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Electronic Musician

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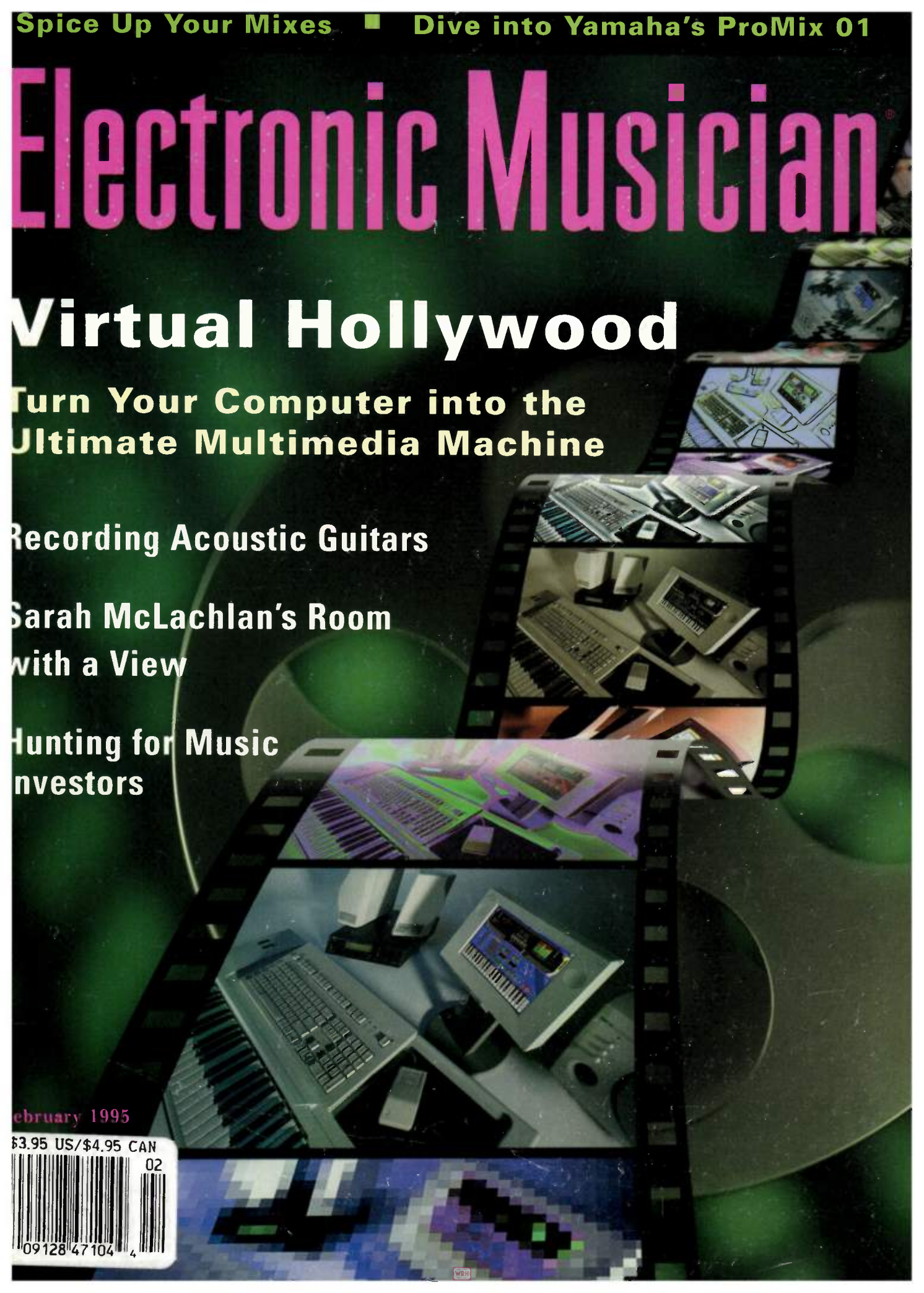
Hunting for Music Investors



ebruary 1995

$3.95 US/$4.95 CAN

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WHY MACKIE IS YOUR BEST 8-BUS

Lately, several big pro audio companies have gone out of their way to "mention" us in their own 8-bus console ads. Many satisfied Mackie owners have urged us to shoot back with hardball comparisons of our own. But that's not our style.

Greg believes that if a product is really good, it should speak for itself — without resorting to slagging the competition. First in a series, this ad details some of the features that we believe make our 8•Bus the best recording or PA console value available today for under $20,000.

Comprehensive equalization for creativity and problem-solving.

To quote Electronic Musician[1], *"It's no secret that the versatility and pristine sonics of the 8•Bus EQ have astonished jaded pros and home hobbyists alike. The 4-band EQ section includes two shelving controls fixed at 12kHz and 80Hz; parametric high-midrange EQ with a 500Hz to 18kHz sweep and a bandwidth that can be adjusted between three octaves and one semitone; and low midrange EQ with a 45Hz to 3kHz sweep. A full 15 dB of boost or cut is provided for each band. In addition, an 18 db/octave low-cut filter is set at 75 Hz. That's a heck of a lot of firepower!"*

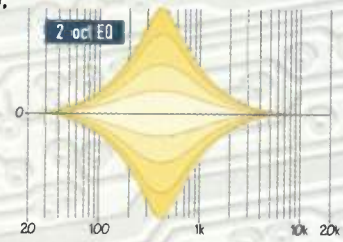
No kidding. But we also like that part about pristine sonics. One of the reasons that the 8•Bus Series took so long to ship was that Greg was determined not to compromise EQ sound quality. Cheap circuitry can create all sorts of sonic grunge that may add distinctive "character" to a console's EQ...but Greg's goal was clarity, not eccentricity.

To further quote Electronic Musician, *"In all applications, the 8•Bus EQ was extremely musical and transparent... One of the engineers summed it up best by saying, 'The 32•8 is so clean that you don't really hear the EQ; everything sounds deceptively natural, which is really great.'"*

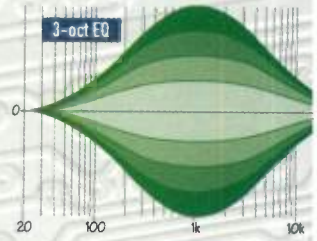
We wouldn't have it any other way.

What parametric EQ means to you.

The biggest gun in the 8•Bus' EQ arsenal is its true parametric high midrange EQ. Conventional sweepable midrange (like our 8•Bus' *low* mid), has a fixed bandwidth of about 2 octaves. No matter how high or low in frequency you sweep it (or how much you boost or cut it), 2-octave EQ's *contour* stays the same. While extremely useful, it's just one tonal "color." Having to rely on swept, 2-octave midrange alone is like being asked to paint a picture with only a bucket of bright yellow paint.

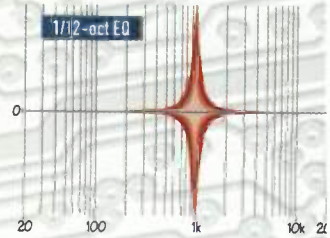


By letting you vary the bandwidth, parametric EQ gives you the equivalent of a full rainbow of tonal "colors" in your artistic pallet. Spreading high midrange EQ over three full octaves transforms it into an extremely subtle — yet extremely dramatic — effect[2]. Sweet and natural-sounding, it can unobtrusively change the character of a track without noticeable tonal intrusion. If you're used to conventional 2-octave swept midrange, you'll be surprised how much 3-octave EQ you can add without things starting to sound obnoxious.



On the other hand, there are times when you want what can only be called surgical EQ. At its narrowest, our parametric Hi Mid is four times as precise as a 1/3rd-octave graphic equalizer. It's like having a delicate artist's brush and a magnifying glass for erasing or enhancing tiny details.

Between three octaves and 1/12-octave is a vast range of tonal colorations, nearly all possible only with parametric equalization. And, since our "HI" mid's sweep range extends from 18kHz all the way down to 500Hz, your creative palate extends over six octaves – to our knowledge the widest midrange sweep currently available[3].



Above
Left to right: 32•8 console with MB•32 meter bridge, 24•E Expander with MB•E meter bridge, and The Sidecar.

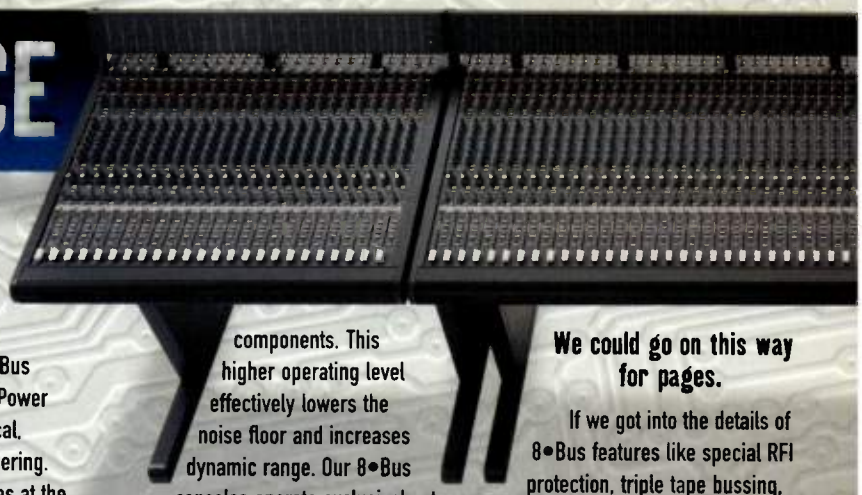
Apparently we're not alone in our belief. In competition with many of the very consoles that keep "mentioning" us in their ads, we recently won the coveted *MIX* Magazine TEC Award for Small-Format Consoles. As well as *LIVE! Sound* magazine's Best Front of House Mixer Award.

To learn why, call us toll-free for our detailed, 24-page 8•Bus brochure.

[1] September 1994 issue, page 64, in a sidebar to an article on The British Invasion (of consoles). We urge you to read the whole thing so that we don't get in trouble for quoting stuff out of context.

[2] This is what we meant when we used the phrase *"Expensive British Console Sound"* in our first 8•Bus ads: Classic English desks were the first to offer extremely wideband (i.e. greater than 2 octaves wide) equalization. Obviously we didn't make ourselves clear on this point, because everyone from our competitors to at least one reviewer has taken us to task over this phrase. Okay, we apologize to all of you Anglophiles. We were merely trying to explain why we consider wide bandwidth EQ such a powerful tool and where we got our inspiration for including it...not attempting to rekindle the Revolutionary War.

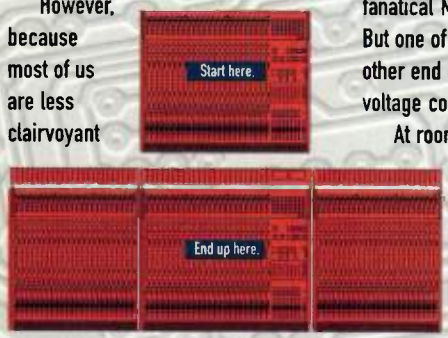
CONSOLE CHOICE



An expandable console system.

If you can successfully foretell the future, you might as well play the commodity futures market, make a zillion bucks and buy a 128-channel SSL console.

However, because most of us are less clairvoyant and a lot poorer, we've designed a system that can grow with your needs and budget. Start with our 24•8 or 32•8 console[4]. Then, when your tax refund comes back, add an optional meter bridge[5]. When you land that Really Big Project That Pays Actual Money, add more input channels (and tape returns) in groups of twenty-four with our 24•E Expander console[6].



You can keep right on growing your Mackie 8•Bus console system up to 128 channels or more.

And, beginning this spring, you can automate the whole shebang with our extremely affordable Universal MIDI Automation system. It consists of the OTTO-34 VCA gain cell unit, wicked-fast Ultramix™ Pro software and the innovative OTTOpilot™ control interface. Both the hardware and the software were debuted in final form at last Fall's AES Convention. They received rave reviews from seasoned pros who are used to working with "mega-console" automation systems.

3 ...on a comparably-priced 8-bus console. Oops! We're starting to sound competitive.

4 $3,995 (24•8) and $4,995 (32•8) suggested retail. Slightly higher in Canada.

5 $795 (MB•24) and $895 (MB•32) suggested retail. Slightly higher in Canada.

6 $2,995 suggested retail; MB•E meter bridge $695...Yadda yadda, Canada, etc. etc.

Very Low Impedance Circuitry (VLZ) for very low noise.

We like to say that the 8•Bus console's monster 220-Watt Power Supply was a product of typical, fanatical Mackie over-engineering. But one of our real motives lies at the other end of the power supply's multi-voltage connecting cable.

At room temperature, all electronic components create thermal noise. Cumulatively, this can become audible and objectionable. We design around thermal noise by making internal circuit impedances as low as possible in as many places as possible. For example, resistor values in our mix bus are 1/4 the value of those typically used — hence thermal noise is proportionally lower. Another advantage of VLZ is that low-impedance circuitry is far more immune to crosstalk problems.

VLZ

VLZ isn't easy to achieve. All circuitry must be thoroughly buffered. Plus, console current consumption goes way up, requiring a beefy power supply. Such as the massive, 31-pound, power supply we ship with each 8•Bus console.

Powersupplyus Humungacidus

+4dBu operation throughout.

This is a biggie in terms of overall noise and headroom. There are two current standards for console operating levels: –10dBV and +4dBu. Without knocking our competition, let's just say that +4dBu is the professional standard, used with all serious recording, sound reinforcement and video production components. This higher operating level effectively lowers the noise floor and increases dynamic range. Our 8•Bus consoles operate exclusively at +4dBu (although their tape outputs and returns can be switched to –10dBV to match other semi-pro/hobbyist gear you may still own).

Built like tanks.

Our 8•Bus Series consoles have been in the field long enough to gain an almost legendary reputation for durability. For example, a lot of them absorbed the impact of toppling monitor speakers during last year's Los Angeles earthquake with little more than a few broken knobs. Others have survived drops off loading docks, power surges that wiped out whole racks of outboard gear and beer baths, not to mention hundreds of thousands of air and semi trailer miles with major tours[7]. Read our 8•Bus tabloid/brochure to learn about the impact-absorbing knob/stand-off design, fiberglass circuit boards and steel monocoque chassis that make our consoles so rugged.

Bottom line: You simply can't buy a more dependable console. Maybe that's why *LIVE! Sound* magazine readers voted us their 1994 "Best Front of House Console."

7 Including the latest Rolling Stones, ZZ Top, and Moody Blues tours. (Footnote to the footnote: Mention in this ad denotes usage only, not official endorsement).

We could go on this way for pages.

If we got into the details of 8•Bus features like special RFI protection, triple tape bussing, in-place stereo solo, constant power pan pots, or the extra 15dB of gain available at the 8•Bus's aux sends and returns, this ad would have even teenier type than it already has.

For these and other facts, call us toll-free (8:30AM-5PM PT) and ask a real live person for our obsessively-detailed, 24-page 8•Bus brochure.

OUR 8•BUS CONSOLES REALLY WORK, THE UPDATE:

Ricky Peterson mixed ☮'s recent hit single, *"The Most Beautiful Girl in the World"* entirely on his Paisley Park Studio 32•8 console.

Queensryche's new platinum album, *Promised Land*, was totally tracked on Mackie 8•Bus consoles (with help from OTTO-automated CR-1604s). A sonic (and musical) masterpiece, it has the tight bass, crisp highs and ear-boxing dynamic range that's becoming an 8•Bus console signature. Need more proof as to why pros prefer Mackie? Buy this superb CD.

MACKIE.

