge. I added an additional six tracks to the original ten and had no problems whatever, even with several DirectX plug-ins running on my Pentium II. When I moved the card to an older Pentium Pro 200 and repeated the tests, I was able to achieve the same results.

### OH, SO MANY OUTS!

Depending on your studio's equipment and your computer's capabilities, you'll find many different ways to use Gina's multiple outs. For example, even with a fast computer, it's often a good idea to take some of the load off your system's CPU. To accomplish this, you could assign each audio track in your multitrack editor or digital audio sequencer to a different output, route them to individual channels on your

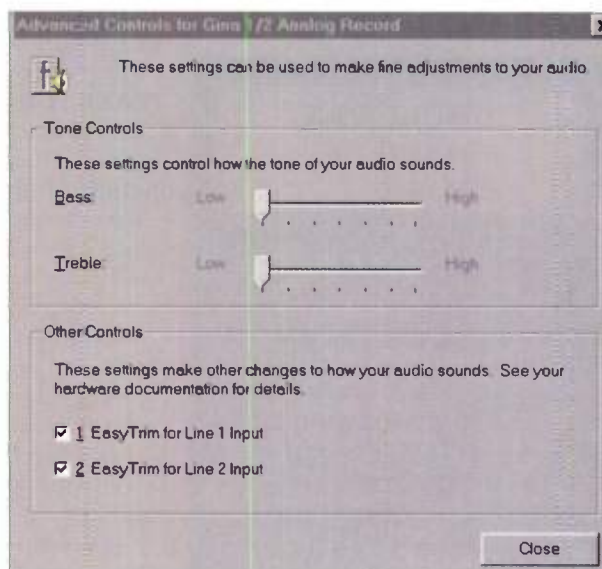


FIG. 3: An included utility called *EasyTrim* can help keep clipping from occurring while recording.

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GINA

outboard mixer, and perform your panning, EQ, and volume modifications on an external mixer. You could then mix down in stereo to a DAT or cassette.

Another way to save processing resources is to take one pair of tracks out to an effects unit and then route the processed audio back using a pair of inputs. Because the card is full-duplex, you should have no perceivable timing problems with this scenario. (Using the A/D converters adds only a 1.5 millisecond delay, according to Event.)

Here's another common scenario: Let's say you wanted to play your MIDI synth and record its output while playing back several tracks of audio in your digital audio sequencer. Simply route the output of your keyboard to Gina's analog inputs, record those inputs on two tracks in the sequencer, and route the two synth tracks to Gina's analog outputs. Also send the digital audio tracks to two or more analog outputs and connect all the outs to your mixer. Because Gina allows you to pass analog input directly to analog out, you can perform numerous types of processing or automation on the audio tracks and monitor all the parts as you record your playing.

Because you can adjust the incoming analog signal's level using Gina's software mixing capabilities, you won't

### Gina System Requirements

Pentium PC with 16 MB RAM, Windows 95, and PCI 2.1 bus.

need to run your synth through your outboard mixer on its way to the Gina inputs. As a matter of fact, if you are listening to the entire mix through your mixer, be sure to keep the synth out of the mixer so it won't cause feedback. Also keep in mind that Gina can't pass incoming data from its digital ins directly to its digital outs. That option

should be available with a forthcoming driver update.

▼  
**Getting the card  
to run in my  
oftentimes  
difficult system  
was a breeze.**

Finally, you can think of Gina's eight analog outs as an 8-bus system. Any number of tracks can be grouped together or left isolated depending on what you ultimately want to do with each track. For instance, you might

have four separate vocal tracks that you route to one pair of stereo outs, using your hard-disk recording program's pan, EQ, and volume features to control the output. An additional lead vocal track could be isolated from those backing vocals and controlled by your outboard mixer's EQ and pan control. There are numerous options to consider, and you'll be hard-pressed to find a configuration that Gina can't accommodate (within reason, of course).

### MAKE IT A BUY

There's very little to complain about with the Gina card. Though it would be nice to have MIDI ports on the card to save you from buying a stand-alone interface or second sound card, several viable solutions work around that problem. The ease of installation is a real pleasure, the sound quality is as good as I've heard, and the numerous I/O configurations offer options for many different users. Gina is one card I can get really excited about (though I'd love to meet her big sister)!

*EM Associate Editor Dennis Miller lives in the suburbs of Boston. He wishes to thank Zack Price for his help on this article.*

### EVENT ELECTRONICS

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FEATURES ■■■■■

AUDIO QUALITY ■■■■■

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VALUE ■■■■■

1 2 3 4 5

**PROS:** Excellent audio quality. Multiple I/O options. 24-bit digital I/O.

**CONS:** No onboard MIDI interface. No Windows NT drivers.

CIRCLE #440 ON READER SERVICE CARD

# MUSICIAN'S EAR

CHORD TRANSCRIBER 2.0  
(MAC/WIN)

*Coax the chord  
progressions from your  
digital audio ditties.*

By Scott R. Garrigus

When music software companies began touting tools that could derive MIDI data from digital audio, most musicians were skeptical. Now, however, many top-notch sequencers include groove analysis and quantizing functions, and some can even translate monophonic audio pitches into MIDI data. The technology hasn't arrived yet that will enable you to completely transcribe a complex digital recording, but it is possible for your Mac or Windows computer to identify and notate the chord progressions in a recording. And the software costs less than \$80.

*Chord Transcriber*, from Musician's Ear, is a small and deceptively simple piece of software that can identify the chords played in almost any kind of music, including rock, jazz, country, and folk (see Fig. 1). The music can come from a cassette tape, a CD, or any other audio source. The technology incorporated in this program is still in

the growing stages, but as long as the chord progressions are clear, *Chord Transcriber* does a nice job of identifying them correctly.

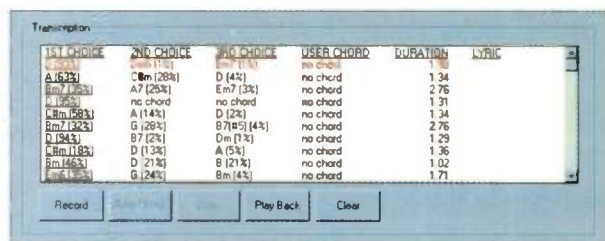
The program comes on a single floppy disk and occupies only 400 KB of hard-disk space, although you'll need 4 MB or more of available space for sampling the recordings. I tested the program on a 150 MHz Pentium MMX machine with Windows 95 and a Sound Blaster-compatible sound card. The installation was quick and painless. The Mac version is essentially identical to the PC version. It uses the Mac's on-board sound capability instead of a sound card.

## GETTING READY

Before using *Chord Transcriber*, you must perform three simple setup tasks. You must first decide whether you're going to use a CD or some other audio source (such as a cassette). If the song you want to transcribe is on CD, all you have to do is pop the disc into your computer's CD-ROM drive. *Chord Transcriber* provides a simple CD-player utility in the PC version that appears when you select CD Player from the program's View menu. (On the Mac, you can use the *AppleCD Audio Player* or a similar utility.)

If you want to transcribe a song from cassette (or any external audio source), you'll have to connect your player to the Line In jack on your computer's sound card (or on the Mac's rear panel). Musician's Ear thoughtfully includes a 6-foot stereo audio cable with an 1/8-inch plug at each end so you can easily route the signal from the headphone jack on your audio source.