16620 Wood-Red Road • Woodinville • WA • 98072 800/898-3211 206/487-4337

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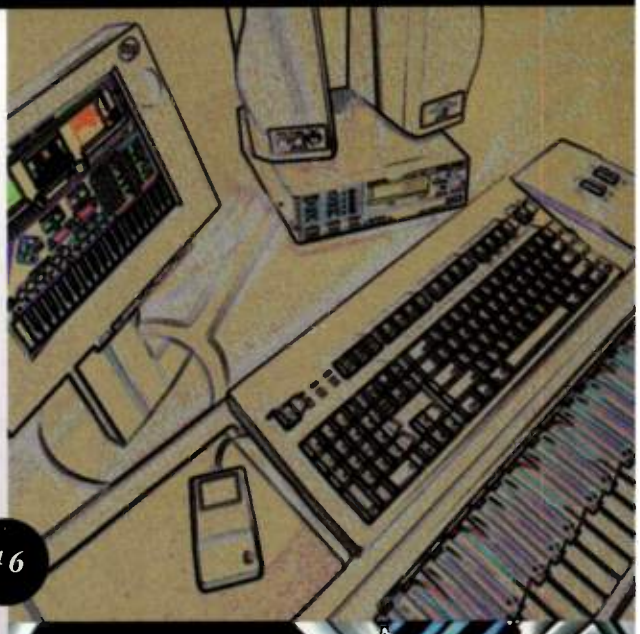
INSIDE

FEATURES



DEPARTMENTS

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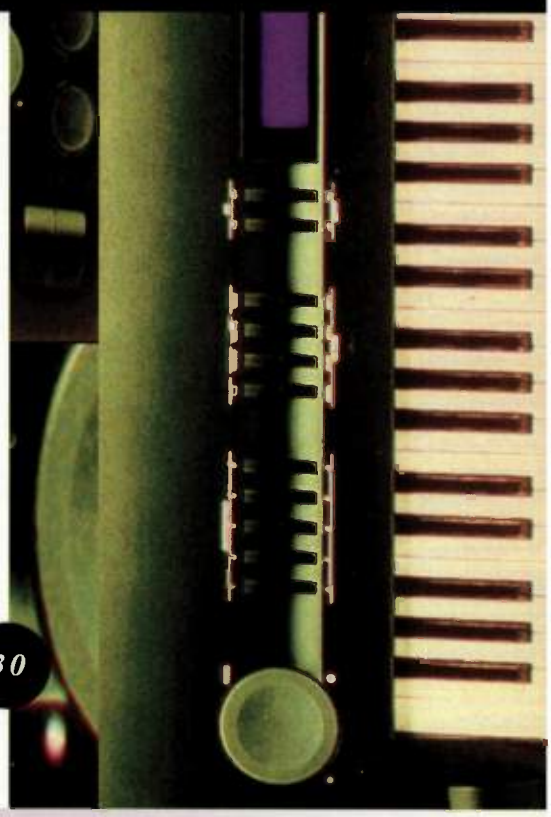
Electronic Musician®

FEBRUARY 1995 VOL. 11, NO. 2

COLUMNS



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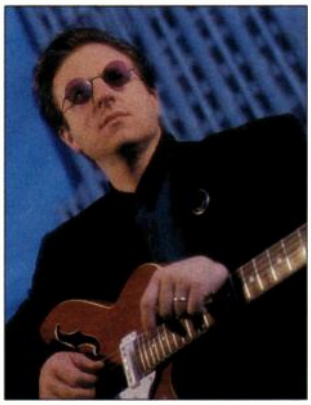
REVIEWS

Cover: Photography and Digital Imaging by Paul Morrell.

Special thanks to Fatar, IBM, Roland, and Yamaha.

Surviving Empowerment

Don't become a casualty of the personal-recording rebellion.



ROBERT PERRY

My friend Glenn McNulty is dazed and confused. He followed all the rules, and he didn't get the big payoff. He bought a modular digital multitrack, a full-featured mixing console, some decent microphones, and a bunch of popular sound modules and signal processors. All this stuff was supposed to make it possible to produce exquisite masters at home, but something went wrong. His tracks didn't resonate with the glorious sound promised by personal studio zealots such as myself. He felt cheated. So, of course, he called me to bust my chops.

Our conversation—and Glenn's disenchantment with the miracle of affordable, high-quality recording gear—triggered some thoughts that I'd like to share. (Yes, this is one of my little rants, so feel free to stop now and flip to "What's New" if you can't stomach my preachy side.)

I freely admit to being a card-carrying, home-recording revolutionary, even though I am one of the "landed gentry" who owns a commercial studio. I can reconcile this apparent duality, because I believe that artists *must* control their creative destinies. Musicians who know exactly what they wish to communicate should not suffer the impediment of translating their ideas through a second party (an engineer) in an alien environment (the studio). Today, music equipment manufacturers empower thousands of home recordists with the means to forge a direct, tactile bond between themselves, their tools, and their work. But, here's the catch: Empowerment struts hand-in-hand with increased responsibility.

Access to high-quality recording equipment is merely Phase One of the personal-studio revolution. To fully realize the movement's potential, recordists must master their tools. Modular digital multitracks aren't magic boxes that transform sound waves into hit songs, they simply reproduce—with astounding clarity—whatever you put into them. If you want to produce amazing tracks, you've got to work it, comrade! I infected thousands of miles of tape with truly atrocious audio before my productions could be favorably compared with commercial releases. I also read everything I could about engineering and record production, studied my favorite albums until I was intimate with every single timbre and effect, and (politely) tortured studio veterans until they revealed their trade secrets. If you want to unlock the power of your home studio, you'll do everything I did and more.

Glenn finally put his shoulder to the wheel and is now a true star of the revolution. He recently completed an advertising jingle for Oysterbed, a Bay Area furniture store that he owns and operates. The tune was recorded and mixed in his home studio, and it sounds absolutely smashing on the telly. The production quality is clean, clear, and packs a wallop that screams, "Hey, listen to me!" A self-produced instrumental album is being recorded as we speak, and he's also thinking about starting a record company to promote and distribute the fruits of his labors.

You see, brothers and sisters, all it takes is a spark of talent and a firestorm of perseverance. So don't feel bad if your first attempts at audio production are, um, abysmal. Just shrug off the disappointment and stick with it. You *will* get better!

Michael Molenda

Electronic Musician

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National Editorial, Advertising, and Business Offices
6400 Hollis Street #12, Emeryville, CA 94608
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BPA INTERNATIONAL

DM-800 Digital Audio Workstation

The Power Studio From Roland

The new DM-800 provides power, speed, portability and reliability like no other system available.

Power Eight discrete tracks with 100 layers per track. 12 channel automated mixing and EQ. Time compression and pitch correction. Nondestructive, full featured editing. Sub-frame accurate SMPTE sync. Optional ADAT, DA-88 or RS-422 interface.

Speed The DM-800 is easy, fast and quick to learn, using powerful hardware controls with tape recorder style punch in and out. No computer required.

MIDI Support The DM-800 supports MMC, MTC and dynamic functions like tempo mapping, bar and beat editing, control of external sequencers and trigger mode for instant phrase playback.

Portability All the features and functions you need are contained in a single 12 pound unit. You can literally grab it and take it with you. Uses internal and external SCSI drives. View any level of information on the built-in LCD or plug the DM-800 directly into your video monitor.

Reliability The DM-800 is a completely dedicated piece of hardware with Roland's renowned reliability.

Price Incredible Power. Incredible Price. $5995.

Call today for your free brochure and video.

Roland®

See us at NAMM in the Anaheim Room

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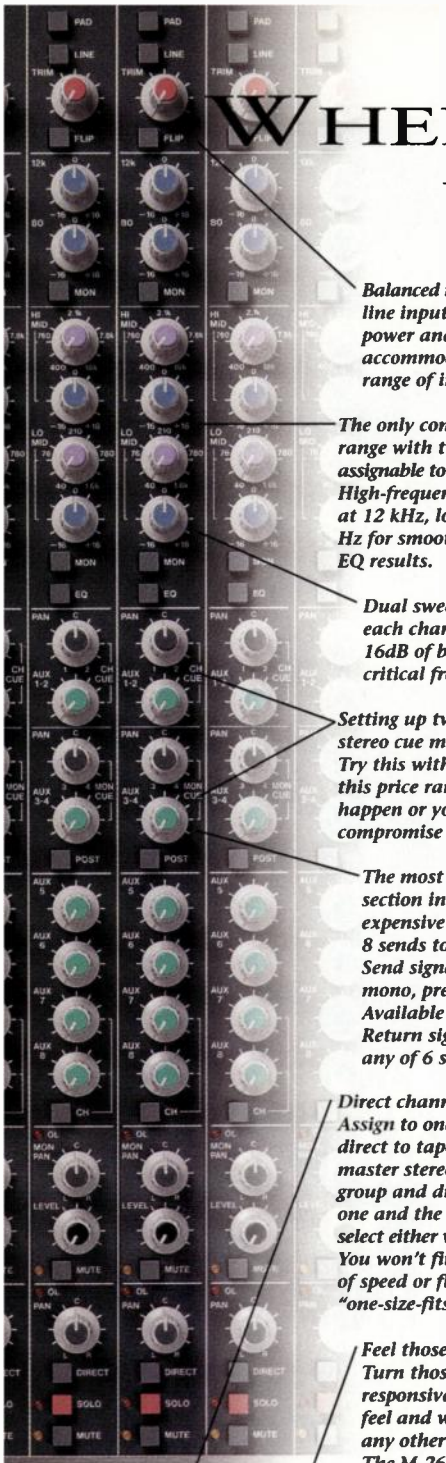
WHEN IT COMES TO RECOR
WILL PUT YOU IN A CO



Balanced mic and unbalanced line inputs with phantom power and 20dB pad accommodate the widest range of input signals.

The only console in this price range with true Split EQ, each assignable to monitor or channel. High-frequency shelving control at 12 kHz, low frequency at 80 Hz for smoother, more musical EQ results.

Dual sweepable mids on each channel let you apply 16dB of boost or cut at critical frequencies.

Setting up two independent stereo cue mixes is no problem. Try this with other mixers in this price range, it just won't happen or you'll have to compromise something.

The most versatile AUX section in its class; rivaling expensive high-end consoles. 8 sends total, 2 in stereo. Send signal in stereo or mono, pre- or post-fader. Available all at once. Return signal through any of 6 stereo paths.

Direct channel input switching. Assign to one of eight busses, or direct to tape or disk, or to the master stereo bus. Because the group and direct-out jacks are one and the same, you can select either without repatching. You won't find this kind of speed or flexibility in a "one-size-fits-all" board.

Feel those 100mm faders! Turn those smooth and responsive knobs! They feel and work better than any other in its class. The M-2600's physical design takes the aggravation out of recording and lets you focus on the process of creating music. Everything is 'right where it ought to be'. Try it for yourself.

Each M-2600 channel features advanced-design mic pre-amps with incredibly low-distortion specs. Plus you get phantom power on each channel. Feed anything into the M-2600 from condenser microphones to line input from synths and sound modules.

For your personal or project studio, don't settle for anything less than a dedicated recording console. Some may try to convince you that a "multi-purpose mixer" works fine for multitrack recording. But don't take their word for it. The compromises, hassles and workarounds just aren't worth it.

Want proof? Ask your salesman how a multipurpose mixer handles these common recording situations. But listen carefully for workarounds, repatching schemes and other compromises. Then compare it to how easily the M-2600, a *true* recording console, sets up and does things.

SITUATION Separate headphone mixes for the talent and the producer. The talent wants a reverb-wet mix, but the producer wants it dry. Everyone wants it in stereo.

Compromise: Multi-purpose mixers require you to sacrifice 4 AUX sends and tape returns to get 2 stereo headphone mixes; but you need those sends/returns for outboard effects! What a dilemma.

M-2600 Solution: With a few buttons, assign up to two, independent stereo AUXs to be used as headphone mixes. Everyone hears the mix they want — and you've still got four AUX sends and returns free for signal processing gear.

SITUATION You're EQing tape tracks to get just the right sound. You're using the shelving EQ for the monitor mix, and the sweepable mids for the channel buss. Still, the drummer wants a certain frequency out of his mix — a job for the sweepable mids.

Available with 16, 24 or 32 inputs, the M-2600 is optimized for digital recording. Don't wait till your first session to discover the compromises and hassles other boards will put you through.

Compromise: Few multi-purpose mixers have EQ assignment. You're stuck with the shelving EQ on the monitor mix, and the sweepable mids on the channels *(if they even have split EQ)*. You've got no choice. Good luck trying to explain this to the drummer.

M-2600 Solution: Assign the shelving EQ, the sweepable EQ, or both to either the monitor or channel buss as necessary. The entire EQ section is splittable and assignable and can work in tandem.

SITUATION Mixdown. You're sending tracks to effects units for added studio polish. You want to take advantage of true stereo effects. How do you do it?

Compromise: Most multi-purpose mixers have fewer AUX sends than the M-2600's eight. Usually only in mono. And, some sends are linked, so you can't send them to different signal paths. So you settle for only a few effects, or forego stereo effects altogether.

M-2600 Solution: Pick one: 8 mono sends or 1 stereo and 6 mono sends or 2 stereo and 4 mono sends. Each with its own level control and separate output jack. So you can use true stereo effects and still have sends left over for effects. Send the effects signals back via 6 stereo returns.

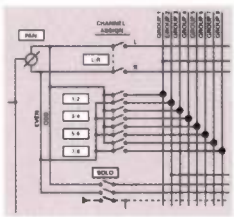
That's not all! The M-2600 doesn't compromise sound, either. You'll appreciate the new TASCAM sound — low-noise circuitry and Absolute Sound Transparency™. It all adds up to the perfect console for any personal or project studio — combining great sound with recording-specific features you'll need when recording, overdubbing and mixing down. Features you can get your hands on for as little as $2,999 *(suggested retail price for the 16-input model)*.

So forget compromises. Invest in a true recording console. The TASCAM M-2600.

DING, MOST OTHER CONSOLES MPROMISING SITUATION.

Only the M-2600 provides two independent stereo cue systems. Demanding performers can hear the submix or scratch tracks the way they want, so they'll perform better. Meanwhile, the control room or producer's mix is unaffected. You can accommodate everyone involved in the production — without interrupting the creative flow. Best of all, using the cue mixes doesn't involve tying up your valuable AUX sends.

Use more effects/signal processing gear on more tracks with the M-2600. Use two (count 'em) true stereo send/returns to support stereo effects units. Plus, you still have 4 fully-assignable AUX sends left over for other gear. A total of 8 AUX sends — more than nearly any other console — anywhere. Better yet, you can use them all at once. No compromises. At mixdown, you can actually double your inputs so you can mix in all those virtual tracks. Just press the "Flip" switch. No repatching. No need to buy expensive and space-eating expansion modules.*



The incredibly flexible design of the M-2600 means signal routing is versatile and accomplished by the touch of a button, instead of a tangle of wire. Our decades of mixer experience has resulted in an ergonomic design that's exactly what you need: a board that speeds and facilitates recording and mixdown. Everything is where you intuitively think it should be. Dedicated solo and mute indicator lights on every channel, on master AUX sends, stereo returns, and each of the 8 busses so you always know exactly what you're monitoring. Plus, SmartSwitches™ protect you against redundant or canceling operations.

ABSOLUTE SOUND TRANSPARENCY AST

TASCAM M-2600: THE CONSOLE DESIGNED SPECIFICALLY FOR RECORDING.

Of course, the M-2600 sounds great. It's got totally redesigned low-noise circuitry, Absolute Sound Transparency™ and tremendous headroom. No coloration and virtually no noise. You will hear the difference. So, even during long mixdown marathons, you'll hear an accurate representation of what's been recorded.

TASCAM®

Take advantage of our experience.

7733 Telegraph Road, Montebello, CA 90640 (213) 726-0303

TO GOOD EFFECT

What an outstanding article ("The Gender Gap," December 1994)! Michael Molenda's usual trenchant commentary established an ideal platform for the observations of the five women producers—each of whom one could imagine listening to for hours to good effect. Patrice Rushen's comments about double standards ("Just get over it and be better.") were particularly invigorating in a an era of so much whining and demanding. Her thoughts exemplify what is, of course, the ultimate antidote to discrimination, whatever its form. It's hard to waste time on superficial differences when you're busy being engaged by the strength of someone else's ideas.

David Flitner
Methuen, MA

Thank you so much for your article on women producers and engineers. It was an especially pleasant change of pace to read about women who are not pop stars or don't have readily recognizable faces, but who excel at the craft of music production. After ten years of classical training on flute—as well as writing, arranging, and producing my own electronic music—I think that if I had read about other women involved in music production when I was in high school, I wouldn't have taken the long way around to find this exciting, ever-changing medium.

Some women may balk at the notion of using their femininity to promote what they're doing creatively, and I have been torn on the subject myself. It's so tempting to play up the fact that I'm a woman who writes *and* produces dark, aggressive electronic music with distorted vocals. Unfortunately, some people seem to think that if you are a woman, your music is strictly "women's music," and therefore it is something men can't or shouldn't enjoy. Of course, the female perspective is different from the male, just like the black perspective is different from the white, the Christian from the atheist, and so forth. But that's exactly why we should listen to the music of those from other genders, races, creeds, and mindsets. It may be the most honest insight we have into experiences that are not our own.

Joann Evan
Pittsburgh, PA

WORST JELLŸ BAND

I sure had a good laugh reading your article on Green Jellÿ in December's Multimedia Musician. It shows that the world of music, and entertainment in general, is heading in a direction where it is less important how accomplished an artist is. What really counts is one's ability to shock people or give them something new that attracts attention.

This is why "the world's worst band" is successful. But what does being a musician mean anymore, when even the artist admits that he or she is trying to be awful? The results should not be worth much, but it seems that they are.

Alex Sanielevici
University of Montreal
Quebec, Canada
sanielea@ere.umontreal.ca

BUILD YOUR OWN

In your November 1994 "Letters" section, you asked readers for ideas on future DIY articles. How about a MIDI theremin, or rather, a theremin that outputs the voltages(s) as (assignable) continuous controller(s) data?

John Szinger
szingerj@vim7.viacom.com

John—Guess what? We've already contracted with electronic music legend Bob Moog to work up a DIY project for a theremin. Being a theremin enthusiast myself, I'm looking forward to this feature. Unfortunately, we can't schedule the article yet, as Moog has been moving his office and needs some more development time. But I promise that readers will see this project very soon. A MIDI retrofit is available for Moog's theremin, and we'll publish a follow-up project to tell you how it's done.—Michael M.