The next step is to be sure that your sound card's software mixer is set up properly. The type of audio source must be selected, and you may need to adjust its volume control. (On the Mac, use the Monitors & Sound control



LIST CHOICE	NO CHOICE	NO CHOICE	USER CHORD	DURATION	LYRIC
A (62%)	C (17%)	D (4%)	no chord	1.30	
Bm (13%)	C#m (28%)	E (4%)	no chord	1.34	
F (22%)	A7 (25%)	Em7 (3%)	no chord	2.76	
C#m (58%)	no chord	no chord	no chord	1.31	
Bm (34%)	A (14%)	D (2%)	no chord	1.34	
D (24%)	G (29%)	B7(9#) (4%)	no chord	2.76	
C#m (18%)	B7 (2%)	Dm (1%)	no chord	1.29	
Bm (46%)	D (13%)	A (5%)	no chord	1.36	
C#m (15%)	D (21%)	B (21%)	no chord	1.02	
	G (24%)	Bm (4%)	no chord	1.71	

FIG. 2: The Chord List displays all of the chord changes within a song after it has been sampled and analyzed.

panel.) This might take a bit of trial and error. I found that, even though the program's *Quick Reference Guide* suggested a mid to high setting, I had to use a level a little below the on-screen fader's midpoint. If the level you set is too low or too high, *Chord Transcriber* warns you when you finish recording. You can also get a rough reading from the program's Volume Meter.

The last setup procedure involves using the Intonation feature. For *Chord Transcriber* to determine the correct chord tones, it must have a reference pitch. The program uses 440 Hz as the standard pitch for the A above middle C (A4). The notes in the song that you want to transcribe can vary from this standard if the recorded instruments are tuned to something other than the standard pitch or if the audio device that you're using is playing back faster or slower than it should.

To correct for any pitch variance, you can set the program's intonation manually or use the Auto-Adjust button. Simply play back a portion of the song where the notes are clear and without vibrato, bends, or excessive noise; then hit Auto-Adjust. The program samples and analyzes a few seconds of the audio and sets the Intonation appropriately. Most of the tunes that I tested didn't need adjustment, but Auto-Adjust easily handled the few that did.

## HEAVY CHANGES

The fun part of using the program comes after you've finished with all of the setup procedures and are ready to do some transcribing. The bottom of *Chord Transcriber's* main window includes a row of buttons used to control its transcription features. Click on the Record button and start playing your song to begin the transcription process. In the case of a CD, you can use the built-in CD-player utility to begin playback.

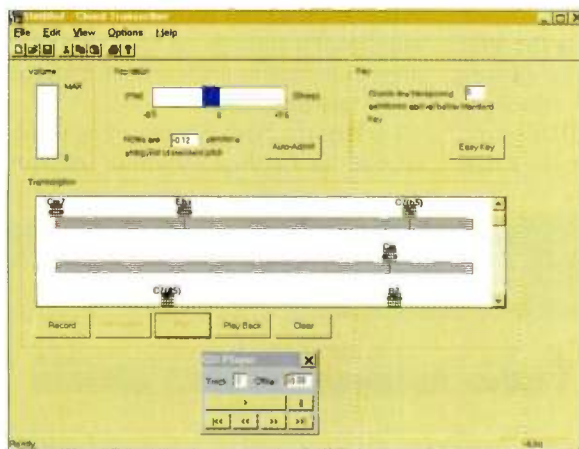
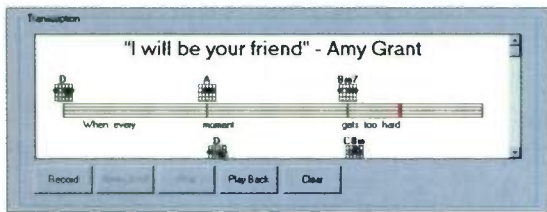


FIG. 1: *Chord Transcriber's* main window includes an Intonation function, a Transposition tool, and a Transcription display that shows the chord progressions. A CD-player utility is available (in the PC version) for transcribing from compact disc.



**FIG. 3: The Song Sheet shows the chord changes within a song as a lead sheet-style display but lacks any appropriate time signature and measure markings.**

A nice addition here would be a user-selectable synchronization feature so that pressing the Record button would automatically start the CD. Pressing the Stop button already works in this way by automatically stopping CD playback.

As soon as you hit the Record button, *Chord Transcriber* starts sampling your song. During this process, you must click the New Chord button at the beginning of each new chord within the song. This can be a bit confusing, especially if you don't know the song very well. It's a good idea to listen to the song a few times and pay particular attention to when each chord change occurs before you try transcribing it, or you may get less-than-optimal results.

It's also best if you anticipate each new chord rather than wait until it has already begun to play. That way, the program will be less likely to confuse the ending of one chord with the beginning of another. You need to perform this function manually because of the way that *Chord Transcriber* analyzes the music.

According to Bruce Larson, the program's creator, the program digitizes the audio signal and writes it to a temporary data file. The program then runs this data through a patented DSP algorithm that looks for excitement in the audio spectrum at the frequencies corresponding to note pitches and filters out harmonic overtones and noise. This information is used to determine which notes are being played at any given time. The most prominent notes are matched against a library of chord types, and the best fit is chosen as the defining chord for that particular instant in the music.

Each instantaneous chord, however, is not always correct, due to passing tones, destructive interference, and imperfections in the overtone and noise filters. The program therefore does not

present all of these instantaneous chords to the user but rather indicates which chord appears to be the predominant one over a span of time. Pressing the New Chord button at each chord change informs the program where each chord begins and ends and allows it to report which chord choice occurred most often

during that time span. In most cases, the chord that is reported for the whole time span is the correct chord.

After the program is finished analyzing the recorded audio, it shows the detected chords in its Chord List display (see Fig. 2). First, second, and third choices are shown for each recorded



**Chord Transcriber  
had a far easier time  
picking the  
right chords in pop  
than in jazz.**

chord along with a degree of certainty (shown as a percentage) for each choice. The duration of each chord (in seconds) is also listed. To save you from having to analyze the same song over again, you can save the transcription information as a file in *Chord Transcriber's* own format.

From here, you can press the Play Back button to listen to the chosen chord progression either as simple audio tones or through a MIDI sound source. You can also select the MIDI channel to be used, but unfortunately you can't choose the MIDI port or device if your setup happens to have multiple MIDI outputs. The chords that are underlined in the Chord List are the ones used for playback, but you can easily substitute chords from each of the choices by double-clicking on them with your mouse.

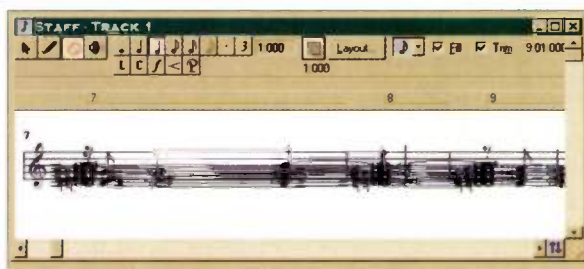
You can also substitute your own chord choices with the User Chord column in the display. Just double-click in the User Chord column and a dialog box pops up, allowing you to select a root and a variant for your new chord. Unfortunately, not every variant is available. For example, diminished seventh is listed but plain diminished is not. Nonetheless, the program does cover most popular variants, including dominant 7, maj7, maj7(9), 9, minor triad, m6, m7, minor(maj7), minor(9), minor 7(9), augmented, dim7, 7(#5), 7(b5), sus4, and 7 sus4. The duration for each chord can also be modified.

In addition to the Chord List, *Chord Transcriber* lets you view the chosen chord progression in a lead sheet-style display called the Song Sheet (see Fig. 3). The Song Sheet shows each chord as a fretboard diagram with the correct guitar fingerings for each chord. A nice addition here would be keyboard notation for the chords, as well. Musician's Ear hopes to add this feature in the next version.

A title and lyrics can easily be added to the display by simply typing them in. Automatic lyric alignment is not available, though. You can transpose the chords to a different key, and with the click of a button, an Easy Key function determines the key that is easiest for you to play on guitar. Unfortunately, you cannot set the time signature for the song, so there are no rhythmic indications.

In addition, bar lines mark each new chord rather than each new measure, as on a traditional lead sheet. This makes it extremely difficult to play the song from just the Song Sheet because there is no way to tell when each chord should be performed.