MISSING THE 'NET

In "Unearthing Antiquities" (November 1994), the sidebar "Searching For Buried Treasure" mentions that "if you have access to the Internet, check out the newsgroup called rec.music.marketplace." I have two points of contention. One, newsgroups are part of USENET News. The Internet is a network and one of the channels by which USENET is propagated. Two, the proper group for posting musical equipment for sale, wanted, or trade is rec.music.makers.marketplace. The rec.music.marketplace is the newsgroup for LPs, CDs, and tapes to be bought and sold.

Christopher L. Goosman
University of Michigan
Computing Club
Ann Arbor, MI
goose@umcc.umich.edu

Christopher—We stand corrected on both counts, and I thank you for helping us gain a better understanding of the Internet.—Michael B.

GO FOR THE GOLD

I just finished reading the November 1994 review of the A.R.T. CS2 and Phonic PCL-3200 compressors, and I thought it was very informative. I have been putting off buying a dbx 166A, but would I get the same (or extremely similar) performance out of one of the reviewed units for a much lower price? The reviewer mentioned that the compressors are good enough to be used in a professional

BUD PEEN

If our new synthesizer didn't sound so good we'd sell it as a mixer.

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The W5/W7 starts you off with superior sound. Proprietary Yamaha technology produces exceptionally clean and realistic voices. 384 of them, to be precise. That includes 8 MB of pre-set, internal and General MIDI voices designed specifically for professional use. And for the first time, the W5/W7 lets you work with all of these voices simultaneously.

The same 32-note polyphony, 16-part multi-timbre synthesizer is available as the 76-key W5 ($2,495 MSRP) and the 61-key W7 ($1,995 MSRP).

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Working on the W5/W7 is like working in a fully-equipped professional studio. Yamaha has loaded this synth with six premium quality effects processors and a powerful, full-function mixer. Here's what they do…

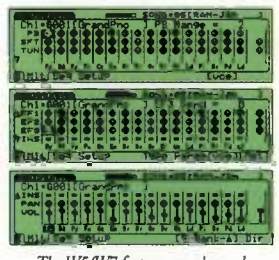
Use the mixer to balance and pan all 16 tracks and put your own personal spin on the voices. You get three independent, fully programmable system effects, each with their own send per track. In addition, the W5/W7 mixer gives you three insertion effects. So, for instance, you get your distortion and wah-rich guitar sound, your rotary speaker organ sound and your carefully EQ-ed drum sound. No more compromises. And no more wimpy voices in your final mix.

In short, the W5/W7 lets you make the music you can't quite get with any other synthesizer.

The W5/W7 16-track, 16-song sequencer is just as powerful as the mixer. A 416 KB sequencer memory stores over 100,000 notes with all the control—pitch bend, modulation, etc.—to make them work. At any point during sequence playback you can drop into voice edit mode and make and store changes without missing a beat.

Additional sequencer functions including full event editing, instant auto-locate points, track solo and mute, and automated punch-in/punch-out recording make this synthesizer as versatile as a recording studio.

The icing on the cake is the new W5/W7 Song Voice function. If you've ever created a sequence and replayed it with the wrong voices, you'll appreciate this. Song Voice bundles voices with their sequence. So you always get the sound you want and never get surprised.



The W5/W7 features an advanced digital mixer and 6 simultaneous digital effects processors.

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If the W5/W7 sounds incredibly powerful and exciting, it is. And surprisingly enough, the operating system actually makes it easy to access the power.

The beauty of the new OS is that it's skin deep. You are almost always within two key presses of any feature or voice. That means that voices are easier to find than ever before. And effects are easier to apply. At last, a synthesizer that helps you make music instead of getting in the way of it.

The W5/W7 is expandable. "Concert Grand", "Vintage Sounds" and "Rhythm Section" wave cards each add 4 MB of exceptional voices.

Programming is just as easy. 171 ready-to-use, intuitive templates help you apply amplitude envelopes, filters, pitch envelopes and LFOs. Programming has never been easier or quicker.

Of course, you can still program it all by yourself if you want to. And you can even take control of the voices to extremes with W5/W7 Editor/Librarian software for Macintosh and Windows.

So there it is. The W5/W7 synthesizer from Yamaha. It's exceptional sound and control give you the power to make the music you've always wanted.

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WRH

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studio, but I can't help wondering what's missing to make them so inexpensive. If I go out and spend $250, am I going to end up wishing I'd forked over the extra $200 for a better unit? I guess what I'd like (in all your reviews) is some indication that the equipment being reviewed is just good for its price, or if it's really as good as the higher-priced units.

Jacob Allen
University of California, San Diego
in%"allanj@sdsc.edu

Jacob—We really sweat to ensure that our reviews are evaluative and comprehensive, but it's difficult comparing apples to oranges. High-priced units hopefully justify their expense by providing better quality sonics, features, and construction, among other things. Our "Value" meter gives readers an indication of how the reviewer rates a product's price vs performance ratio. Look for this meter to see whether we believe the product is "good for it's price" or exceeds expectations. It's a tough call, however, to praise an affordable product as being "as good as higher-priced units" without pitting the products against each other in one of our face-offs. But, heck, it might be fun for a group of affordable products to challenge higher-priced competitors for a "quality crown." Hmmm.

Regarding your specific question, I personally found both the CS2 and the PCL-3200 to be very good units and certainly capable of working pro-level sessions. They do the job, have all the necessary features, and deliver spotless audio quality. Would I choose them over a 166A for critical tracks such as lead vocals, guitars, or bass? No—but I'm an admitted dbx devotee. (Some engineers are put off by the aggressive nature of the 166's compression, but the unit's "in your face" quality is the main reason I dig it.) Unfortunately, neither I, nor our marvelous reviewers, can put you at ease about getting your money's worth from gear purchases. I strongly recommend trying all three units at a local music store and seeing which one you like the best. Let your ears drive your pocketbook.—Michael M.

HOW TO

I have a question regarding MIDI striping to tape. I have *Cakewalk Pro for Windows*, version 2, a Tascam Porta 05, and I just purchased the MIDIman Syncman. My problem is this, I can't seem to set up properly to write and read to/from Smart Song Pointer. Any tips? I apparently can't use SMPTE/MTC with the Porta 05, because it doesn't defeat the noise reduction on individual tracks, so I'm left with FSK (frequency shift keying). Is that the same as Smart Song Pointer?

Ed Forrest
forrestIII@pan.com

Ed—Let's begin by clearing up the confusion between different types of sync signals. First, there are the signals you record on one track of the tape. These include simple FSK, Smart FSK, and SMPTE. The last two represent elapsed time, while simple FSK only indicates tempo, not elapsed time. Then there are the different MIDI messages that synchronize MIDI devices, such as sequencers and drum machines. These messages include MIDI Clock and MIDI Time Code (MTC). Like SMPTE, MTC indicates the passage of time in hours, minutes, seconds, etc. MIDI Clock only represents tempo with 24 Clock messages per quarter note; it conveys no information about elapsed time. Song Position Pointer is not a continuous sync message per se.

Instead, it tells the slave device (e.g., sequencer) where to start if it's been stopped in the middle of a song and it subsequently receives a MIDI Continue command. Once the device gets under way, it uses MIDI Clocks to stay in sync.

In your system, the Syncman can write and read SMPTE or Smart FSK to and from tape. If you select SMPTE, the Syncman converts it to MTC for the sequencer; if you select Smart FSK, it uses MIDI Clock and Song Position Pointer. Tascam recommends striping a blank tape with SMPTE on track 4 of the Porta 05 with the dbx noise reduction turned off. Then turn dbx on to record parts. This procedure should not adversely affect the SMPTE time code.

However, in order to avoid excessive crosstalk, be sure to record SMPTE at the lowest level that still provides a reliable signal; conventional wisdom suggests a level of -3 dB. After striping the tape with SMPTE, connect the output from track 4 to the Syncman, and connect the MIDI Out from the Syncman to the MIDI In on the computer. Cakewalk Pro for Windows *should be able to read MTC from the Syncman without difficulty.—Scott W.*

HOME ALONE

I am an up-and-coming home-studio owner, and out of all the stuff I've read, *Electronic Musician* is by far the greatest thing to happen to electronic musicians since MIDI. My studio hardware consists of a Roland U-20 keyboard, a Roland R8 MKII, and a Performa 600CD, along with all the MIDI extras. Unfortunately, I've found it difficult to integrate all my hardware properly without pulling out my hair—which brings me to a request. Is there any publication that **EM** puts out that covers the ins and outs of building a home studio? With my schedule, I only have time to teach myself, so even a beginner's guide would be a great help.

Conrad Lissade
Carle Place, NY

*Conrad—***EM** *has not published anything dedicated to "Building an Electronic Studio from A to Z." However, there are sections in our* Making Music with your Computer *and* Making the Ultimate Demo *books that discuss MIDI setups, sequencing, synchronization, mixers, and so on. Both books are available from our very own* Mix Bookshelf *(tel. [800] 233-9604 or [510] 653-3307). While you're on the line with them, ask if they have any outside publications that offer tips for building home studios. The Bookshelf crew is an amazing source of information—and they're really nice people, too—so call them if you have any questions regarding music publications.—Michael M.*

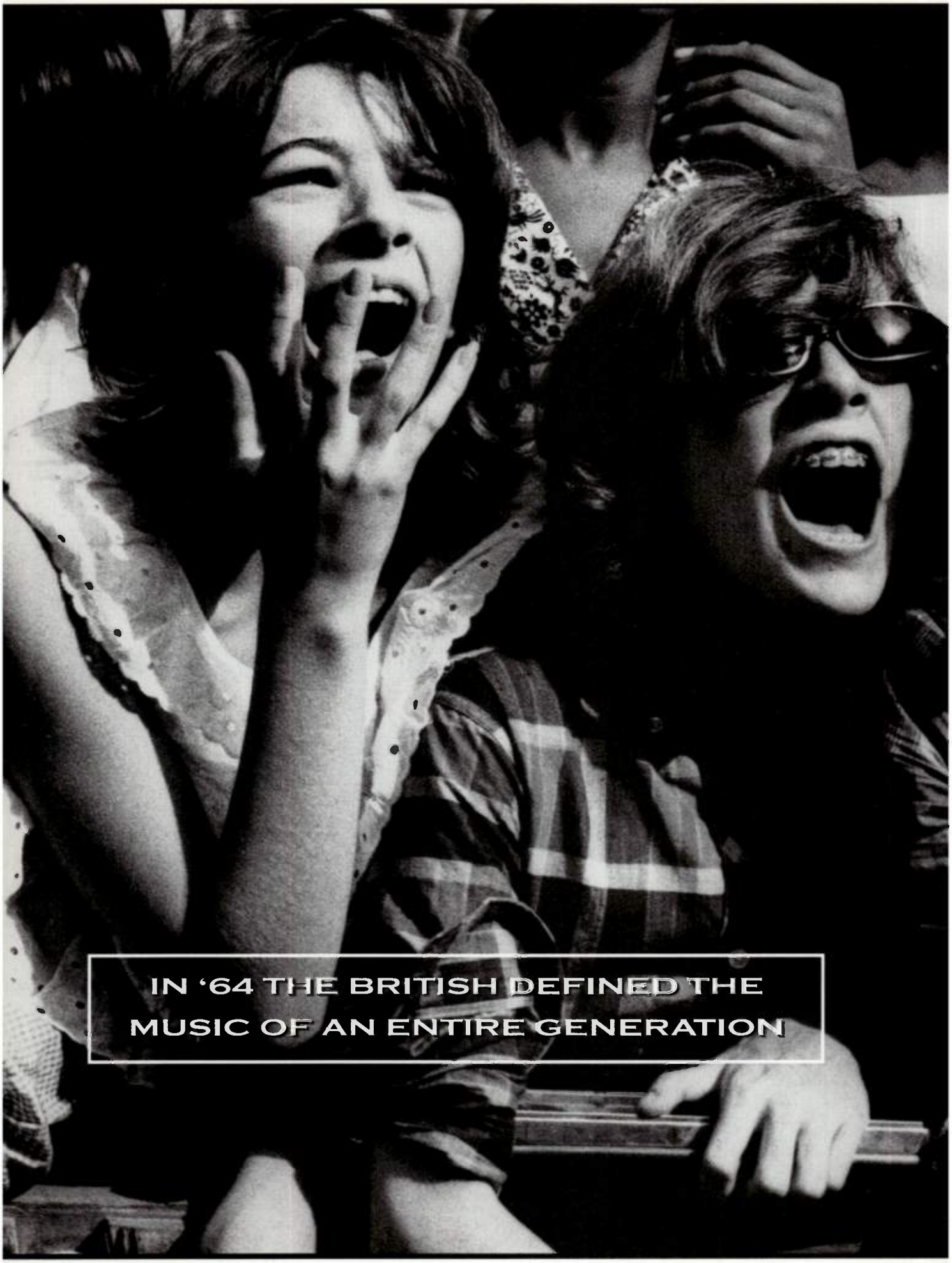
KUDOS

Congratulations to **EM** for an excellent product. I have been an advertiser in the past and have watched the magazine evolve. As a Christian songwriter, I enjoy most of your magazine. Keep up the good work!

Charlie Solak
solak@attpls.net

WE WELCOME YOUR FEEDBACK.

Address correspondence to "Letters," Electronic Musician, 6400 Hollis St. #12, Emeryville, CA 94608 or e-mail at emeditorial@pan.com. Published letters may be edited for space and clarity.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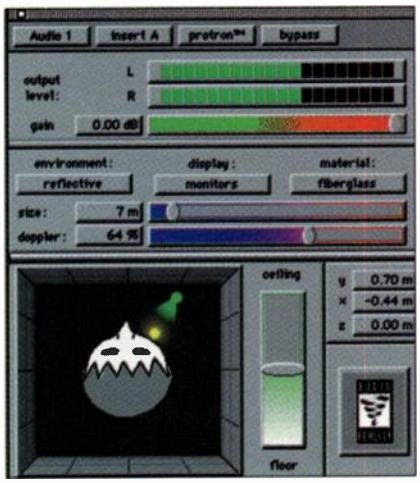
WHAT'S NEW

By Steve Oppenheimer



CRYSTAL RIVER PROTRON

Crystal River Engineering is shipping its *ProTron* plug-in for TDM, which incorporates the company's Audio-Reality real-time, interactive, 3-D audio spatialization technology. *ProTron* ($995) offers a graphical interface that uses buttons and sliders to select elevation, azimuth, and distance.

In addition, the user can choose custom materials for the ceiling, floor, and walls and select a rendering level for the direct path and first-order and second-order reflections.

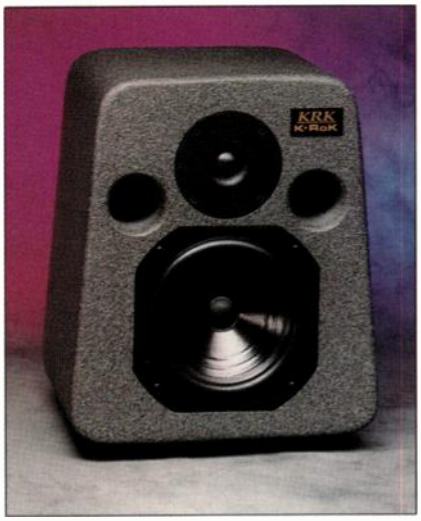
Finally, *ProTron* provides an adjustable Doppler shift, and all parameters are continuously adjustable. Crystal River Engineering; tel. (415) 323-8155; fax (415) 323-8157.

Circle #401 on Reader Service Card

KRK K•ROK

KRK's K•RoK close-field monitors ($449/pr.) feature a proprietary, 7-inch, latex-coated, long-stroke woofer and a 1-inch, silk-dome tweeter, crossed over at 2.5 kHz. The custom, passive crossover network features hand-wound inductors and polypropylene capacitors. The unique enclosure shape minimizes parallel surfaces and is designed to optimize linearity and deliver maximum low-end punch.

The K•RoK can handle up to 100W (peak) into 8Ω and produces up to 106 dB SPL. The K•RoK has a sensitivity of 92 dB (1W @ 1m). Frequency response is rated at 57 Hz to 19 kHz (±3 dB). The cabinet measures 14 × 12 × 9.75 inches and weighs eighteen pounds. Speaker connections are via 5-way binding posts.



KRK Monitoring Systems; tel. (714) 841-1600; fax (714) 375-6496.

Circle #402 on Reader Service Card

DIGIDESIGN PRO TOOLS III

Digidesign has unveiled the Pro Tools III digital audio-recording system for the Macintosh. The Pro Tools III Core System ($6,995) includes one Disk I/O NuBus card, which connects to an 8-channel audio I/O interface and provides SCSI support for up to sixteen independent record and playback tracks on one or more hard disks.

The user can select between two audio interfaces. Digidesign's 882 I/O ($995) offers eight balanced, ¼-inch inputs and outputs and one stereo S/PDIF I/O. The 888 I/O ($2,995) has eight balanced, analog XLR inputs and outputs and four stereo AES/EBU digital inputs and outputs.

The company's TDM high-speed digital bus and virtual digital mixing environment is included, along with one DSP Farm NuBus card. Also included is the DAE audio operating system, a new version (3.0) of the *Pro Tools* software, and three plug-ins: an EQ, dynamics processor, and modulation delay.