Luckily, the Song Sheet can be printed out for further notation and can



**FIG. 4: This is the Staff view in Cakewalk Pro Audio displaying a portion of a Standard MIDI File, that was exported from Chord Transcriber.**

be saved as a Standard MIDI File (SMF) for editing in a sequencer or notation program. Because of the time-signature problem, however, when you load up the Standard MIDI File, it will probably end up looking like notation spaghetti due to the measure misalignment (see Fig. 4). Your best bet is to use *Chord Transcriber* merely for identifying the chords in a song; then you can play the chords into your sequencer or notation program manually. And while you're at it, you might as well enter the lyrics later, too; they're not exported when you save as an SMF.

**SO DOES IT WORK?**

To put the program through its paces, I sampled about twenty songs from a variety of different artists performing in several styles: a little Amy Grant for pop, Ace of Base for techno, Gary Burton for jazz, and so on. As you might expect, the simpler the chord progression, the better *Chord Transcriber* performed. That's not to say it didn't identify any of the more sophisticated chords that it encountered, but it had a far easier time picking the right chords in a pop tune than it did in a jazz tune.

In Amy Grant's "I Will Be Your Friend" from her new *Behind the Eyes*

**Chord Transcriber System Requirements**  
**Mac:** 4 MB of hard-disk space; 16 MB of RAM; 680X0 or Power Macintosh running Mac OS 7.0 or higher.  
**PC:** 4 MB of hard-disk space; 8 MB of RAM; 16-bit sound card.; 33 MHz 80486 or higher CPU; Windows 3.1 or 95.

CD, *Chord Transcriber* made about ten totally wrong choices but guessed the rest of the changes pretty much correctly. And when I say pretty much, I mean there may have been a misplaced variant here and there (probably due to passing tones in the vocals), but the roots were right.

In Gary Burton's rendition of "O Tannenbaum" from *A GRP Christmas Collection*, however, the mistake ratio was higher. In the parts of the song that stuck with the traditional tune, *Chord Transcriber* performed nicely, but in the improvisational sections, most of the chords it identified were incorrect. I believe this was mainly due to the faster and more sophisticated chord changes. Passing tones in the instrument solos also could have made a difference.

**TRAILING NOTES**

This technology still has a way to go before it can reach a level of consistent accuracy, but *Chord Transcriber* does work to an acceptable degree much of the time. It really depends on what kind of music you need to work with. The program itself could stand some touching up in a few key areas, especially the Standard MIDI File export function.

A single *Quick Reference Guide* card is the only documentation provided with the program, and although it gives you all of the basic information that you need to run the program, it would help to have more details about how to get optimal results.

If you find yourself doing a lot of transcribing and the songs that you're working with have clear and not overly complex chord progressions, *Chord Transcriber* is worth your consideration. If, however, you only need an occasional lead sheet, you're probably better off just buying the sheet music for a few measly bucks or transcribing it manually. ☹

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**MUSICIAN'S EAR**  
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 \$79

**FEATURES** ■ ■ ■ ■

**EASE OF USE** ■ ■ ■ ■ ■

**DOCUMENTATION** ■ ■

**VALUE** ■ ■ ■ ■

1 2 3 4 5

**PROS:** Easy to use. Good chord recognition with popular music styles. Displays guitar fingerings for recognized chords. Allows playback of transcription via audio or MIDI. Supports most popular chord variants.

**CONS:** Less effective at recognizing sophisticated chord changes. Inadequate documentation. SMF export often produces unreadable notation.

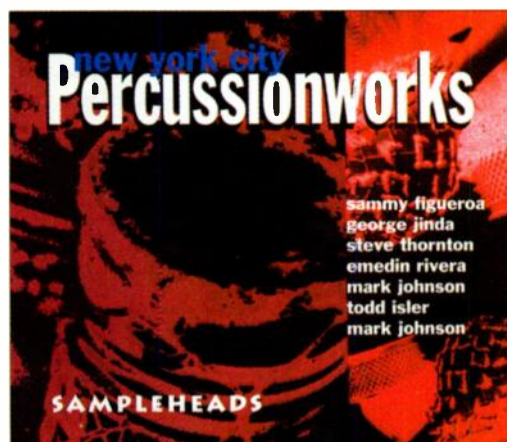
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## SAMPLEHEADS

New York City Percussionworks

By Jeff Obee



Tour the world of percussion guided by New York's finest with Sampleheads' *NYC Percussionworks*.

If you're at all like me in your approach to composing music, you love percussion. I already have a hard drive overflowing with various percussion samples, but *New York City Percussionworks* puts a truckload of great new hits and loops right at my fingertips.

### Gimme Some Skin

*NYC Percussionworks* is available as a 2-disc audio CD (\$99.95) and as a CD-ROM (\$249.95) in Akai S1000, Roland S-700, Kurzweil K2000, SampleCell, and Steinberg Cubase VST's REX formats. The discs feature an amazing abundance of loops, hits, and fills in a wide variety of styles by some of the best players in New York City. Latin American, African, Arabic, rock, ballad, funk, and other idioms are featured, with emphasis on Latin and African styles. The samples are taken from a very long list of instruments, including conga, shaker, dumbek, tabla, bongo, tambourine, triangle, cowbell, agogo, timbale, berimbau, talking drum, flexitone, and many more. Most loops are around five to six seconds in length.

### Fun with Percussion

I really dug the feel of the loops and hits, particularly those by Todd Isler—his double-udu "Hadjinie" drum is unique and usable in all sorts of music. He also does some fine frame-drum work that is very well recorded. There's an excellent palette of tabla samples by Mark Johnson—if you want tabla, you get it here in spades.

The dumbek is represented by George Jinda and Steve Thornton, who contribute two tracks each. However, these Arabic rhythms weren't very strong, and the sound of one of the dumbeks wasn't to my liking. On the whole, I would have liked to hear a broader scope of Middle Eastern and frame-drum percussion on the disc.

You'll feast on the extensive selection of African and Latin percussion here. I was impressed with the tasty performances in the loops—great feel and natural sound—and you get numerous hits and fills to create your own custom maps.

### Mindful Methods

Many loops were recorded at the same tempi, making them interchangeable with other instruments and artists on the CD. This makes the entire library work seamlessly as one entity and gives the user the ability to use samples from the different players and idioms without much restriction.

Most tempi are in steps of four or twelve bpm, which can make it difficult to insert a loop into a tune after the fact if it is in a different tempo than the one provided.

### The Good Book

I was pleasantly surprised by the documentation provided. The 32-page booklet clearly lists the track, the type of sound, and the length of the sample. There are short blurbs on each percussionist, artists of note they have played with, and their style and specialty. Hallelujah! I love getting information like this—it makes me feel like the producers are really focused on the end user.

### Big City Appeal

I quickly became enamored of these samples. Being a bass player, I could tune in grooves that appealed to me and create some awesome rhythm tracks! The samples sound great, the price is right, and the loops are eminently usable in all sorts of situa-

tions. If you like percussion, you should add *NYC Percussionworks* to your sample arsenal.

**Overall EM Rating (1 through 5): 4.5**

CIRCLE #442 ON READER SERVICE CARD

## EAST-WEST COMMUNICATIONS

Electronica

By Alex Artaud

*Electronica* (\$99.95) is the fourth in a series of sample CDs put together by Greg Hawkes (formerly of the Cars) and Perry Geyer. Their Boston-based Cybersound Studio has also put out an ambient CD, *Hypnotica* (reviewed in the April 1998 *EM*), as well as two popular techno sample CDs, *Technophobia!* and *Tekno/Industrial*. The disc contains audio, AIFF, and MIDI files, so you can play these tracks on your CD player as well as in your CD-ROM drive. (Note that for playback on a CD player, you should start on track 2 to avoid MIDI data on track 1 that could damage your CD player.)

### The Kids Love It

The CD showcases loops familiar to anyone who has walked into a dance club that's playing electronica. Taking advantage of the nebulous nature of its moniker, the disc provides primarily atmospheric beats ranging from laid-back flangefests and odes to the Eventide H3000 to vocoded techno experiments. There are a couple of decent nods to jungle/drum 'n' bass, and the selection is eclectic enough that you don't feel you're being pummeled by the



From laid-back flangefests to vocoded techno experiments, East-West's *Electronica* has some good beats, and you can dance to it.



same groove in different clothes. Pluses are the *de rigueur* Roland TR-808-style sounds and the pleasing analog feel on some tracks.

The producers chose to divide the CD into two sections: the first provides 66 complete loop passages ranging from 68 to 214 bpm; the second contains 27 passages comprising a loop, its individual components, and an accompanying MIDI file for you to edit. Tagged on at the end are an assortment of cool kicks and snares to sample. Good move.

### Slice and Dice

The first section boasts heavier production qualities, with a richer assortment of sounds and treatments. This was a mixed blessing; even though I definitely enjoyed the majority of the loops and could easily chop them up, they often felt like mini-compositions in and of themselves. For a deejay with a sampler, these loops could be ideal. However, for creative flexibility, the MIDI files and sounds in the second section prove more useful. They're stripped down and allow room for some treatments and messing about. Not that they don't require any tweaking once they're in the sequencer and sampler (I found some quirks when transposing), but that's a fairly painless process.

### Hear It First

Overall, *Electronica* is a good value, with little filler material. It definitely aims for a club sound; if that's what you need, you should check it out. Oh, and the Web site is cool, too, providing sounds to audition before you buy.

Overall EM Rating (1 through 5): 3.5

CIRCLE #443 ON READER SERVICE CARD

## SPECTRASONICS

### Liquid Grooves

By Dan Phillips

In the April 1998 issue of *EM*, I gave top marks to Spectrasonics' *Burning Grooves* drum-sample library. But if that kind of fiery performance doesn't suit your current project, the highly produced, sophisticated *Liquid Grooves* (\$199, CD-ROM; \$99, audio CD) may be a better fit. The CD-ROM is available in Roland S-700, Kurzweil K2000, Akai S1000 (compatible with E-mu EIIIx and Ensoniq ASR series),

(continued on p. 184)

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## PRO HEADPHONES



### K240M Studio Headphones



The first headphone of choice in the recording industry. A highly accurate dynamic transducer and an acoustically tuned venting structure produce a naturally open sound.

#### FEATURES-

- Integrated semi-open air design.
- Circumaural pads for long sessions.
- Steel cable, self-adjusting headband
- 15Hz-20kHz, 600Ω

### SONY MDR 7506 Pro Headphones



The Sony 7506's have been proven in the most trying studio situations. Their rugged, closed-ear design makes them great for keyboard players and home studio owners.

#### FEATURES-

- Folding construction
- Frequency Response 10Hz to 20k Hz
- 1/4" & 1/8" Gold connectors
- Soft carrying case • Plug directly into keyboards

### beyerdynamic DT 770 Pro Pro Headphones



These comfortable closed headphones are designed for professionals who require full bass response to complement accurate high and mid-range reproduction.

#### FEATURES-

- Wide frequency response
- Durable lightweight construction
- Equalized to meet diffused field requirements
- Padded headband ensures long term comfort

### SENNHEISER HD265/HD580 Pro Headphones



The HD-265 is a closed dynamic stereo HiFi/professional headphone offering high level background noise attenuation for domestic listening and professional monitoring applications. The HD 580 is a top class open dynamic stereo HiFi/professional headphone that can be connected directly to DAT, DCC, CD and other pro players. The advanced design of the diaphragm avoids resonant frequencies making it an ideal choice for the professional recording engineer.

## MIXING BOARDS

### Panasonic RAMSA

Stop dreaming about your digital future, it's here! The Panasonic/Ramsa WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's easy to use, and it's available NOW!

#### FEATURES-

- 32 Inputs/6 AUX send/returns
- 24-bit converters
- Large backlit LCD screen displays EQ, bus and aux assignments, and dynamic/delay settings.
- 4-band parametric EQ
- Choice of Gate/Compressor/Limiter or Expander on each channel
- 5.1 channel surround sound in three modes or the bus outputs
- Output MMC
- Optional MIDI joystick



### MACKIE. 8 Bus Series Mixing Consoles

Since its introduction, Mackie Designs' 8-Bus Series consoles have proven that excellent sonic quality, practical features and extreme durability can be affordable. All 3 versions offer extensive monitoring, 4-band EQ, accurate, logarithmic taper faders, and expansive headroom. The 24x8 and 32x8 can be expanded using Mackie's 24-E Expander console which consists of 24 input channels and tape returns and may be daisy chained to provide 128 or more total input channels.

#### FEATURES-

- Each channel includes Mackie's well-known Mic preamp and a -10/+4 switchable tape return
- 8-assignable submasters and a L/R mix master
- 4-band EQ with true parametric (3-control) Hi Mids, Lo Cut filter
- Extensive routing capabilities
- Available in 16, 24 & 32 channels
- Optional Meter Bridges available
- Optional 24-E Expander console available
- Rugged all-metal chassis
- In-line monitoring effectively doubles your input channels



### MS1202VLZ 12-Channel Compact Mic/Line Mixer

- Gain control, pan, 3 band EQ, and 2 Aux sends
- 4 mono, 4 stereo channels (12 inputs total)
- Great for "extra inputs" on the fly.
- Phantom power.



### MS1402VLZ 14-Channel Compact Mic/Line Mixer

- Mic preamps w/trim control (channels 1-14)
- 60mm "long" faders
- Mute switch routes to alt 3&4 bus
- Low-cut filter • Phantom power.



### CR1604VLZ 16 x 4 x 2 Mic/Line Mixer

- 7 Aux sends, 3 band EQ.
- Large 10-segment LED meter
- Lowest noise/highest headroom.
- 16 studio grade mic pre's
- 3 different setup positions.
- Low-cut filter • Phantom power.



The MS-1202, 1402, 1604 & SR Series all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8-Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

### SPiRiT LX7 Professional Mixing Console

The LX7 was designed by Soundcraft co-founder Graham Blythe. Built in the UK, it uses surface mount technology to ensure accurate, consistent insertion of all components into LX7's PCBs. Roadworthy construction and 25 years of audio console experience put this newest addition to the Spirit line at the top of the heap.

#### FEATURES-

- 24 Ultramic preamps
- 100mm ALPS faders
- 7 bus outputs
- Comprehensive 4-band EQ includes 2 swept mids and 15dB of boost or cut
- Separate stereo input section
- Use in FOH applications as well as studio recording.
- Internal power supply



## MONITORS

### MACKIE. HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable, they're internally bi-amped. "What's the catch?" Let us know if you find one.

#### FEATURES:

- 150W Bass amp, 100W Treble amp
- Full space, half space and quarter space placement compensation
- Frequency Response 39Hz to 22kHz, ±1.5dB



### SPiRiT Absolute Zero

Absolute Zero monitors maintain a wide frequency response at high and low listening levels, both on and off-axis for consistent results every time.

#### FEATURES-

- High definition linear phase design
- Wide, controlled dispersion
- CAD optimized, low loss crossover
- Custom designed drivers
- Long throw 170mm LF driver
- 25mm soft dome HF unit on proprietary waveguide



### TANNOY PBM 6.5II

The PBM 6.5 II is the industry standard for studio reference monitors. They provide true dynamic capability and real world accuracy.

#### FEATURES-

- 6.5" low frequency driver and 3/4" tweeter
- Fully damped and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass



### JBL 4206 & 4208

The 4206 & 4208 studio reference monitors are 6" and 8" respectively. Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environments.