Pro Tools III can be expanded to 48 disk-based audio tracks and up to 64 analog or digital I/O channels. Each Pro Tools Expansion Kit ($4,995) includes one Disk I/O card and one DSP Farm. Eight channels of I/O can be added, with a Bridge I/O Card ($1,395) and either I/O.

In related news, several manufacturers have announced new Pro Tools III/TDM-compatible products and software upgrades. These include Apogee Electronics *MasterTools;* Arboretum Systems *Hyperprism TDM;* Crystal River Engineering *ProTron;* Jupiter Systems *MDT* 2.0 (multiband dynamics processing) and *JVP* 1.1t; Lexicon *NuVerb* 1.5; QSound Labs *QSystem/TDM;* and Waves *C1-TDM, Q10-TDM,* and *L1-TDM Ultramaximizer.*

TDM-compatible digital audio sequencers now include EMAGIC *Logic Audio* 2.0, Opcode *Studio Vision Pro,* and Steinberg *Cubase Audio* 2.5. Mark of the Unicorn will also support TDM in an upcoming version of *Digital Performer.*

Finally, Digidesign has announced a price reduction for the earlier Pro Tools 4-channel system, now dubbed the Pro Tools 442 Core System ($4,995). The Digidesign Audio Interface, which is included in the 442 Core System, has been renamed the 442 I/O. It is compatible with the new Pro Tools III system. Digidesign; tel. (415) 688-0600; fax (415) 327-0777.

Circle #403 on Reader Service Card

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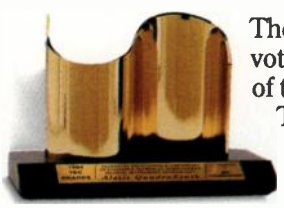

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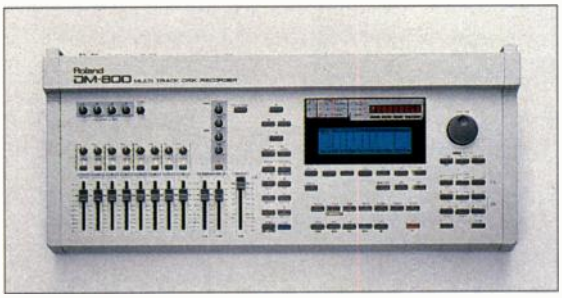
ALESIS STUDIO ELECTRONICS

ROLAND DM-800

Roland's DM-800 ($5,995) shoehorns an 8-track hard-disk recorder/editor and 12-channel mixer into a compact (26 × 11.25-inch), 12-pound package. The unit offers nondestructive, 16-bit recording and editing at 48, 44.1, and 32 kHz. It has 300 virtual tracks, full dynamic automation, pitch correction, and time compression. It includes 18-bit, 128× oversampling A/D converters and 18-bit, 8× DACS. Internal processing is 24-bit.

The 12-channel digital mixer includes eight dedicated channel faders and pan knobs, a stereo main output fader, and track enable/mute/play buttons. It has one stereo aux send and two stereo aux returns. A 2-band, fully automated, semi-parametric EQ (i.e., with cut/boost and center-frequency controls) is included on all channels.



The user interface also features tape-style "transport" controls, an alpha dial, and an alphanumeric keypad. Five function keys control editing operations such as Punch In/Out, Section Loop, Preview, Scrub Preview, and Manual or Compu Mix. The system includes 40 location markers.

The built-in LCD shows all system, waveform, and track-based parameters. Waveforms are displayed with six levels of zoom. Locations are displayed in measure/beat, minutes/seconds, or SMPTE time on a 9-character LED display. RGB, S-VHS, and composite video connectors (switchable for NTSC or PAL operation) are included.

The four analog inputs are on +4 dBm, balanced (TRS), ¼-inch phone jacks. Trim knobs provide 20 dB of variable gain for matching +4 to -10 dBm sources. There are four ¼-inch analog outputs, plus a headphone output with level control. The unit also has two stereo AES/EBU digital outputs.

A Roland Multi Purpose Digital Bus (RMDB) connector provides access to a variety interfaces, including an optional ADAT interface (price tba) and an optional RS-422 Sony-protocol interface (price tba) for connection to a video editor. A Tascam DA-88 interface is under development.

The DM-800 generates and syncs to SMPTE and MTC, with support for all frame rates. Incoming SMPTE can be reshaped and passed to the output jack, and a built-in SMPTE resolver lets it lock to nonsynchronous time-code sources. The unit includes eight MIDI triggers for phrase playback, and it can follow internal or external tempo maps, including full support for MIDI Clock and Song Position Pointer. Additional features include MIDI Machine Control and MIDI triggering of Record and Punch In/Out.

Two 2.5-inch SCSI drives can be mounted inside the unit. Each of the two rear-panel SCSI ports can access up to 4 GB of storage, for up to 24 track-hours of 48 kHz recording. The unit is compatible with removable media, including 270 MB SyQuest, and it can back up to most MO drives. An audio DAT can be used for data backup via the digital output, and data DAT can be used for backup via SCSI. Roland Corporation US; tel. (213) 685-5141; fax (213) 722-0911.

Circle #404 on Reader Service Card

MACKIE LM-3204

Mackie Designs' 5U rack-mount LM-3204 line mixer ($995) offers sixteen stereo channels for a total of 32 inputs. The ¼-inch inputs are electronically balanced and accept -10 dBV or +4 dBu signals. Two XLR inputs feed mic preamps, which can be patched to any input channel via rear-panel output jacks. The mic preamps include trim pots and +48V phantom power.

Each channel includes a rotary gain pot, two stereo aux sends, two mono aux sends, a pan pot, solo switch, signal-present and overload LEDs, and a mute button. The latter doubles as a routing switch to an alternate stereo output bus, similar to the Alt 3/4 bus on the company's CR-1604 mixer. The 3-band channel EQ is the same as on the CR-1604.

The Control Room Monitor section routes signals to the headphone jack and Control Room outputs without affecting the main L/R mix. This lets you monitor the solo bus or stereo tape inputs when selected by the Tape Monitor switch. Separate rotary level controls are provided for the solo bus and headphone outs. Two 13-segment, peak LED meters display the levels for the stereo L/R bus, tape inputs, or soloed channels.

Level controls are provided for the four stereo aux returns. A switch routes the alternate stereo bus to aux return 3 for submixing, then routes it back to the main mix. Another switch routes aux return 4 to the Control Room section; for example, this lets you listen to a wet monitor signal while sending the dry signal to the main outputs.

Insert points are provided for channels 1 through 4 and the main L/R bus. Tape inputs and outputs are provided on both RCA and ¼-inch connectors. A multipin connector is provided for daisy-chaining up to four LM-3204E expansion modules (not available at press time).

THD is rated at <0.0025%. The nominal frequency response is rated at 20 Hz to 60 kHz (±1 dB), and it extends from less than 10 Hz to beyond 100 kHz altogether. Noise is spec'd at better than -84 dBu with all faders at unity gain, and adjacent-channel crosstalk is better than -83 dBu. Mackie Designs; tel. (800) 898-3211 or (206) 488-6843; fax (206) 487-4337.

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All four discrete subgroup outputs, Left Right and Main outputs feature balanced XLR connectors and TRS insert points for simple interfacing of your finest signal processors.

Stereo Inputs

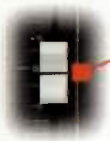
Stereo inputs featuring more EQ than most consoles have on their *mono* inputs. With two sets of inputs per channel and an A/B switch, you have the flexibility to select between 4 stereo sources (keyboards, CD etc.) For multitrack recording, used in conjunction with the 4 AUX/tape returns, you can bring in 8 tracks of tape while still tracking all of the other 10 inputs and getting a full function studio monitor feeds as well!

Auxiliary Section

6 discrete auxiliary sends selectable pre-fader/EQ (for monitor or studio headphone sends) or post fader (for effects sends) Routing and flexibility not found on mixers costing hundreds, even thousands more!

AUX Reverse Routing

Full function stage monitor console, ***it's that simple!*** Routing switches via our unique source reverse switch allows the console to be converted from a recording/Front-of-House sound reinforcement board to an expandable 18:6 stage monitor console with a fully selectable engineer's cue mix.



Faders

As is the standard on all professional mixers of its class, the GL2 boasts full throw 100 mm Alps™ faders for thousands of hours of smooth, seamless operation.

Master Section

Four discrete subgroups, left and right outputs, and the AUX reverse section allow the GL2 to adapt in ways impossible on other compact mixers.

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ELECTRONIC MUSICIAN 1995 EDITORS CHOICE

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▲ LEXICON REFLEX

Lexicon has announced the Reflex ($499), a MIDI-controlled, digital reverb. The unit is functionally similar to the company's LXP-1 and is compatible with LXP-1 editors, including MOTU's *Unisyn* editor/librarian and TB Systems' *SoftMC* MIDI control program. It offers stereo output, but the inputs are merged.

The 1U rack-mount device features sixteen basic presets that include variations of eight algorithms. Seven of these are the familiar Hall, Inverse, Plate, and Gated reverbs, plus Flanger, 6-Voice Chorus/Delay, and Multi-Tap Delay. The eighth Resonator, simulates the acoustic effects of stringed-instrument bodies. The Hall reverb includes a Randomizer feature that reduces coloration, enhances long reverb tails, and uses dual early reflections to enhance realism.

The Reflex includes 128 user memory locations and comes with 112 factory-programmed effects. Decay, delay time, and effects level can be quickly accessed from the front panel. Many more parameters can be tweaked in Advanced Programming mode or via MIDI, including full Dynamic MIDI real-time control. Up to four MIDI control patches can be created per program.

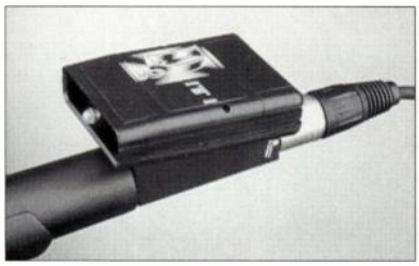
Global input level, output level, and wet/dry mix are set with front-panel knobs, and an LED display shows the current program number. Lexicon; tel. (617) 736-0300; fax (617) 891-0340.

Circle #406 on Reader Service Card

▼ D^3 IR-1

New from D^3 Inc. is the IR-1 ($165), a battery-powered device that noiselessly switches mics on or off. The unit automatically detects when the performer's body is within a user-defined range and switches the mic accordingly. An LED indicates on/off status. The IR-1 can be easily attached to a wide variety of mics. D^3, Inc.; tel. (800) 701-7899 or (408) 745-7899; fax (408) 745-7897.

Circle #407 on Reader Service Card



▼ KURZWEIL K2500R

Kurzweil announced the K2500R Production Station, the latest generation of the company's K-series synthesizer/sampler-based workstations. (Expected price of the K2500R is $3,495.) The 3U rack-mount unit is powered by a 25 MHz Motorola 68340 processor and features true 48-note polyphony, 60 internal DSP functions, 200 ROM Programs, and 100 ROM Setups.

The K2500R ships with 8 MB of internal ROM sounds, expandable to 28 MB. Optional 8 MB ROM SoundBlocks currently include Contemporary and Orchestral ($395 ea.). The company also offers a new 4 MB Stereo Grand Piano SoundBlock. The user sample RAM is expandable to 128 MB, and user Program RAM is expandable to 1,256 KB. The new instrument stores its operating system in Flash EEPROM, which lets you update the OS via the DOS-compatible floppy-disk drive or the SCSI port. (The K2500R includes two SCSI ports.) Programs also can be stored in Flash memory.

In addition to the stereo Mix analog outputs, the unit has eight individual analog outputs. A Sample-while-Play feature lets you edit and resample without aborting other operations. Other features include a fluorescent, backlit, 64 × 240-dot LCD; a hierarchical file directory system; and a full-function, 32-track sequencer modeled after professional software sequencers.

The stock unit uses the same DigiTech effects processor found in the K2000, but the circuit has been improved to acheive better bandwidth and S/N ratio, and Kurzweil has developed new effects programs. However, the KDFX option adds a Kurzweil effects processor with four stereo effects buses and two digital ins with flexible signal routing.

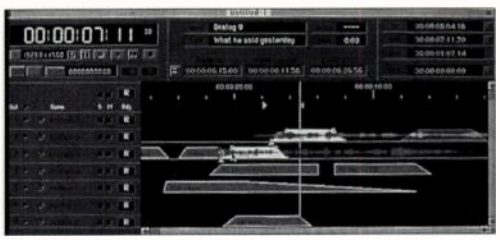
The KDFX option also lets you connect the K2500R to Kurzweil's new 1U rack-mount DMT digital multitrack interface. The DMT can convert the K2500R's digital signal to four stereo AES/EBU or S/PDIF outputs. It can also return two tracks from a digital recorder to the K2500R, in the digital domain, for processing and/or sampling. The DMT can even be used as a real-time sample-rate converter. The digital output rate of the DMT signals can be slaved to an external clock or set from the front panel.

With an additional optical interface card, the DMT can output eight channels of K2500R digital data to an Alesis ADAT or Tascam DA-88 (or compatible MDMs). Two DMTs can be used in parallel to convert eight channels of digital audio between ADAT and DA-88 formats. Kurzweil Music Systems; tel. (310) 926-3200; fax (310) 404-0748.

Circle #408 on Reader Service Card

▼ SYNCLAVIER COMPANY EDITVIEW 4.0

The Synclavier Company has debuted *EditView* 4.0 ($999), a cross-platform version of its digital-audio editing software that can run on a Synclavier PostPro system or Fostex Foundation 2000; it can also run on many Digidesign systems, including Pro Tools, Pro Tools III, Sound Tools, and Audiomedia (but not Session 8). In fact, it can control multiple systems simultaneously, displaying all tracks on one interface, with the ability to drag and drop audio files between the different systems. It also supports TDM, so you can access TDM plug-ins from within the *EditView* environment.



When New England Digital, the creator of the Synclavier, crashed and burned in 1992, part of its brain trust ended up with Fostex and part emerged as the Synclavier Company, and there was bad blood between the two. Thus, the announcement that *EditView* would support the Fostex Foundation 2000 represents a major peacemaking effort for both companies.

EditView is object-oriented, so when you move an event, all corresponding data (e.g., level automation) moves with it. Tracks can be graphically rearranged by dragging, and you can do multitrack edits by selecting a region. You can edit any number of events, even if they are not adjacent.

The program offers complete user control over screen layout, including the ability to specify the number and size of tracks. Each event is displayed with its ADSR envelope and name. Waveform and fader data can be selected and displayed for an entire track or as individual events. The corresponding source audio is displayed in color for each event, enabling easy creation of loops and fades. Audio can be displayed as segments or waveforms.

EditView 4.0 is completely integrated with Synclavier's *S/Link* 2.0 ($199), a utility that provides batch-file transfer and sample format and rate conversion. Using *EditView* with *S/Link*, you can drag source audio from any SCSI drive attached to the Mac and drop it directly into the sequence, in sync. Transfer and translation are performed automatically and a named event is created at the specified sync point.

With *S/Link* 2.0, supported computer file formats include AIFF/AIFC (Mac and SGI), AU/SND (NeXT and Sun), IFF/SVX (Amiga), MOD (Amiga and DOS), QuickTime (Mac and *Windows*), SND (Mac), Sound Designer I and II (Mac), SoundEdit (Mac), VOC (Sound Blaster), and WAV (*Windows*). Other supported formats include Foundation 2000 RPE, OMF, and PostPro/Synclavier.

S/Link also lets users transfer sounds directly from CD-ROM or CD-Audio, converts between 16-bit and 8-bit resolution, and converts from 44.1 kHz to lower sampling rates. *S/Link* runs on a Macintosh with a 68020 or better CPU. The Synclavier Company; tel. (603) 448-8887; fax (603) 448-6350.

Circle #409 on Reader Service Card

▶ YAMAHA MT50

Yamaha has introduced the MT50 ($449), a 4-track cassette ministudio that allows simultaneous recording on all four tracks. The mixer section includes 2-band channel EQ (±12 dB, 80 Hz and 12 kHz shelving), one post-fader aux send, and channel pan. The four unbalanced, ¼-inch channel inputs have switchable mic/line trim. Each channel has separate main and cue level faders. A Record Select feature lets you assign channels directly (e.g., channel 1 to track 1), or via odd/even assignments for internal ping-ponging.

The unit offers stereo main outputs, monitor outs, and a headphone output. A Monitor/Phone level pot is included, and a Monitor Select switch lets you monitor the stereo bus, cue bus, or a mix of both. The MT50 also features a stereo aux return with a rotary level pot.

A Sync Out jack carries the output of channel 4 to a MIDI sequencer or synchronizer. The dbx noise reduction is defeatable globally, or just on track 4. The MT50 also includes a variable pitch control (±10%), a mechanical tape counter, defeatable Zero Stop, and footswitch-controlled punch in/out. The transport runs at 3¾ ips. Power is supplied by an external AC adapter. The recorder's frequency response is rated at 40 Hz to 16 kHz (+3/-5 dB). The S/N ratio is 85 dB (@3% THD, dbx on, A-weighted).