- Multi-Radial baffle ABS baffle virtually eliminates baffle distortion
- Superb imaging & reduced phase distortion
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.
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## MUSIC SOFTWARE

### Steinberg CUBASE VST

#### Virtual Studio Technology

Steinberg's Virtual Studio Technology (VST) turns your PowerPC or Windows based computer into a music production powerhouse featuring digital audio, real-time effects, automation, MIDI and scoring in one single program. Expandable with software Plug-Ins and an audio bus system for use with the latest generation of multi I/O audio cards. Cubase VST delivers.

#### FEATURES-

- Up to 32 channels of digital audio
- Complete mixer with up to 128 ECs
- 2 full-featured effects racks
- All Realtime. Every action can be automated
- **CUBASE SCORE** adds professional score printing and layout functions
- **CUBASE AUDIO XT** adds support of Digidesign DAE (compatible interfaces) such as the ProTools System.



### emagic LOGIC AUDIO 3.0

#### For Mac or Windows

Logic Audio 3.0 integrates Digital Audio Recording & Editing, MIDI Sequencing, and Professional Scoring into a leading edge music composition and production system. The new Version 3.0 features extended real-time editing and manipulation options along with numerous detailed solutions for use in professional studio environments.

#### FEATURES-

- Custom window setups can be assigned to keys for instant recall, up to 90 screensets per song.
- Interactive Editors such as Event, Hyper, Score, Matrix, Arrange and Environment are all linked.
- Real-time DSP effects
- Highest resolution available: 960ppq
- Environment window provides knobs, faders, buttons and other virtual objects that can be defined to send out any type of MIDI data.
- New bus system, Punch on the fly, & Cycle Mode
- Support of Adobe Premiere and Digidesign Audieroute plug-in formats



### Mark of the Unicorn Digital Performer 2.11 MIDI Sequencer for Mac

Digital Performer contains all of the sequencing capabilities of Performer V.5 and adds Digital Audio to the picture. Apply effects such as Groove Quantize, shift, velocity scaling and more. **All in REALTIME.**

#### FEATURES-

- MIDI Machine Control, Quicktime Video playback
- Sample rate conversion
- Spectral effects, pitch correction
- Real-time editing and effects processing
- Full featured Notation section
- Virtual automated mixing

## HARD DISK RECORDING



With Pro Tools Project you get 8 tracks of digital audio & 64 virtual tracks! The Pro Tools Project system includes an audio card as well as award winning Pro Tools software. You choose either an 888 or an 882 I/O to complete the package. Random access, non-destructive digital editing keeps your precious recorded material in its original form as you process and play with it, allowing you to take chances on tweaking a performance without risk. Project also features MIDI recording and playback as well as Quickpunch™ punch-on-the-fly & a direct upgrade path that lets you move to a full Pro Tools system when you're ready.

#### REQUIRES-

- Qualified NuBus or PCI Macintosh CPU
- Hard Drive, system software 7.1 or greater
- 24MB RAM minimum
- 14" monitor (17" recommended)

### ProTools Project™ Digital Audio for Macintosh



### 888 & 882 I/O Audio Interfaces

The 888 and 882 I/Os each provide 8 channels of high quality A/D, D/A I/O for connection to Pro Tools Project and Season 3 PC systems. Choose the 882 and get an affordable audio interface featuring 1+4 balanced/unbalanced ins and outs in a single rack space. For more high-end applications, the 888 provides features such as XLR balanced analog ins and outs, 8 channels of AES/EBU I/O for direct digital transfers of tracks, high resolution LED metering & individual input/output level trims.

### Audiomedia III Digital Audio Card

Audiomedia III will transform your computer into a powerful multitrack workstation. Compatible with a wide variety of software options from Digidesign and Digidesign development partners, Audiomedia III features 8 tracks of playback, up to 4 tracks of recording, 24-bit DSP processing, multiple sample rate support and easy integration with leading MIDI sequencer programs.



### TDM BUNDLE

If you're already familiar with the Waves TDM bundle, you'd better take another look! This great package is now even fatter with the addition of 5 new processors, at the SAME PRICE! TDM owners can now maximize their power with plug-ins including the famous TrueVerb virtual-space reverb, the Q-10 EQ, C1 Compressor/Gate, S-1 Stereo Imager, PAZ-Psychocoacoustic Analyzer, L1-Ultramaximizer as well as MultiRack, WaveConvert and TrackPac Pro applications.



## DIGITAL MULTI-TRACK RECORDERS

### TASCAM DA-38 Digital Audio Recorder

The DA-38 was designed for musicians. Using the same Hi-8 format as the highly acclaimed DA-88, the DA-38 is an 8 track modular design that sounds great. It features an extremely fast transport, compatibility with Hi-8 tapes recorded on other machines, rugged construction, ergonomic design and sync compatibility with DA-88s.

#### FEATURES-

- Hi-8mm tape format
- Next generation 18-bit A/D and 20-bit D/A converters with Delta-Sigma oversampling
- Digital track copy for simple assembly composite edits

- Built-in Digital patchbay
- Track advance and track delay
- Easy to use interface



### ALESIS ADAT XT20 Digital Audio Recorder

The New ADAT-XT20 provides a new standard in audio quality for affordable professional recorders while remaining completely compatible with over 100,000 ADATs in use worldwide. The XT20 uses the latest ultra-high fidelity 20-bit oversampling digital converters for sonic excellence, it could change the world.

#### FEATURES-

- 10-point autolocate system
- Dynamic Braking software lets the transport quickly wind to locate points while gently treating the tape
- Remote control
- Servo-balanced 56-pin ELCO connector

- Built-in electronic patchbay
- Copy/paste digital edits between machines or even within a single unit. Track Copy feature makes a digital clone of any track (or group of tracks) and copies it to any other track (or group) on the same recorder.



## MIDI HARDWARE



### Mark of the Unicorn MIDI Time Piece™ AV 8x8 Mac/PC MIDI Interface



The MTP AV takes the world renowned MTP II and adds synchronization that you really need like video genlock, ADAT sync, word clock sync, and even Digidesign superlock!

#### FEATURES-

- Same unit works on both Mac & PC platforms
- 8x8 MIDI merge matrix, 128 MIDI channels
- Fully programmable from the front panel.
- 128 scene, battery-backed memory.
- Fast 1x mode for high-speed MIDI data transfer.

### Digital Time Piece™ Digital Interface



Think of it as the digital synchronization hub for your recording studio. The Digital Timepiece provides scalable, centralized sync for most analog, digital audio, and video equipment. Lock together ADATs, DA-88s, ProTools, word clock, S/PDIF, video, SMPTE, and MMC computers and devices flawlessly. It ships with "Clockworks" software which gives you access to its many advanced features and remote control of some equipment settings such as record arm.



### Studio 64XTC Mac/PC MIDI Interface



The Studio 64XTC takes the assorted, individual pieces of your studio—your computer, MIDI devices, digital and analog multitracks and even pro video decks, and puts them all in sync.

#### FEATURES-

- 4 In / 4 Out, 64 channel MIDI/SMPTE interface/patchbay with powerful multitrack & video sync features
- ADAT sync with MIDI machine control
- Simultaneous wordclock and Superclock output, 44.1kHz or 48kHz for perfect sync with ADAT, DA-88 and ProTools
- Video and Blackburst in (NTSC and PAL)
- Cross-platform: Mac and Windows compatibility

### MIDI Translators MIDI Interfaces

The MIDI Translator II™ and MIDI Translator Pro™ are the next generation portable interfaces. The MIDI Translator Pro™ provides twice the processing power of the MIDI Translator II and both let you switch between MIDI or peripherals with a flip of the THRU-switch - NO CABLE SWAPPING!

#### TRANSLATOR II FEATURES-

- 1 IN and 3 MIDI OUTS • 16 MIDI channels
- Small size fits anywhere - no power supply required!

#### TRANSLATOR PRO FEATURES-

- 2 MIDI INs x 6 MIDI OUTS, Supports 32 MIDI channels
- 2 MIDI OUTS accessible on front panel
- Self powered - no power supply required





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## KEYBOARDS AND SOUND MODULES



### A-90EX Master Keyboard Controller

The A-90EX is an 88-note, weighted master controller with one of the best keyboard actions currently on the market. It offers incredibly realistic piano sounds, powerful controller capabilities and "virtual" programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.



- FEATURES—**
- Master Volume Slider and Global Transpose features
  - Proprietary 88-note hammer-action, velocity sensitive keyboard with aftertouch

- 2 types of stereo-sampled grand pianos, various acoustic and electric pianos (including a great classic Rhodes)
- Stores up to 64 Performances

### JV-2080 64-Voice Synth Module

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, all housed in a 2-unit rack-mount design.



- FEATURES—**
- 64-voice / 16-part multitimbral capability
  - 8 slots for SR-JV8C Series wave expansion boards
  - 3 independent effects sets plus independent reverb/delay and chorus
  - 6 outputs, Main Stereo and 4 assignable
  - NEW patch loader and Phrase Preview functions for easy access to all patches
  - Large backlit graphic display
  - Compatible with JV-1080, XP-50, & XP-80

### KURZWEIL K2500 Series Music Workstations



Building on the same features that made the 2000 series popular, the 2500 series utilizes Kurzweil's highly acclaimed V.A.S.T. technology for top-quality professional sound. Available in 76-key (K2500), 88 weighted key (K2500K) and rackmount (K2500R) configurations, the K2500s combine ROM based samples chosen from the best of Kurzweil's collection, on-board effects, and full sampling capabilities on some models (K2500S, K2500RS & K2500XS).

- FEATURES—**
- True 46-voice polyphony
  - Fluorescent 64 x 240 backlit display
  - Up to 124MB sample memory
  - Operating system stored in flash ROM (for software updates via floppy disk and SCSI)

- Full MIDI controller capabilities
- 32-track sequencer • Dual SCSI ports
- Advanced file management system
- Sampling option available
- Optional DMTI Digital Multitrack interface for data format and sample rate conversion with ADATs/DA-88s

### MicroPiano™

The MicroPiano is a half-rack sound module featuring Grand Piano and other sampled sounds, plus built-in digital effects. Altogether there are 32 available presets, chosen from Kurzweil's highly acclaimed sample library, making the MicroPiano the ideal sound module for any player who demands great sound quality at an unprecedented price.



- FEATURES—**
- High quality full-bandwidth 20-20KHz sampled sounds
  - Full Digital Multi-Effects

- Easy to use front panel functions
- 32 presets including Grand Pianos, Hammond Organ, Strings, Dual Cross-Faded Rhodes and more
- 32-note poly, half-rack, MIDI In/Thru, Stereo outputs

## SAMPLING

### ALESIS QS6, QS7 & QS8 Pro Keyboards

Alesis QS synthesizers all provide true 64-voice polyphony, and a huge sound library that is constructed of 16-bit linear samples. With their powerful computer and digital audio interface capability, built-in 4-bus Multi-effects and expressive performance features, there is sure to be a QS synth perfect for you.



- FEATURES—**
- 16-bit 48kHz sample ROM
  - 64 voice polyphonic
  - 512 preset, 128 user internal program memory
  - 400 preset, 100 user mix memory
  - RS422, RS232 port formats • ADAT interface\*
  - 16MB internal, 16MB expansion memory (32MB total possible)\*

- 4 outputs (2 main, 2 aux)\*
- SoundBridge Sample software for importing almost any sample from your Mac or PC.

QS6 - 61 key synth QS7 - 76 key synth  
QS8 - 88 weighted keys

\*Available on QS7 and QS8 only

### NanoSeries Modules

The NanoSynth is a 64 Voice Sound Module featuring 512 presets and 128 user definable patches with 8MB of internal ROM. Like the QS series of synthesizers, the NanoSynth's sounds are constructed from non-compressed 48kHz, 16-bit linear samples for great sound quality. General MIDI compatible, 1/3 Rackspace.



The E4 Voice NanoBass features 256 bass sounds designed for Dance, Pop and Rock. Each program features an adjustable parameter that you can change using the convenient front panel controller. Factors like Attack, Decay, Brightness, and more let you customize the NanoBass's programs for your specific needs.

### KORG SGproX

The SGproX features newly-sampled stereo pianos recorded with attention to every detail. Carefully crafted velocity switching provides tonal changes and dynamics that come alive under your fingers and the 88-note weighted keyboard has been designed as both a stage piano and master controller.



- FEATURES—**
- 88-note, weighted action keyboard
  - 64-voice polyphony, 24MB ROM

- 64 user-definable programs
- 12-types of stereo digital multi-effects
- Master Controller functions, Backlit LCD display

### E-MU E-mu Systems, Inc. e-6400 Emulator

The e-6400 offers the power of E-mu Systems' renowned Emulator Operating System (EOS) and superb audio quality in a package perfect for the budget-minded professional. The e-6400 comes with stereo sampling, 4MB of RAM and is fully upgradeable to E-mu's top of the line Emulator sampling synthesizers, the E4X, and E4XTurbo.



- FEATURES—**
- 64 voice polyphony (expandable to 128)
  - 4MB sound RAM
  - 2 CD-ROM's included (400MB of sounds)
  - 8 balanced analog outputs

- Onboard graphic waveform editing
- Load while play
- Stereo phase lock time compression

## THE NEW MPC!

### AKAI MPC2000 MIDI Production Center

Whether you're producing rap or hip-hop, sequencing a rack of MIDI modules, or performing live, the MPC2000 gives you powerful tools to make your music shine. It's the NEW MPC!



- FEATURES—**
- Large 248 x 60 LCD Graphic display
  - 64-track, 100,000 note sequencer with linear drum machine style programming
  - 16-bit, 32-voice stereo sampler
  - Standard SCSI interface
  - Soft keys, Data/Digit wheels, cursor control and more.
  - Keypad for directly entering sample points

- Note variation slider gives you realtime control of any sound's tuning, attack, decay, or filter frequency.
- Floppy Disk Drive
- Powerful expansion options turn your MPC2000 into an MPC2000 STUDIO, the ultimate MPC!

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- Rotary 2 head design, 2 direct drive motors.
- XLR mic/line inputs (w/phantom power)
- Analog and S/PDIF (RCA) digital I/O
- 32/44.1/48kHz sample rates & SCMS-free recording.
- Built in MIC limiter and 20dB pad.
- TRS jack w/ level control for monitoring.
- Includes shoulder belt, AC adapter, & battery.



### PDR1000/PDR1000TC



- 4 head Direct Drive transport
- XLR mic & line analog ins. 2 RCA line outs. Digital I/O include: S/PDIF (RCA) and AES/EBU (XLR)
- L/R channel mic input attenuation selector (0dB/-30dB)
- 48V phantom power, limiter & internal speaker
- Illuminated LCD display shows clock and counter, peak level, rearing, margin display, battery status, IO number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for 2 hours, AC Adapter/charger included

#### PDR1000TC Additional Features-

- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97, 29.97DF, & 30 fps.
- External sync to video, field sync and word sync.

#### MS1000 Master Sync module

ensures drift will be no more than 1 frame in 10 hrs.

#### HM1000 Headphone Matrix

provides a rotary switch for selection of Stereo, Mono Left, Mono Sum, & M/S (mid-side) Stereo modes.

## SONY TCD-D10 PROII



A reliable, high-performance DAT recorder, the portable TCD-D10 PROII has many enhanced features for professionals including absolute time recording. Maintenance and servicing are also quick and easy due to the simple signal routing combined with separate board construction.