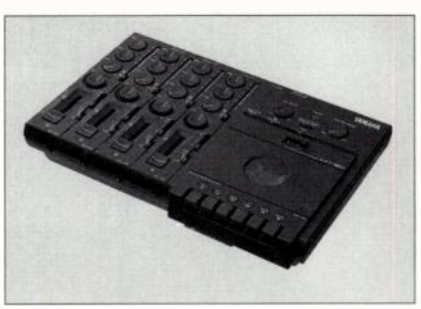
Also new from Yamaha is the REV100 ($299), a true stereo digital reverb that features 16-bit converters and samples at 44.1 kHz. The unit features 99 editable reverb programs, including stereo and gated reverbs, reverb plus flanger, and assorted delays. Programs can be selected from the front panel or via MIDI Program Change, and program numbers are revealed in a 2-digit LED display.

Decay, delay time, and wet/dry balance can be programmed and stored with front-panel knobs. Input and output level knobs are also provided. The audio inputs and outputs are on ¼-inch, unbalanced connectors. Frequency response is rated at 20 Hz to 20 kHz.

In other Yamaha news, the company is shipping the VL1-m ($2,995), a rackmount version of the VL1 physical-modeling synthesizer. The unit features an onboard effects processor; 128 program memory locations; ¼-inch, stereo outputs; a high-density floppy-disk drive; 240 × 64-dot LCD display (black-and-white, reversible); and a stereo headphone jack. In addition to its MIDI In, Out, and Thru connectors, the VL1-m has a front panel input for a Yamaha BC-1 or BC 2 controller. Yamaha Corporation; tel. (714) 522-9011; fax (714) 739-2680.

Circle #410 on Reader Service Card

(continued on p. 26)



Their performance controller's key action is based on a very simple concept.

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Our idea is simple: a digital piano will never sound like a real piano unless it plays like one. Take apart some keyboards and you'll find cheap spring action more suited to toys than musical instruments. Look into the RD-500 Digital Piano and you'll find our proprietary PA-4 hammer action, giving you all the expressive subtleties of a fine concert grand.

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Roland

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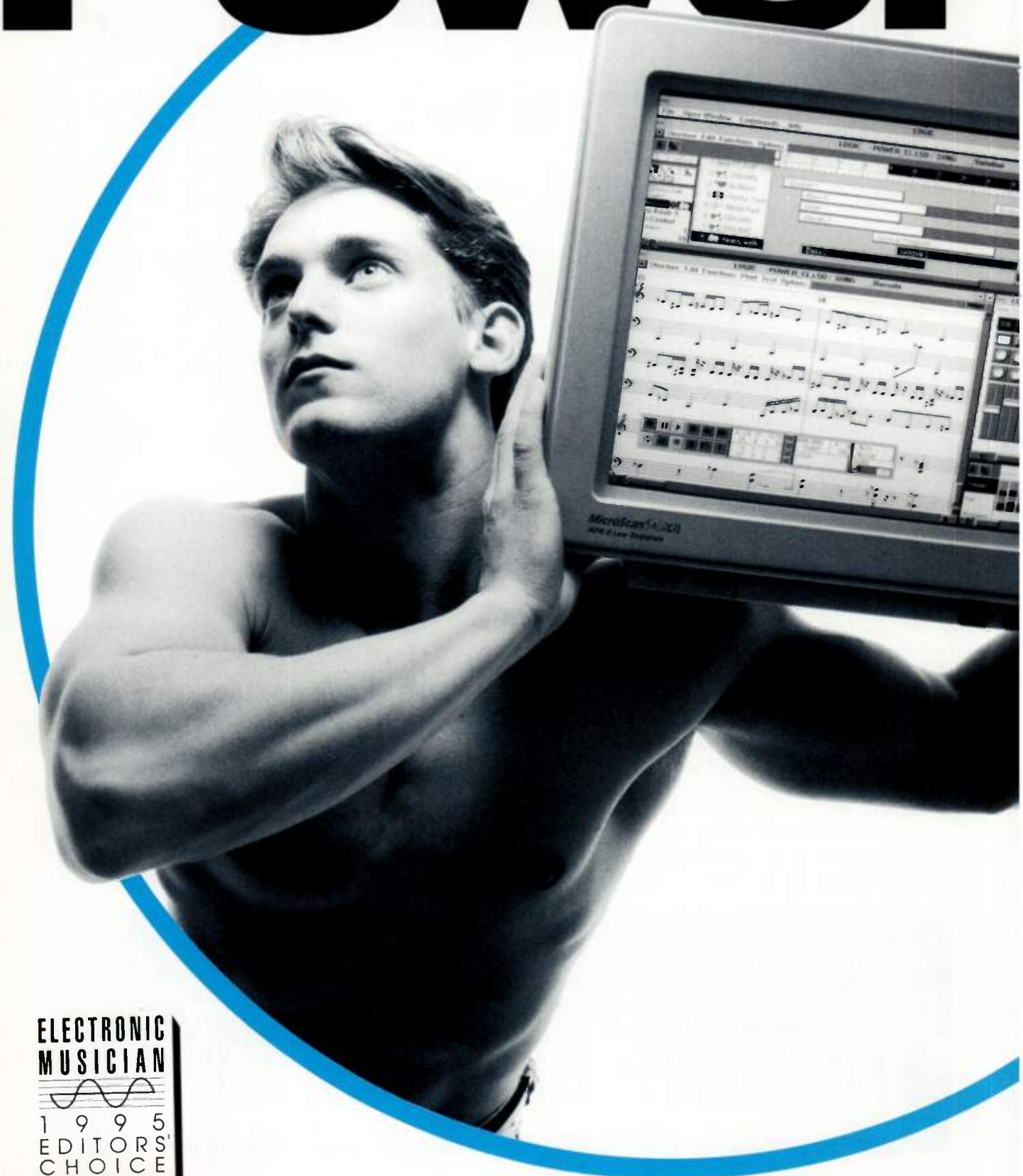
Power



ELECTRONIC MUSICIAN

1995 EDITORS' CHOICE

Circle

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97TH AUDIO ENGINEERING SOCIETY CONVENTION ▲ ▲ ▲ ▲ ▲

For the second time in three years, the City by the Bay welcomed the Audio Engineering Society Convention. Once again, the show was a rousing success, with lots of hot new products, challenging ideas, and plenty of entertainment, presented in one of America's finest urban settings. (Okay, I'm prejudiced; the Bay Area is home, sweet home.)

Furman Sounds' Pro Series power conditioners

Producer George Martin kicked things off at San Francisco's Moscone Convention Center with an excellent keynote address in which he reflected upon the history and development of recording during his long, illustrious career. Martin warned that the power and complexity of today's recording equipment can be detrimental if we let the tools distract us from focusing on the musical content. He also offered many fun Beatles anecdotes; for example, we learned that Ringo could never hear the rest of the band onstage, so he kept in time by following the gyrations of their posteriors!

Martin has suffered severe hearing loss from decades of recordmaking, and he strongly recommended monitoring mixes at moderate levels. Ironically, his remarks introduced the loudest AES show in recent memory. One of the worst offenders was KRK, whose ear-splitting speaker demo caused many victims—er, attendees—to cover their ears and reach for the hearing protectors. Fortunately, the demo was in a private room, not on the show floor.

While not health-threatening, the sound pressure levels on the show floor were quite annoying. For example, Digidesign's booth created so much noise that visitors to nearby exhibits had little chance of hearing the demos. The problem is that some companies attempted to address large groups of people without using a sound booth. Such demos should have been held in a private room. Hopefully, the AES will return to their old policy and enforce sane demo levels.

Speaking of Digidesign, the company formally announced their aquisition by Avid, a long-time business partner. This marriage of the leading purveyor of digital audio workstations and the reigning monarch of digital video workstations creates exciting possibilities, especially for high-end users.

Digital audio continues to be a major area of expansion. We saw new DAWs from Digidesign, Roland, Fostex, Digital Audio Labs, and Akai. Sonic Solutions unveiled new high-end and moderately priced systems and hosted an Opcode rep who showed a Sonic-compatible version of *Studio Vision*. The Otari RADAR 24-track system garnered a lot of attention, and Micro Technology Unlimited, Digital Expressions, and Spectral (formerly Spectral Synthesis) showed updated versions of their digital workstations. Obviously, we'll have much more to say about these products in the near future.

Not to be outdone, the modular digital multitracks blossomed, too. Sony Electronics introduced the PCM-800 ($5,995), which adopts the Tascam DA-88 format. (By the way, Tascam has dubbed this format "DTRS," for "Digital Tape Recording System." Oh joy, yet another acronym! Hereafter, I promise to avoid using it whenever possible.) The PCM-800's analog I/O is on XLRs, whereas the DA-88 uses RCA connectors. For digital transfers, it offers two 25-pin D-sub connectors that carry four AES/EBU I/O pairs. However, it doesn't include Tascam's TDIF 8-channel interface, so you need Tascam's optional IF-88 AES/EBU interface to copy eight tracks of digital audio between the DA-88 and PCM-800.

Alesis fought back, unveiling an agreement with Panasonic to produce an ADAT-compatible MDM. The company also announced deals with Otari, Roland, and E-mu to put an ADAT lightpipe interface on the RADAR, DM-800, and Emulator IV, respectively. Finally, Alesis cut its list price for the ADAT to $2,999, and the BRC's price has been trimmed to $1,499.

The hottest demo at the show—literally—came from Jim Furman of Furman Sound, who showed off his new Pro Series 20-amp power conditioners. First, Furman attached a boombox to the Pro Series device and cranked up the voltage until the protection circuit automatically shut down. When the voltage dropped to acceptable levels, the radio came back on, undamaged. But when Furman repeated the procedure with a competing power conditioner, the boombox went up in smoke! *Quod erat demonstratum.*

Sony's PCM-800 modular digital multitrack

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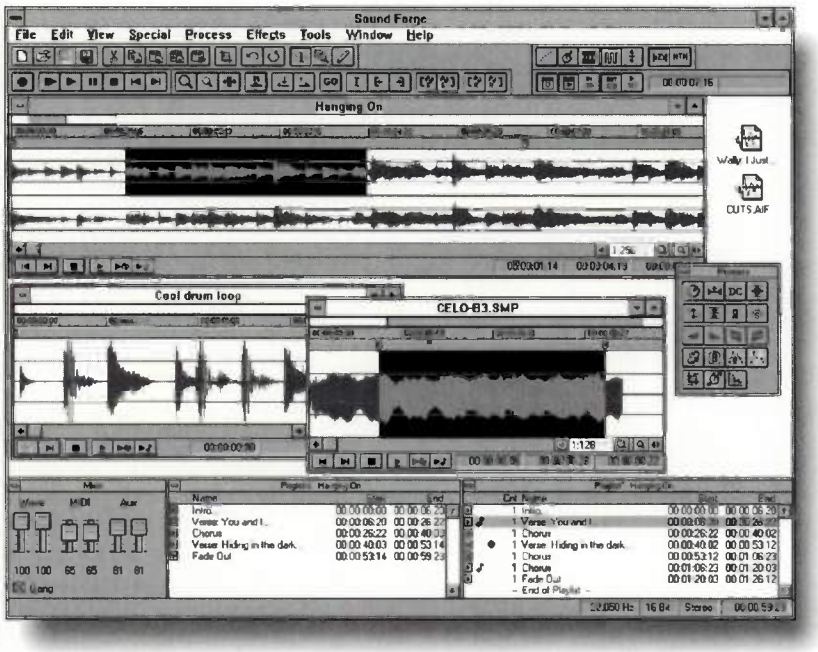

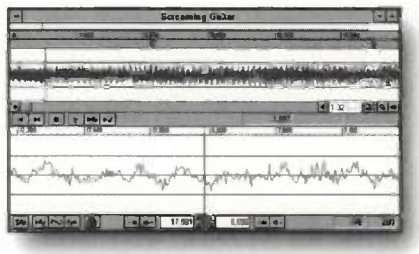

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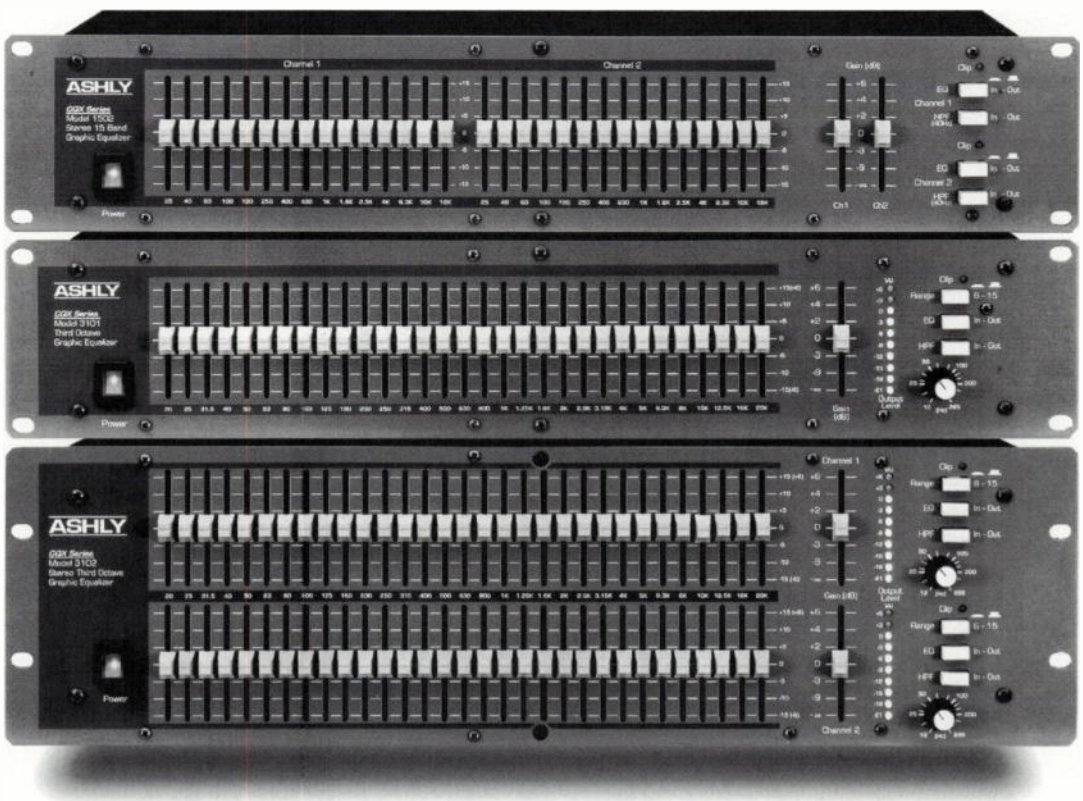

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PRO FILE

Funkin' Groovin'

Bobby Byrd brings back the bump and grind.

By Michael Molenda

Want to hear something embarrassing? A German record label is revitalizing an indigenous American music form and rescuing a soul hero from obscurity in his own country. So much for our national pride. But, then again, it's hard to feel bad when the hero in question, rhythm and blues mastermind Bobby Byrd, has unleashed a ferocious funk attack. Byrd's new album, *On The Move,* is a jubilant celebration of horn-driven funk played the way it's supposed to be: live, hot, and sweaty.

"In Europe, people really appreciate live music," says Emu V. Gerkan, co-owner of Soulciety Records in Hamburg, Germany, and coproducer (with Byrd and label partners Michael Kirsch and Goetz Buehler) of *On The Move*. "They get off on the roar that musicians make when they play together in the same room. You can't get that sound with samplers or sequencers. You've got to let the band loose and let them cook."

As far as "cooking" goes, Bobby Byrd is the real thing. He was the arranger and bandleader for James Brown during the Godfather of Soul's glory years between 1964 and 1970. And Byrd was no simple musical administrator. He wrote or cowrote more than 40 songs and either sang, played organ, or pounded the drums on all of Brown's early hits. After going solo in the 1970s, he burned up the record charts with the smash hits "Hot Pants" and "I Know You Got Soul."

"Bobby Byrd was one of our idols," enthuses Gerkan. "He's a great soul singer, and we couldn't believe that he never got to do a complete album on his own. He was touring over here in Germany, so we just asked him if he'd like to do a record."

To bring all the best funk players together, *On The Move* was literally recorded "on the move" in studios in Hamburg, Nashville, Los Angeles, London, and San Francisco. (The legendary Tower of Power horns make an appearance on one track.) The recording medium, however, remained constant: All of Byrd's soulful bump and grind was captured on analog 2-inch, 24-track decks.

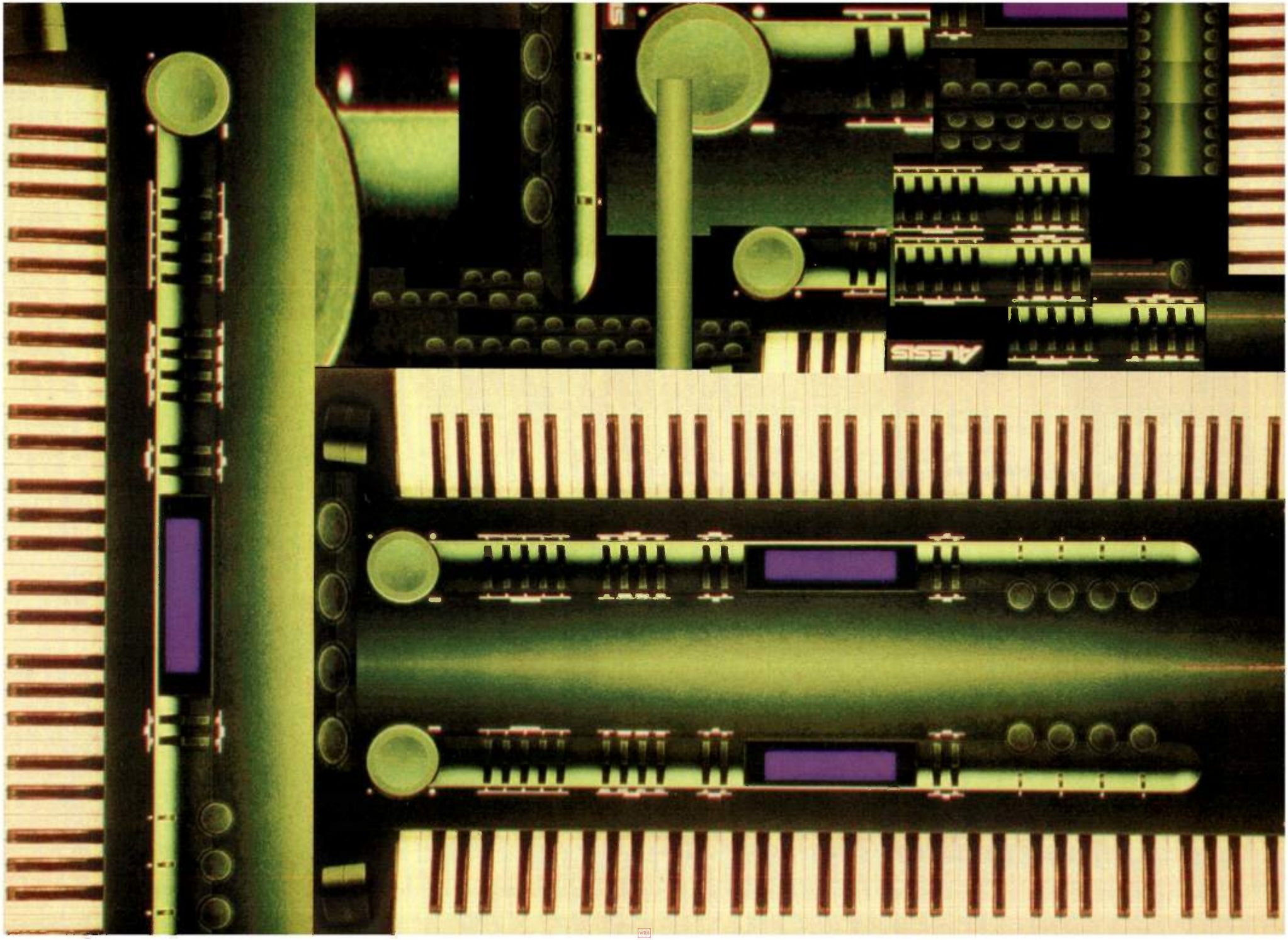
"We are extremely dedicated to that classic method of recording musicians playing together in a single room," explains Gerkan. "We like all those rough sounds—the natural room reverb and slapback echo. So even though we were using modern equipment, we really tried to produce a 'classic' band sound for the 1990s."

"Our belief in these classic methods of recording is kind of funny," he continues. "Today, all the techno kids are going for this vibe when they sample sounds, but they don't know where the sounds came from. So a lot of the samples used on these electronic dance tracks are actually natural sounds from albums that were recorded live in the studio. It's the *band sound* they want. And that sound is exactly what we wanted for Bobby's record. So what's old-style and what's cutting-edge here?"

The international studio treks that produced *On The Move* also proved that funk music may transcend cultural barriers.

"We recorded in all these different studios with people of different races and people from different countries who spoke different languages," says Gerkan. "But all these differences melted away when the musicians started playing together. Suddenly, everyone was speaking the same language. The common tongue was the language of music." ❁

Bobby Byrd


ALESIS

By Clark Salisbury

QUADRAPHENIA

Unlocking the hidden power of the Alesis QuadraSynth.

Already a major player in the effects processing, drum machine, and modular digital multitrack arenas, Alesis has set its sights squarely on the synthesizer market. When the company's QuadraSynth keyboard was first announced, its feature list sounded too good to be true. But Alesis finally delivered the goods, with 64-voice polyphony, 16 MB of sample ROM, multi-effects with up to four buses, and a lot more. Recently, the company followed with a rack-mount version, the S4. (The QuadraSynth keyboard was reviewed in the July 1994 EM.)

Feature list aside, the QuadraSynth is extremely programmable. So programmable, in fact, that I'm limiting the discussion to two underdocumented, yet powerful, features: the Modulation Matrix and the Tracking Generator.

ILLUSTRATION: RICHARD STUTTING

GETTING STARTED

Before we get started, it's important to understand how to navigate through the parameters. Upon entering an edit mode, a number of words appear in the lower left portion of the display. These are Functions, and each one represents a group of related parameters. To edit any parameter, first scroll to the appropriate Function with the Function buttons.

Once you have selected a Function, up to four parameters appear in the right half of the display. For most Functions, there are several Pages of parameters; this is indicated in the lower left of the display. After finding the Page that includes the parameter you wish to edit, select the parameter by pressing its associated Quad Button. You can then edit the parameter by pressing the Value Up

and Down buttons or moving the associated Quad Knob.

It's also important to realize that the QuadraSynth maximizes polyphony by keeping track of which voices are actually sounding. Once a voice reaches an amplitude of zero, it is released for use elsewhere. The QuadraSynth knows that a voice is at zero amplitude when its AENV LEVEL has reached 0. In addition, unlooped sounds, such as drum and percussion samples, are released once they finish playing.

The catch is that if you use a modulator, such as Aftertouch, to modulate a Sound's level downward and the Sound's AENV LEVEL reaches 0, it is released and cannot be brought back, even if you let up on Aftertouch. Tc avoid this, you must make sure the Sound's AENV LEVEL never reaches 0. The simplest solution is to set the AENV LEVEL parameter to at least 01. (This parameter is in the AENV Function. In Edit 1 mode, it is Parameter 3 on Page 3; in Edit 4 mode, it is found on Page 10.) With the AENV LEVEL at a value of 01, the Sound will be silent for all intents and purposes, but it will not be released for use elsewhere until the envelope's release level reaches 0.

MODULATION MATRIX

A QuadraSynth Program consists of up to four Sounds, which can be split and/or layered on the keyboard. The basic structure of a Sound is standardized (or "normalized," as Alesis calls it) along fairly traditional lines for subtractive synthesis. A sampled waveform is played through a filter and amplifier, which are modulated by three envelope generators, three LFOs, keyboard position, Velocity, Channel Pressure (Aftertouch), and so on.

However, you can go far beyond the normalized configuration with the Modulation Matrix. Say you want to create a string Program in which Velocity controls the sound's attack time, allowing you to play the strings with a slow, gentle attack at low Velocities and a quicker, more forceful attack at higher Velocities. In the normalized configuration, the amplifier envelope (AENV) attack time is not modulated by Velocity, but this can be easily arranged in the Modulation Matrix, as we'll see.

Each Sound includes its own Modulation Matrix configuration, which provides up to six independent, simultaneous paths for alternate controller routings (see **Fig. 1**). Each path includes four parameters: SOURCE, DEST, LEVEL, and GATE. As expected, the SOURCE parameter determines the modulation source. In our example, the SOURCE would be Velocity. DEST is the modulation destination, which would be AENV ATTCK. LEVEL controls the amount of modulation. (We'll get to the GATE parameter in a moment.)

There are three level parameters to deal with when using the Modulation Matrix: the level in the Matrix, the level of the source modulator, and the level of the destination. The source and destination levels are set in their respective Function displays. The source level must be set to a number other than 0 to have any effect, regardless of the Matrix level. However, the Matrix and destination levels are added together; if the destination level is 0 and the Matrix level is not 0, the source will still have an effect on the destination.

DIGGING IN

Let's start with Preset 116, "SoloViolin," because it's in the string family and uses only one Sound. First, we'll take a look at the Matrix Modulation routing described in our example.

Press the Edit 1 button to enter Edit 1 mode. Make sure you have the correct Sound selected for editing (in the case of the "SoloViolin" Program, this is Sound 1). The Editing line in the display shows you which Sound is selected. If the correct Sound isn't selected, hit the Edit 1 button repeatedly to scroll through the Sounds. You can also select a Sound to edit by hitting the Edit 4 button, hitting the Quad Button for the desired Sound (Quad Button 1 to select Sound 1, for example), then hitting the Edit 1 button to return to Edit 1 mode.

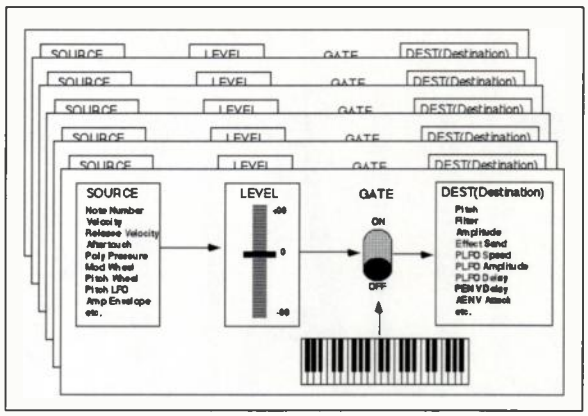


FIG. 1: The Modulation Matrix provides six alternate, simultaneous modulation paths for each Sound in a Program.

Use the Function buttons to select the word MOD in the display; this is the Modulation Matrix. Press both Page buttons simultaneously to select the first page and parameter of the Modulation Matrix. (On the S4 module, press both sides or the exact center of the Page button.) The display shows the four Modulation Matrix parameters: SOURCE, DEST, LEVEL, and GATE.

You can display the value of any parameter by pressing the associated Quad Button. For example, press Quad Button 1 to see that Velocity is selected as a modulation source on this page. (Remember, there are five other identical pages in the Modulation Matrix for each Sound, each of which lets you route a different controller to any destination). Pressing Quad Button 2 reveals that AENV ATTCK is the destination for Velocity, and pressing Quad Button 3 shows that the programmed level is -13. (Modulators can go in a positive or negative direction.) This configuration lets you control the amplitude envelope attack with Velocity as described earlier.

Now, suppose you want to use the mod wheel to control AENV Attack. Press Quad Button 1 to select the

The S4 rack-mount synth module has the same sounds and programming features as the QuadraSynth keyboard.

SOURCE parameter, and use the Value buttons or Quad Knob 1 to select MOD WHL. We can leave the DEST parameter where it is (AENV ATTCK); this is one of the parameters we prefer to modulate from the mod wheel. Select the LEVEL parameter with Quad Button 3 and set it to 30 or so with the Value buttons or Quad Knob 3. (You can adjust this to your own taste.)

When the wheel is pushed forward, the attack time of the amplifier envelope is increased, causing the Sound to attack more slowly. In the preset Program, the wheel also controls vibrato, but so does Aftertouch. To "disconnect" the mod wheel from controlling vibrato, scroll to the PLFO function with the Function buttons, scroll to Page 2 with the Page buttons, select the MDWHL parameter with Quad Button 2, and set it to 00 with the Value buttons or Quad Knob 2.

The Modulation Matrix LEVEL parameter can be either positive or negative, so you can invert any modulator's effect. For example, let's say you want the same violin Program to produce very slow attacks when the mod wheel is pulled down and quicker attacks as the wheel is pushed forward. Set the LEVEL parameter in the Modulation Matrix to a negative value (e.g., -30).

However, keep in mind that the destination (in this case, AENV ATTCK) is now being modulated downward, so it must be set to an initial value that lets it move in that direction. In other words, if the AENV ATTCK parameter is set to 00 (or some relatively low number), it doesn't matter how much negative modulation is applied; it can't go below 00. If you want to use the wheel (or any modulator) to create a shorter attack, the ATTCK parameter in the AENV function should be set to some relatively high number, such as 50 or 60, or perhaps even greater.

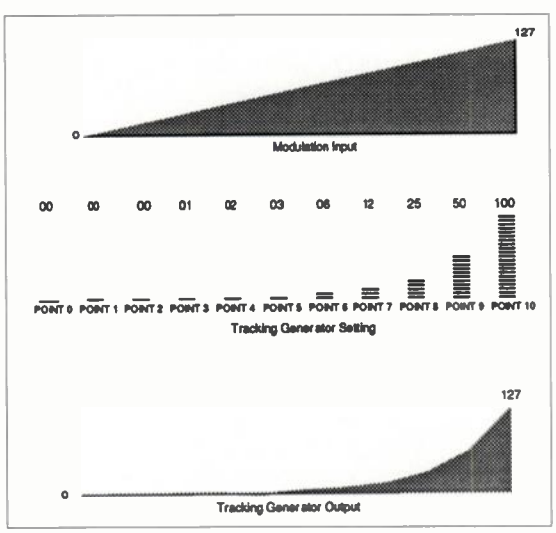


FIG. 2: The Tracking Generator lets you reshape the output of any modulator. The top curve represents a modulator's initial output from 0 to 127, and the middle graph reveals the Point settings to produce the final output as represented in the bottom graph.

THE GATE

Although it is relatively simple, the GATE parameter in the Modulation Matrix is generally misunderstood. This is unfortunate, because this parameter provides some very cool options.

When the GATE parameter is on, the source modulator assigned in the same Page of the Modulation Matrix is active only while a key is held down. This turns the modulator off as soon as a key is released, which lets you program things like LFO-controlled tremolo that are active only while you hold a key (or keys) on the keyboard. (Use ALFO as a SOURCE in the Modulation Matrix, with AMPLITUDE as the DEST, at whatever LEVEL suits you. In addition, make sure the ALFO LEVEL is greater than 0 and the SPEED is to your liking.) Notes that continue to sustain after the keys are released (either because the AENV Release is fairly high or you are depressing the sustain pedal) have no tremolo.

Among many other applications, this makes it possible to do something that's difficult or impossible on keyboards that don't have Key Pressure (Polyphonic Aftertouch): bend only some notes in a chord. Assign PITCH WH as a SOURCE in the Modulation Matrix and PITCH as its DEST. (On the second page of the PITCH Function, set P-WHL to 00 to eliminate the direct modulation of pitch from the wheel; we want pitch-wheel modulation to occur only through the Modulation Matrix.) To produce a bend of a whole step, set LEVEL in the Modulation Matrix to a value of 07, and set the GATE to ON. Now play a chord on your keyboard, depress the sustain pedal, and release all but

one note. Moving the pitch wheel bends only the note you hold with your finger.

This is a wonderful feature with several cool applications. For example, you can program your own pseudo-Polyphonic Aftertouch by assigning AFT TCH as the SOURCE in the Modulation Matrix and setting the DEST to PITCH, one of the LFO amplitudes, AMPLITUDE (for volume changes), and/or FILTER (for brightness changes).

By turning the GATE on, you can sustain notes with the pedal while pressing on other notes to add vibrato, increase brightness and/or amplitude, and so on. Only the notes you actually press are affected by Aftertouch.

BETTER MOD MATRIX

Many other applications for the Modulation Matrix come to mind, far too many to describe here. But perhaps I can whet your appetite by outlining a few of them.

Use Velocity to control effect amount. Use Velocity as a source and assign EFFECT SEND as the destination. This lets you control the "wetness" of a sound by how hard you play the keys, which is particularly effective when used with drum and other percussive sounds.

Use an envelope to control effect amount. Assign any unused envelope (typically PENV) with a slow attack as a source to control the EFFECT SEND to a delay effect. This is great for simulating the cool guitar-through-a-volume-pedal-into-a-delay sound.

Use keyboard position to control envelope times. Assign NOTE # as a source to control AENV decay and release times to produce shorter sounds in the upper range of the keyboard. Set the AENV DECAY and RELEASE times to the rate desired for the low notes of the keyboard, and set the Matrix LEVEL to a negative value to shorten the rates for the high notes of the keyboard. This can help improve sounds that are meant to imitate real acoustic instruments.

Route an unused LFO to PITCH. Here is another trick that can greatly improve imitative sounds. Assign an unused LFO, which has been set to the RANDOM waveform and a slow speed, as a source to control PITCH. Set both the LFO LEVEL and Matrix LEVEL to low, positive values. A small amount of random pitch-shifting helps to disguise the static nature of sampled instrument sounds. This is particularly effective on wind-instrument sounds.

TRACKING GENERATOR

For my money, the most powerful and underutilized feature in the QuadraSynth is the Tracking Generator. It takes a bit of thought to really grasp what the Tracking Generator can do. Once you've mastered it, though, it can provide a level of control normally unavailable to mere mortals.