#### FEATURES-

- Backlit LCD Multi-Function Display
- 100X Search with up to 99 start ID
- 140X High-Speed Spooling • Limiter/Mic Attenuator
- Built-in Speaker • RF End Search • Wired Remote Control
- AC/DC Operation • Hours Meter

## SONY TCD-D8

This is the least expensive portable DAT machine available. It features 48kHz, 16-bit sampling, automatic and manual recording level, a long play mode for 4 hours of recording on a 120 minute tape, & an anti-shock mechanism. It includes a carrying case, a DT-10CLA cleaning cassette and an AC-E60HG AC adapter.



## PORTABLE HARD DISK RECORDING

### Roland VS-880 V2 Hard Disk Recorder

The VS880 V2 is a stand alone hard disk recorder designed for musicians looking for great sound in a flexible package. Record basic tracks at home, then take it to your saxophonist's place for overcubs, then off to the percussionists for that needed tambourine, then to the singers... It's powerful software and familiar tape-transport style interface allow you to get the most out of this baby's incredible creative potential, and with the optional CD Recorder and software, you don't even need to get a record deal.

#### FEATURES-

- Auto Mixing Function records and plays back realtime
- Easy recording with an inserted effect in "INPUT-TRACK" mode.
- Process the master output with a specific inserted effect such as total compression.
- Scene change by MIDI program change message.
- Simultaneous playback of 6 tracks in MASTER MODE
- Digital output with copy protection.
- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Canceller, Lr-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Canceller.



- 100 additional preset effects.
- Use MIDI program & control change messages to edit and change effects.
- Over 20 powerful features in editing/sync sections have been added. Some require the optional effects expansion board
- Upgrade existing VS-880s to V2 software via Zip disk



### Fostex DMT-8 VL Hard Disk Recorder

The latest in the Fostex HD recording family, the DMT-8 VL truly brings the familiarity of the personal multi-track to the digital domain.

#### FEATURES-

- 18 bit A/D, 24 bit D/A conversion
- Built in 6 channel mixer, Ch 1&2 feature mic & line level.
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks.
- Built-in MIDI Sync, 6 memory locations.
- Dual function Jog/Shuttle wheel provides digital "scrub" from tape or buffer without pitch change. 1/2X to 16X.
- Divide the drive into 5 separate "virtual reels", each with it's own timing information.
- NO COMPRESSION!



## MINIDISC MULTITRACKS

### TASCAM 564 Digital Portastudio

The Tascam 564 Digital Portastudio combines the flexibility and superior sound quality of digital recording with the simplicity and versatility of a portable multi-track. Using MiniDisc technology, the 564 has many powerful recording and editing features never before found in a portable 4-track machine.

#### FEATURES-

- Self-contained digital recorder/mixer.
- Uses low-cost, removable MiniDiscs.
- 2 AUX sends / 2 Stereo returns • 4 XLR mic inputs.
- Channel inserts on inputs 1 & 2.
- 5 takes per track, 20 patterns, 20 indexes per song.
- Random access and instant locate.
- Non-destructive editing features with undo capability include: bounce forward, cut, copy, move.
- Full-range EQ with mid-range sweep.
- S/PDIF digital output for archiving.
- MIDI clock and MTC



### SONY MDM-X4 MD Multi-Track Recorder

MD recorders are here! Offering up to 37 minutes of high-quality 4-track digital recording, the MDM-X4 is truly the next generation of personal multi-tracks. With a built-in mixer, exclusive Track Edit system, and a Jog/Shuttle wheel for sophisticated editing with ease, the MDM-X4 will encourage you to flex your creativity.

#### FEATURES-

- Records on high quality, removable MD data discs
- 3.5-gen. ATRAC LSI for wide dynamic range.
- 10 Input / 4Bus mixer
- 2 AUX sends, 3-band EQ, • 11-point locator
- Random access: memory for quick playback and record from anywhere on the disk.
- Editing features include Undo, Redo, & Section/Song editing for fixing material between different tracks.



## STUDIO DATS

### Panasonic SV3800 & SV4100



The SV-3800 & SV-4100 feature highly accurate and reliable transport mechanisms with search speeds of up to 400X normal. Both use 20-bit D/A converters to satisfy even the highest professional expectations. The SV-4100 adds features such as instant start program & cue assignment, enhanced system diagnostics, & multiple digital interfaces.

### Fostex D-15



The new Fostex D-15 features built in 8Mbit of RAM for instant start and scrubbing as well as a host of new features aimed at audio post production and recording studio environments. Optional expansion boards can be added to include SMPTE and RS-422 compatibility allowing the D-15 to grow as you do.

#### FEATURES-

- Hold peak readings with a choice of 5 different settings
- Set cue levels and cue times
- Supports all frame rates including 31df
- Newly designed, 4-motor transport is faster and more efficient (120 minute tape shuttles in about 60 sec.)
- Parallel interface
- Front panel trim pots in addition to the level inputs

### D-15TC & D-15TCR

The D-15TC comes with the addition of optional chase and sync capability installed. It also includes timecode reading and output. The D-15TCR comes with the further addition of an optional RS-422 port installed, adding timecode and serial control (Sony protocol except vari-speed)

### SONY PCM-R500



Incorporating Sony's legendary high-reliability 4D.D. Mechanism, the PCM-R500 sets a new standard for professional DAT recorders. The Jog/Shuttle wheel offers outstanding operational ease while extensive interface options and multiple menu modes meet a wide range of application needs.

#### FEATURES-

- Set-up menu for preference selection. Use this menu for setting ID6, level sync threshold, date & more. Also selects error indicator.
- Includes 8-pin parallel & wireless remote controls
- SBM recording for improved S/N (Sounds like 20bit)
- Independent L/R recording levels
- Equipped with auto head cleaning for improved sound quality

### TASCAM DA-20



Suited for personal project or broadcast studios, this high performance durable DAT recorder is a great value in a digital mastering deck. It features multiple sampling rates, SCMS free recording and a full function wireless remote.

(continued from p. 179)

and Digidesign SampleCell formats, and it comes with a complementary copy of the audio-CD version.

The collection includes 32 groove categories, each with a variety of remixes, subgroups, and soloed parts. In fact, most grooves include 10 to 24 different mixes, for a total of more than 500. The CD-ROM version also offers a collection of single hits.



Spectrasonics' *Liquid Grooves* offers silky, sophisticated drum grooves with extensive submixes, remixes, and solo parts.

### Liquid Loops

The grooves take full advantage of traditional and nontraditional percussion. You'll find the standard drum kit, shakers, cowbell, triangle, congas, and bongos (sometimes played with brushes), along with more exotic instruments such as slit drum, m'bira, finger cymbals, Korg Wavedrum, and a metal Rush Limbaugh Fan Club sign. Spectrasonics Creative Director Eric Persing's adept production augments this varied palette of timbres with processing tricks such as swept filters, vocoders, downsampling, and delays.

Tempi range from 53 bpm to 117 bpm; the slower grooves work very well at double the tempo. The loops run the gamut from light and airy to deep and heavy, sometimes even within the different mixes of a single groove. "Lay It Down" is a good example. The basic groove has a funky, laid-back, Afro-Cuban-tinged sound, and there are several straight-ahead submixes. All parts are available soloed, including drums, two conga parts, cowbell, shaker, and two Wavedrum patterns.

The fun really begins with the remixes. One uses a delay on the drums to add 32nd-note elements, transforming it into a jungle or drum 'n' bass pattern. Two "slo-mo" remixes use sweeping filters to give the groove a sleepy, yawning canter. Three

other remixes transpose the drum kit up an octave (so that it's twice as fast), adding delays to enhance the double-tempo effect, while leaving the other elements at the original pitch.

### Groove Elements

The emphasis in *Liquid Grooves* is on loops, but the CD-ROM has 400 drum and percussion hits, as well. The 85 Wavedrum hits are very interesting, featuring everything from straight acoustic timbres to swooping noise, resonant rubberbandy twangs, and more. Other standouts include a good selection of brush snares and the unusual and delicate brushed congas and timbales.