The Tracking Generator reshapes the output of any modulation source. This can produce both subtle and radical changes in the output from the selected modulator. The Tracking Generator includes eleven Points (PNT 0 through

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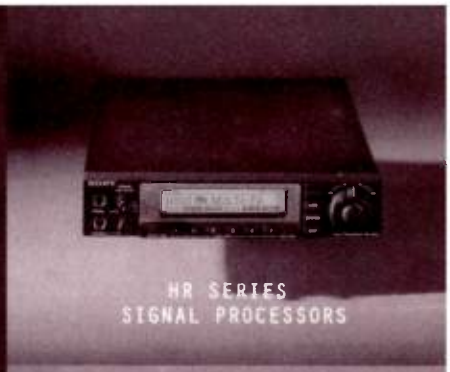

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PNT 10). Each Point is set to a value of 0 to 100% of the input modulator's *maximum* value. For modulators such as Modulation, the maximum value is 127, but other modulators, such as Pitch Bend, envelopes, and LFOs, have different maximum values.

As the value of the input modulator changes, the Tracking Generator looks at different Points to determine the factor by which the modulator's *maximum* value will be scaled. Each Point corresponds to a 10% increment in the modulator's value. For example, when the modulator is at its lowest value (which is equivalent to 0% of its full range), the Tracking Generator looks at PNT 0 for the scaling factor. When the modulator is at 10% of its full range, the Tracking Generator looks at the setting of PNT 1. When the modulator is at 50% of its full range, the Tracking Generator looks at the setting of PNT 5, and so on.

Let's take a look at a more concrete

IT'S A GIFT!

I call this program "Tracker" because it uses the Tracking Generator extensively. The mod wheel crossfades between Sounds 2, 3, and 4 via the Tracking Generator.

Sound 1's Pitch Envelope is also routed to the Tracking Generator, which is then routed to control pitch through the Modulation Matrix for some interesting pitch-sweep effects. In addition, the Pitch Envelope depth is controlled by the mod wheel (again, through the Modulation Matrix); the pitch-sweep depth is 0 when the wheel is all the way down, increasing as the wheel is moved forward. The same Pitch Envelope is used to modulate Sound 1's effects send, so the wet/dry mix changes as the pitch is swept.

Aftertouch is used to control a touch of vibrato and increase amplitude and filter cutoff of Sounds 2, 3, and 4. In addition, note the use of Release Velocity in Sound 4; it is routed through the Modulation Matrix to control Sound 4's release time. This lets you control how long it takes Sound 4 to release by how quickly you release the keys. (Sound 4 is the main sound heard when the mod wheel is all the way forward.)

Start by selecting a User Program location to save this Program. In Program mode, turn Quad Knob 3 until the display says "User," then turn Quad Knob 1 to select location. Press Edit 4 and enter the following parameter values.

ASSIGN-VOICE	SND1	SND2	SND3	SND4
GROUP	KEYBRD	ENSMBL	VOICE	STRING
NAME	FMMRMBA V	STRINGS	CHOIR AAHS	BASS PTZ

LEVEL				
VOLUME	99	99	99	99
PAN	1>	<1	1>	<1
OUTPUT	MAIN	MAIN	MAIN	MAIN

EFFECT-LEVEL				
LEVEL	48	85	85	85
BUS	1	2	2	2

PITCH				
SEMITONE	-12	-12	0	0
DETUNE	0	0	0	0
DETUNE TYPE	n/a	n/a	n/a	n/a
PITCH WHEEL RANGE	2	2	2	2
AFTERTOUCH DEPTH	0	0	0	0
PLFO DEPTH	99	99	0	99
PENV DEPTH	0	0	0	0
PORTAMENTO	n/a	n/a	n/a	n/a
PORTA RATE	n/a	n/a	n/a	n/a
KEYBOARD MODE	POLY	POLY	POLY	POLY

FILTER				
FREQUENCY	0	5	13	5
KEYBOARD TRACK	ON	ON	ON	ON
VELOCITY	0	0	0	0
PITCH WHEEL DEPTH	0	0	0	0
AFTERTOUCH DEPTH	20	10	12	12
FLFO DEPTH	0	0	0	0
FENV DEPTH	99	99	99	99

AMP				
VELOCITY CURVE	LINEAR	LINEAR	LINEAR	LINEAR
AFTERTOUCH DEPTH	20	10	5	5
ALFO DEPTH	52	0	0	0

RANGE				
LOW LIMIT	C-2	C-2	C-2	C-2
HIGH LIMIT	G8	G8	G8	G8
SOUND OVERLAP	20	42	20	10

MOD

MODULATOR 1

SOURCE	TRACKGEN	TRACKGEN	TRACKGEN	TRACKGEN
DEST	PITCH	AENV AMP	AENV AMP	AENV AMP
LEVEL	99	99	99	99
GATE	OFF	OFF	OFF	OFF

MODULATOR 2

SOURCE	PENV	n/a	n/a	REL VEL
DEST	EFFECT SND	n/a	n/a	AENV RELES
LEVEL	30	0	0	-65
GATE	OFF	n/a	n/a	OFF

MODULATOR 3

SOURCE	MOD WHL	n/a	n/a	VELOCITY
DEST	AENV ATTCK	n/a	n/a	AENV ATTCK
LEVEL	-99	0	0	-86
GATE	OFF	n/a	OFF	OFF

MODULATOR 4

SOURCE	MOD WHL	n/a	n/a	n/a
DEST	FENV ATTCK	n/a	n/a	n/a
LEVEL	-67	0	0	0
GATE	OFF	n/a	n/a	n/a

MODULATOR 5

SOURCE	MOD WHL	n/a	n/a	n/a
DEST	AENV AMP	n/a	n/a	n/a
LEVEL	-54	0	0	0
GATE	OFF	n/a	n/a	n/a

MODULATOR 6

SOURCE	MOD WHL	n/a	n/a	n/a
DEST	PENV AMP	n/a	n/a	n/a
LEVEL	99	0	0	0
GATE	OFF	n/a	n/a	n/a

EFFECT

NUMBER	Same as Program number.
TYPE	USER

(Press the Select button to access the rest of the Effect parameters.)

COMMON PARAMETERS

NAME	"TRACKVERB"
CONFIG	2 Sends, with EQ

MOD

SOURCE	AFT TCH
DEST	P2 SPEED
MOD LEVEL	23
SOURCE 2	AFT TCH
DEST 2	D4 LEVEL
MOD LEVEL 2	99

MISC

LOW EQ FREQ	120
LOW EQ GAIN	+07
HI EQ FREQ	10
HI EQ GAIN	+7

(Press Edit 1 to scroll through the effects buses.)

BUS 1 PARAMETERS

PITCH

TYPE	STEREO CHORUS
SHAPE	SINE
SPEED	46
DEPTH	76
FEEDBACK	80

REVERB

INPUT 1	PITCH OUT
INPUT 2	SEND IN
PREMIX	IN-1<00>IN -2
INPUT LEVEL	80
REVERB TYPE	PLATE 1
PREDELAY	032 ms
PREMIX	IN 50->PREDLY
REVERB INPUT FILTER	99
REVERB DECAY	00
LOWS	00
HIGHS	-13
DENSITY	00
DIFFUSION	78

DELAY

TYPE	PING PONG DELAY
BALANCE	SEND<00>PTCH
DELAY TIME	390 ms
FEEDBACK	88

MIX

PITCH OUT	00
DELAY OUT	99
REVERB OUT	00

BUS 2 PARAMETERS

PITCH

TYPE	STEREO CHORUS
SHAPE	SINE
SPEED	29
DEPTH	99
FEEDBACK	00

MOD

SOURCE 1	AFT TCH
DESTINATION 1	P2 SPEED
MOD LEVEL 1	23
SOURCE 2	AFT TCH
DEST 2	D4 LEVEL
MOD LEVEL 2	99

REVERB

INPUT 1	PITCH OUT
INPUT 2	SEND IN
BALANCE	IN-1<99 IN-2
INPUT LEVEL	92

DELAY

TYPE	STEREO DELAY
BALANCE	SEND<00>PTCH
LEFT TIME	060
LEFT FEEDBACK	00
RIGHT TIME	045
FEEDBACK	05

MIX

PITCH OUT	99
DELAY OUT	64

(Press Select to return to the Program parameters.)

NAME "TRACKER"

PLFO

WAVE	SINE	SINE	n/a	SINE
SPEED	44	47	n/a	43
DELAY	0	0	n/a	0
TRIGGER	MONO	MONO	n/a	POLY
LEVEL	0	0	0	0
MOD WHEEL	0	0	0	0
AFTERTOUCH	20	4	0	12

FLFO

WAVE	n/a	n/a	n/a	n/a
SPEED	n/a	n/a	n/a	n/a
DELAY	n/a	n/a	n/a	n/a
TRIGGER	n/a	n/a	n/a	n/a
LEVEL	0	0	0	0
MOD WHEEL	0	0	0	0
AFTERTOUCH	0	0	0	0

ALFO

WAVE	SINE	n/a	n/a	n/a
SPEED	16	n/a	n/a	n/a
DELAY	0	n/a	n/a	n/a
TRIGGER	MONO	n/a	n/a	n/a
LEVEL	99	0	0	0
MOD WHEEL	-99	0	0	0
AFTERTOUCH	0	0	0	0

PENV

ATTACK	86	n/a	n/a	n/a
DECAY	82	n/a	n/a	n/a
SUSTAIN	0	n/a	n/a	n/a
RELEASE	42	n/a	n/a	n/a
DELAY	80	n/a	n/a	n/a
SUSTAIN DECAY	76	n/a	n/a	n/a
TRIGGER	NORMAL	n/a	n/a	n/a
TIME TRACKING	OFF	n/a	n/a	n/a
SUSTAIN PEDAL	ON	n/a	n/a	n/a
LEVEL	0	0	0	0
VELOCITY	0	0	0	0
MODULATION				

FENV

ATTACK	49	0	0	0
DECAY	81	90	60	71
SUSTAIN	26	43	46	45
RELEASE	56	80	80	80
DELAY	0	0	0	0
SUSTAIN DECAY	99	99	99	99
TRIGGER	RESET-FRERUN	NORMAL	NORMAL	NORMAL
TIME TRACKING	OFF	OFF	OFF	OFF
SUSTAIN PEDAL	ON	ON	ON	ON
LEVEL	19	0	0	0
VELOCITY	99	99	99	99
MODULATION				

AENV

ATTACK	0	36	36	53
DECAY	98	71	69	84
SUSTAIN	86	99	99	99
RELEASE	44	44	38	44
DELAY	0	0	0	0
SUSTAIN DECAY	99	99	99	99
TRIGGER	NORMAL	NORMAL	NORMAL	NORMAL
TIME TRACKING	OFF	OFF	OFF	OFF
SUSTAIN PEDAL	ON	ON	ON	ON
LEVEL	99	1	1	1

TRACK

INPUT SOURCE	PENV	MOD WHL	MOD WHL	MOD WHL
POINT 0	0	100	0	0
POINT 1	0	75	25	0
POINT 2	30	50	50	0
POINT 3	30	25	75	0
POINT 4	52	0	100	0
POINT 5	52	0	100	0
POINT 6	52	0	75	25
POINT 7	61	0	50	50
POINT 8	61	0	25	75
POINT 9	52	0	0	100
POINT 10	37	0	0	100

MISC

SOUND ENABLE	ON	ON	ON	ON

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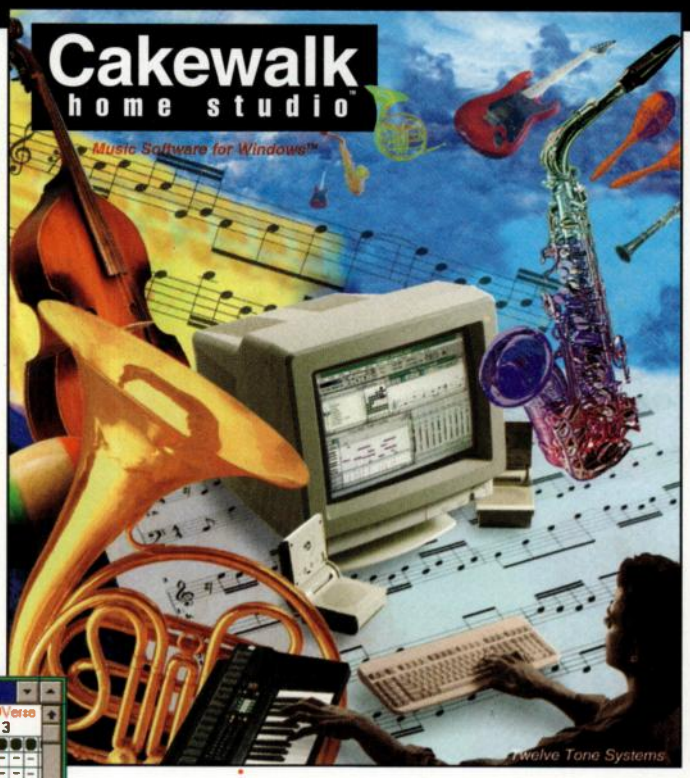

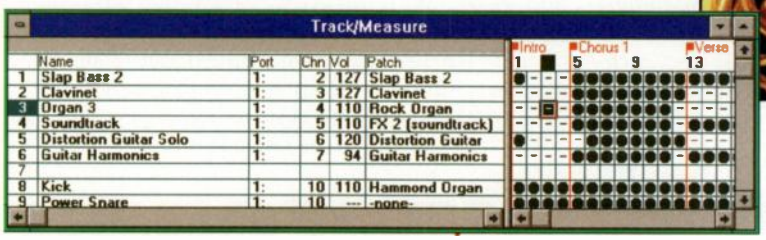

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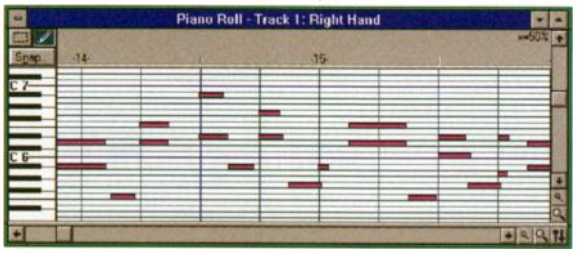

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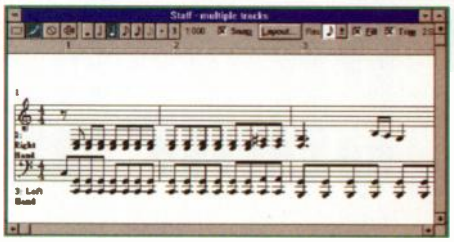

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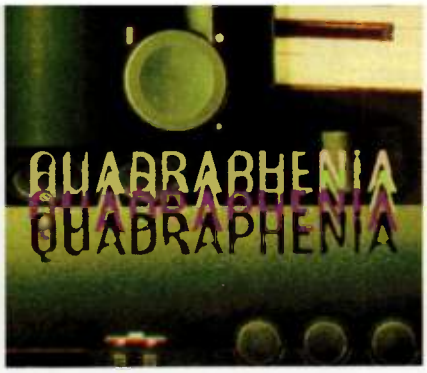

The Alesis QuadraSynth offers a 76-key keyboard, 64-note polyphony, and more programming possibilities than you can shake a MIDI cable at.

example. If the input modulator is a mod wheel that sends a value of 0, the Tracking Generator scales the maximum possible value of the mod wheel (127) by the percentage assigned to PNT 0. If this setting is 50%, the Tracking Generator sends a Modulation value of 64. If the mod wheel sends a value of 38 (which is 30% of its full range), the Tracking Generator scales 127 by the percentage assigned to PNT 3. If this setting is 100%, the Tracking Generator sends a value of 127.

What happens if the modulator sends a value between Points (e.g., a value that is 25% of the full range)? The Tracking Generator interpolates between the scaling factors of the two nearest Points. In other words, the Tracking Generator ramps smoothly between Points, rather than jumping discontinuously.

The applications for the Tracking Generator are practically limitless. For example, you can use it to create a custom Aftertouch response curve. Scroll to the TRACK Function (the Tracking Generator) with the Function buttons, scroll to Page 1 with the Page buttons, select the INPUT parameter, and assign AFT TCH to the Tracking Generator input. Next, select each Point with the appropriate Quad Buttons and set them to the values given in **Fig. 2**. (To access the rest of the Points, press the Page buttons.)

Now, scroll to the MOD Function, select the desired Page(s), and assign TRACKGEN to the SOURCE parameter. Finally, assign AENV LEVEL and/or FILTER FREQ to the DEST parameter and establish a positive LEVEL.