*Liquid Grooves* should be quite useful to anyone looking for high-quality, fully produced drum and percussion loops. At \$199, the CD-ROM represents money well spent. In my current alternative electronica project, I frequently find myself reaching for this disc, along with *Burning Grooves*; they complement each other well, and kits on both discs are mapped the same way so you can easily combine them. With fire and water covered, can *Airy Grooves* and *Earthy Grooves* be soon to follow? One can only hope.

**Overall EM Rating (1 through 5): 5**

CIRCLE #444 ON READER SERVICE CARD

### AMG

Steve White: *On the Beaten Track*

By Alex Artaud

Advanced Media Group (AMG) is a British company with an extensive catalog of groove-based sample CDs. *On the Beaten Track* (\$99.95), featuring drummer Steve White, is billed as "a selection of street beats and modern soul grooves," but I see it more as a tribute to the influential funk drummers from the late '60s and early '70s who helped define the grooves used in hip-hop and its derivatives. White acknowledges several celebrated figures, including James Brown alumni Clyde Stubblefield, Jabo Starks, and Bernard Purdie; former Meters ace Ziggy Modeliste; and top session talent James Gadson and David Garibaldi.

### On the Tracks

*On the Beaten Track* delivers 98 tracks of samples, yielding 200 breaks. White

has clearly done his homework and covers a lot of ground, from Meters-infused New Orleans stylings to lock-step drum 'n' bass. In fact, most of the disc's selections will feel quite familiar to anyone who's ever spun a radio dial.

Tempi range from the languid "Lazy 16s" at 68 bpm to the frenetic "Pushy Drums" at 166 bpm. One blessing is that effects are kept to a minimum, save for the occasional crunchy bass drum and echoing kit. Having relatively dry recordings means you're not wedded to an engineer's inspired reach for the "Gated Large Reverb" setting. All the loops are normalized.

An interesting addition at the tail end of the disc is the Weller Beats section. Apparently, Paul Weller gave his blessing for a number of Jam and Style Council beats to be covered by White. This is a bonus that will either please you or leave you scratching your head.

### Can't Be Beat

The collection doesn't include any single hits, but you won't miss them if you have a decent sample editor. The documentation lists loops by track with tempi for all the loops except those in the Weller Beats section. Start times and durations are not given, however.

White's drumming is good enough to satisfy even the purists in the audience, although not all the loops are keepers. It shouldn't keep you from hunting through vinyl—or programming your own beats and sounds—but at just under \$100, this is one of the more useful drum loop CDs you'll find out there. ☺

**Overall EM Rating (1 through 5): 4**

CIRCLE #445 ON READER SERVICE CARD



AMG's *Steve White: On the Beaten Track* is a tribute to the drummers who paved the way to hip-hop beats—and a very usable product.

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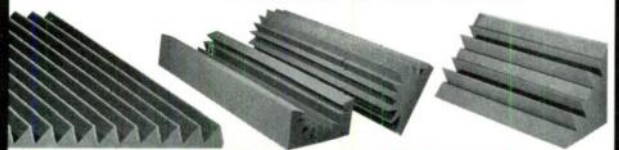
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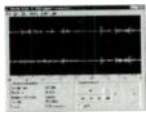
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# FINAL

# MIX

## What's in a Word?

Anybody know the difference between a product that's "100 percent beef" and one that's "all beef"? The important difference is the stuff in the latter that's not beef. FDA regulations say a product labeled "all beef" can contain a percentage of filler ingredients that are not actually beef products. This is an example of what I like to call "creative truth." False advertising is illegal, so those trying to promote their products must work creatively with the facts.

Audio and music vendors are a reasonably truthful lot, at least in comparison with some other industries. But ours is a technology-driven industry, which introduces an Achilles' heel in its veracity: the buzzword. Much of the time, buzzwords start out as legitimate terms with clear definitions, but once they start popping up in brochures and catalogs, the clarity of these words diminishes as the size of the type grows. We users quickly lose our ability to do meaningful comparisons when the same words, spoken by different people, mean different things.

Take the term "24-bit," for example. Most of us working with sound and

music today understand that two of the most important determinants of sound quality in a digital device are its sampling rate and its word length (also called "bit depth" and "bit resolution"). We are told that more is better in these areas, and there is certainly much truth in that.

Today, devices with word lengths longer than sixteen bits are becoming commonly available. Boasts of new devices with 18, 20, and 24 bits of resolution are frequently heard. What does this mean?

There are at least three areas where resolution is an important consideration: analog-to-digital and digital-to-analog conversion, internal resolution, and digital audio input/output. A single device could have different resolutions for each of these, so to start making sense out of the claim that a device is "24-bit," we first must determine to which area that refers. On the whole, word-length claims have to do with conversion—but not always.

A device with 24-bit A/D conversion needs greater than 24 bits of internal resolution to maintain a signal's mathematical accuracy (which translates to

audio fidelity) after mixing, equalizing, or other processing. Yet I've seen manufacturers claim that a product is "24-bit" when only the internal resolution is 24-bit; both the A/D and D/A converters are 20-bit (still superb audio quality).

Some "term abuse" isn't a deliberate attempt at a rip-off; it's just inaccurate. PCM encoding is the old conversion standard, still in use in many devices. But many so-called 18-, 20-, or 24-bit converters now use a technology called delta-sigma modulation, which very cleverly uses 1-bit encoding to obtain resolution that is equivalent to 18, 20, or 24 bits of PCM encoding. Your "24-bit" A/D might actually be 1-bit delta-sigma, yet it could sound even better than real 24-bit PCM.

I could go on much longer: "workstation" and "tube emulation" are commonly abused buzzwords, and don't get me started on frequency response specifications (which are more accurately called "amplitude responses"). It needs to be noted, too, that some manufacturers are sticklers for accurate use of terminology. For example, some more correctly state their converters to be "24-bit resolution."

The bottom line is that next time you're shopping for equipment or software, remember that the brochures and sales pitches are likely to mean what they say, but they don't always say what they mean. And, as the Mad Hatter admonished Alice, the two are "not the same thing a bit!"

*Larry the O is a musician, producer, and engineer whose San Francisco-based company, Toys in the Attic, provides a variety of musical and audio services. His Celtic meltdown band, Annwn, just released the CD Anarchy and Rapture.*



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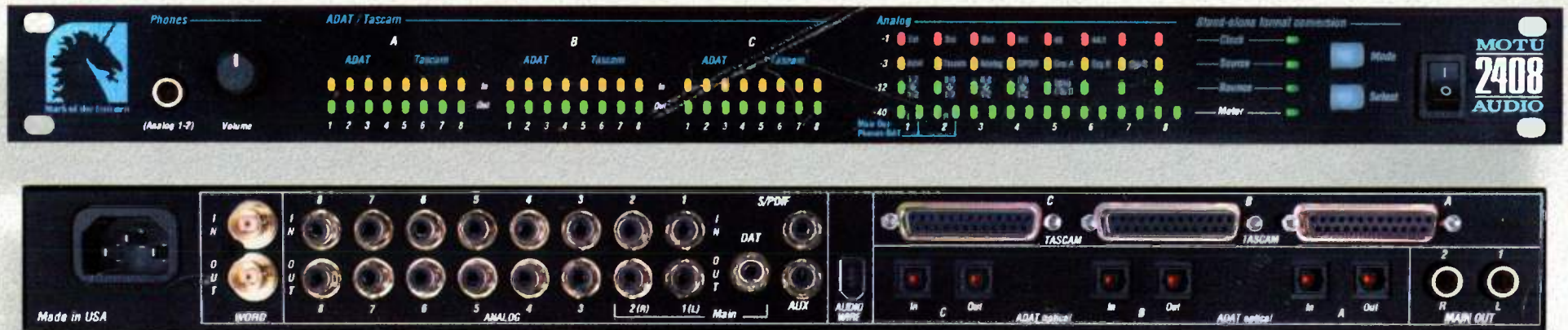
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