With this setup, Aftertouch has little effect until you press the keys quite firmly, at which point it ramps up to full value fairly quickly. Conversely, if you want Aftertouch to kick in quickly,

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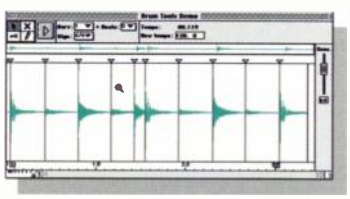

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ELECTRONIC MUSICIAN 1995 EDITORS' CHOICE

• **Groove Control.** ReCycle! creates a Groove MIDI file from your audio loop. Quantize any of your music to the feel of any loop! Or use the power of quantization to change the feel of any loop. *With ReCycle! you can quantize audio to MIDI and MIDI to audio!*

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• **Pitch Control.** Once the slices are in your sampler, you have complete pitch control without affecting the tempo or feel of your loop. Great for guitar riffs or other loops with pitch. *ReCycle! makes audio loops fit the pitch of your song!*

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• **Separate Outs.** Send an individual sound within a Loop to a specific sampler output for processing. So you can add Reverb to just the snare or add extra bottom to the kick or ...
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set PNT 0 in the Tracking Generator to a fairly low number. (Remember to set the Sound's AENV LEVEL to a value above 00; if it reaches 0, the voice will be released and you'll have to retrigger the note to hear it.) Then set PNT 1 through 10 to a value of 100.

You can also use the Tracking Generator to create complex crossfades between Sounds. This is illustrated in our free Program (see sidebar, "It's a Gift!").

THE WRAP-UP

The QuadraSynth offers so many possibilities that there's no hope of covering them all here. We haven't even broached the subjects of Mix Mode or the effects processor. (For some good tips on QuadraSynth effects, check out Erik Norlander's article in the Fall/

▼

The applications for the Tracking Generator are practically limitless.

Winter edition of Alesis' newsletter, *First Reflection*). However, I hope I've piqued your curiosity enough to try your own programming. With some experimentation, you'll soon be cruising through the QuadraSynth with the greatest of ease.

(Many thanks to Marcus Ryle of Fast Forward Designs; Craig Devin, Tim Gerht, Jeff Klopmeyer, Randy Lee, Erik Norlander, and Rob Rampley of Alesis; and Athan Billias of InVision Interactive.)

Clark Salisbury *does composition, technical writing, and studio production and engineering. His company, Music & Sound Associates, provided several factory sounds for the QuadraSynth.*

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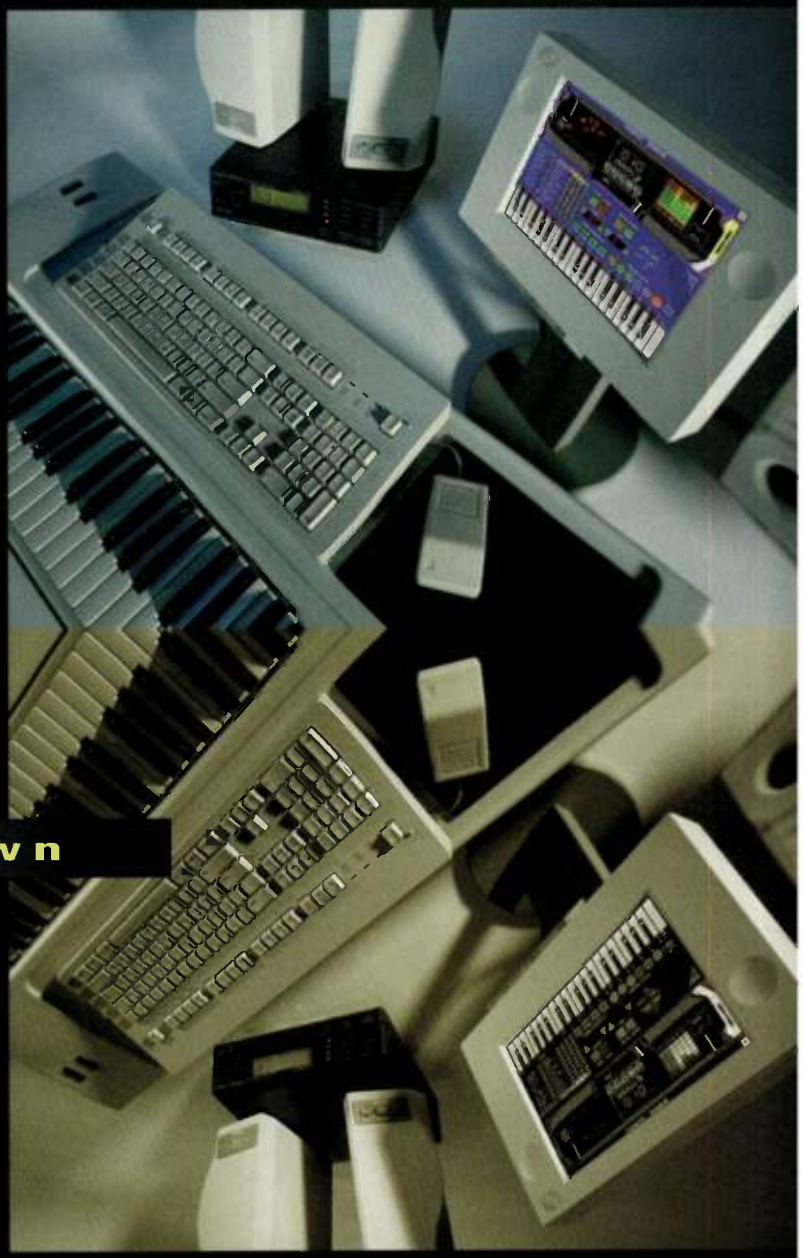
Movie

It's finally happened. After several years of fits and starts, multimedia has become a *real* industry. This is great news for musicians. With the demand for multimedia products going through the stratosphere, the demand for talented musicians is following close behind. Whether the project is a simple audio/video presentation, an interactive kiosk, a video game, or a documentary CD-ROM, it needs sound and music; and for that, multimedia publishers need you.

Now, all of these happy career opportunities are great, except for one caveat: If you're going to get into multimedia production, you need a computer capable of doing the job. That can get pretty scary. We've all heard horror stories about installing and configuring sound cards, CD-ROM drives, and device controllers. But the truth is, configuring a PC-compatible for multimedia is really no more difficult than configuring a rack of MIDI sound modules and effects processors, and configuring a Macintosh is even easier.



By Michael Brown

Studios

Explore new (and wacky) dimensions of audio and video with a fully loaded multimedia machine.

Photo Imaging by Paul Morrell

Movie Studios

In either case, it's just a matter of learning the ropes. Let's take a look at what it takes to ready a Mac or PC-compatible for multimedia playback and production, whether you're upgrading an existing computer or starting from scratch.

SHOP 'TIL YOU DROP

You'll find plenty of computer manufacturers and dealers eager to sell you their latest "one-stop-shopping" multimedia solution. But would you equip your studio by purchasing all the equipment from a single manufacturer? Would you trade the freedom to mix and match the best components for the convenience of getting everything in one box? Probably not. And if you're shopping for a computer to produce multimedia, or if you're adding multimedia capabilities to a computer you already have, you shouldn't buy a preassembled system or a multimedia upgrade kit.

If you're too busy to learn the necessary skills to configure your own multimedia workstation, you don't have to settle for mediocrity. Just find a computer dealer who is willing to custom-configure a system for you. Competition among computer dealers is fierce, so most of them will even install new components into a computer you already own—provided, of course, you buy the components from them.

For example, if you purchase a sound card or a multimedia upgrade kit from a major dealer, such as CompUSA or Circuit City, they'll install the components into your existing computer. Both chains assess a service charge for the work, but CompUSA waives the fee if you select a sound card or upgrade kit from Creative Labs. At both stores, the installation is performed on the premises by factory-authorized store employees and comes with a customer-satisfaction guarantee.

If you're in the market for a new PC-compatible, your choices are more plentiful, because computer manufacturers who sell direct to the consumer, such as Gateway 2000 and Dell Computer, will configure one exactly to your specifications. On the retail front, CompUSA sells its own brand—Compudyne—and will do the same. If you're looking for another brand of computer, such as an Apple, Compaq, or IBM, most dealers will install whatever additional components you decide to buy when you buy the computer. Having the factory-authorized dealer perform the installation not only frees you from installation hassles, it also protects your warranties.

THE ONE-BOX WONDER

Just one year ago, all-in-one multimedia computer systems were found only at the top of the PC-compatible and Macintosh consumer lines. This year, multimedia systems are the *only* PC-compatible computers you'll find at some dealers. (Interestingly, this trend is not yet prevalent among Macintosh models.) If you want a computer just for playing games and multimedia titles, these one-box wonders are fine. But if you're more interested in *producing* multimedia, you should think long and hard before bringing an integrated system into your studio.

All-in-one systems *do* have advantages, such as internally mounted CD-ROM drives that don't consume desk space. Some video monitors, such as Compaq's Presario 140 14-inch SVGA monitor ($399) and Apple's 14-inch AudioVision monitor ($589), even have built-in stereo speakers. The biggest advantage, of course, is that you don't have to install any of these components. You just plug the system in, and it works.

The downside to this type of computer, however, is that you probably won't see eye to eye with the manufacturer when it comes to selecting the best components for a multimedia *production* system. Take the Compaq Presario CDS 924, for example. This computer, which retails for $1,899 without a video monitor, is built around an 80486-DX2/66 microprocessor. (The difference between DX and SX processors is that the former has an integrated math coprocessor and the latter does not.) The 80486 is not as powerful as the Pentium, but it's sufficiently powerful for most multimedia applications. The package also comes with 16-bit sound capabilities, a double-speed CD-ROM drive, and local bus video. Sounds pretty good, doesn't it? Closer examination of the components in this system, however, reveals some shortcomings.

For example, this Presario model comes with built-in, 16-bit sound. *RAH!* However, the onboard synth is FM only. *BOO!* The Yamaha OPL-3 chip used in this system (as well as most other FM-synth-based sound cards) provides only 11-voice polyphony (6 melodic and 5 percussive) when in 4-operator mode (you get 20 voices—15 melodic and 5 percussive—in the thinner-sounding 2-operator mode). Wavetable synthesis is a more sophisticated solution because it generates sounds that are based on digital recordings of acoustic instruments. And most wavetable-synth sound cards provide 32-voice polyphony.

The Presario model also comes with a double-speed CD-ROM drive. *RAH!* The drive, however, uses a proprietary interface that's built into the circuit board. *BOO!* That brings up a host of problems. First, you can't use software such as Optical Media International's *Disc-to-Disk* ($199) to extract digital audio from a CD to your hard-disk. Second, because it's mounted internally, you can't use it with your sampler. Finally, you'll have to add a SCSI host adapter to the system should you

Compaq's Presario CDS 924 is typical of an MPC Level 2 system. Unfortunately, the internal CD-ROM drives and FM synths found in these types of systems really don't fulfill the needs of most musicians.

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KDT will not work with applications that require 'dongles' or 'keys' that are attached to the Macintosh ADB port. Must have at least one install left to use.

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The **SX** is a full-blown music workstation style keyboard, using the same "engine" as the award-winning S Series Turbo MusicProcessor, with all the things the MusicProcessor is famous for: hundreds of huge, fat sounds with 32-voice polyphony, a powerful 250,000 event 16-track sequencer (no that is not a typo, 250,000 events), dual digital effects processors, and a 3.5" disk drive. But that is only the beginning.

Although the **SX** has much in common with other workstations, it is capable of producing musical ideas of its own – riffs and patterns called *Styles* that can be edited, looped and combined to create and inspire your songs within minutes. The **SX** even has

G I N E

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Basically, this whole ad is trying to tell you that Generalmusic's **SX** keyboard is much better than the Korg i3. In case you still don't get it, here are the precise reasons why.

	Generalmusic SX2	Korg i3
Sounds	376 ROM+1672 RAM	256
Sequencer	250,000	40,000
Sequencer Resolution	192 ppq	96 ppq
Battery-backed Seq. RAM	Yes	No
Record Tempo Changes	Yes	No
Load while Playing	Yes	No
Styles	96	48
Store User Styles	32 + 32 Variations	4
User Pitchable Drumkits	Unlimited	2
Lyric / Score	Yes	No
Video Output	Yes (option)	No
Load New Samples	Yes (2MB option)	No
Price	Less	More

Generalmusic's New SX Multimedia Workstation

Sure, that would be enough - but wait, there's more! ***Imagine,*** without using any complicated computer software, pressing a single button and seeing any sequencer track instantly displayed as a musical score. Plus, the unique **SX** "preload" feature allows you to load new sounds and sequences while playing. The **SX** can be expanded with 2MB of optional sample RAM, which allows you to load in your favorite digital samples from choirs, to guitars, to applause. And, the optional video interface provides the connection to most televisions or computer monitors, which allows you to share your lyrics, music, or both with other people, turning your every performance into a multimedia event. For even

The **SX2** is 61-note keyboard, while the **SX3** has the expanded 76-note keyboard, both with lightly-weighted actions.

The new **SX** from Generalmusic is possibly more keyboard than you ever imagined. Way better, way cool, lots of fun, and for a lot less money than you might think. Visit your Generalmusic dealer today or contact Generalmusic Corporation for more information and the dealer closest to you.

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decide to upgrade to a faster CD-ROM drive (e.g., a triple- or quad-speed model) or if you decide to add another mass-storage peripheral, such as a removable hard-disk drive.

All Macintoshes come with a built-in SCSI controller, so adding external components such as a CD-ROM drive is both easier and cheaper. *RAH!* On the other hand, many Macintosh models, including the otherwise multimedia-hip $1,279 Quadra 630, include onboard support only for 8-bit audio. *BOO!* The absence of NuBus slots is another of the 630's few shortcomings. *BOO! HISS!* The most sophisticated audio and video peripherals available for the Mac require one or more NuBus slots. The absence of these slots limits you to add-on components that use the 630's Processor Direct Slot (used by some accelerators, video encoders, and other devices), its communications slot (used by internal fax/modems and network adapters), or its video-in slot (used by low-end video digitizers and TV tuners).

PAY NOW OR PAY LATER

Custom-configuring a PC-compatible to meet a musician's multimedia-production needs costs considerably more than it does to buy a preconfigured multimedia PC-compatible. (For an idea of the price difference, see the table "The One-Box Wonder vs The Custom Configuration" on p. 56.) The preconfigured system costs less for three basic reasons. First, the manufacturer can buy peripheral components, such as CD-ROM drives and sound cards, for much less than a consumer can. Second, the components that manufacturers typically choose to install in their mass-market computers are far from state-of-the-art. Third, some components are actually built into the computer's main circuit board (which is also commonly referred to as the motherboard).

In any event, the price gap between the two systems in the table shrinks considerably when you take the "street" prices of the add-ons into consideration. For example, Ensoniq's Soundscape wavetable sound card lists for $279, but we found several dealers who were selling it for less than $200.

The first system listed in the table is the aforementioned Compaq Presario

Apple's Quadra 630 is an excellent value for multimedia applications, as long as you can do without NuBus slots.

ESI-32

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That's right. All those BIG features that used to come with a BIG price tag are now yours for a price that's—small. Standard models start at just US $1,495, to be exact.

While ESI-32 is ideal as a first sampler, it could also very well be your last. Right out of the box, ESI-32's professional features, stellar audio quality and incredible ease of use make it a great value at any price. But ESI-32 also offers expandability so you can customize your unit as your needs grow. Load it up with 32MB of RAM SIMMs, opt for S/PDIF digital I/O and advanced SCSI interface upgrades and replace the onboard floppy drive with a 3.5" Syquest 270MB removable hard drive.

Yep...ESI-32s can be a powerful introduction into digital sampling or ultimately support all of your power-user needs in full-blown studio and performance situations.

Naturally, you're going to want to see how ESI-32 stacks up against the competition. We invite the comparison. We're confident that when you see what you'll have to pay to match ESI-32's features, you'll make the next logical move...through the door of your local E-mu dealer to check it out in the flesh.

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CDS 924 with an NEC MultiSync 2V video monitor and a pair of AppleDesign powered multimedia speakers. Many multimedia developers have told us that if their mix sounds good on the AppleDesigns, they know it will sound good on most other multimedia speakers, as well.

The second system is a similar desktop computer from Compaq, less the multimedia components. We chose Compaq's Prolinea MT 4/66 for this comparison, because it was the closest configuration to the Presario. Compaq, however, considers the Presario to be a "consumer" computer and the Prolinea to be a "business" computer.

We've equipped the Prolinea for multimedia by adding a wavetable sound card; a SCSI host adapter; an external, SCSI-controlled, double-speed CD-ROM drive; the same NEC monitor; and the same AppleDesign multimedia speakers. The Glyph CD-ROM drive that we've specified in our configuration is more expensive than most double-speed drives, but it offers the unique feature of having S/PDIF digital-audio outputs.

You can also find other, less expensive PC-compatible systems from smaller manufacturers. CompUSA's $1,499 Compudyne LP540, for example, shares many of the same features as Compaq's Presario CDS 924, but costs $400 less.

UPGRADE ALTERNATIVES

If you already have a computer, you may be interested only in rendering it multimedia-capable. Here again, you'll be faced with two basic alternatives: You can go with a multimedia upgrade kit, in which case all of the component decisions will have been made for you, or you can choose each of the components individually.

Before you decide to invest in a multimedia upgrade, however, you should decide if your computer is powerful enough to handle multimedia applications. If the microprocessor in your PC-compatible is less than the minimum 25 MHz, 80486SX required by the MPC Level 2 specification, you should consider accelerating your system. Likewise, if the microprocessor in your Macintosh is less than a 25 MHz 68030.

Although both of the platforms can

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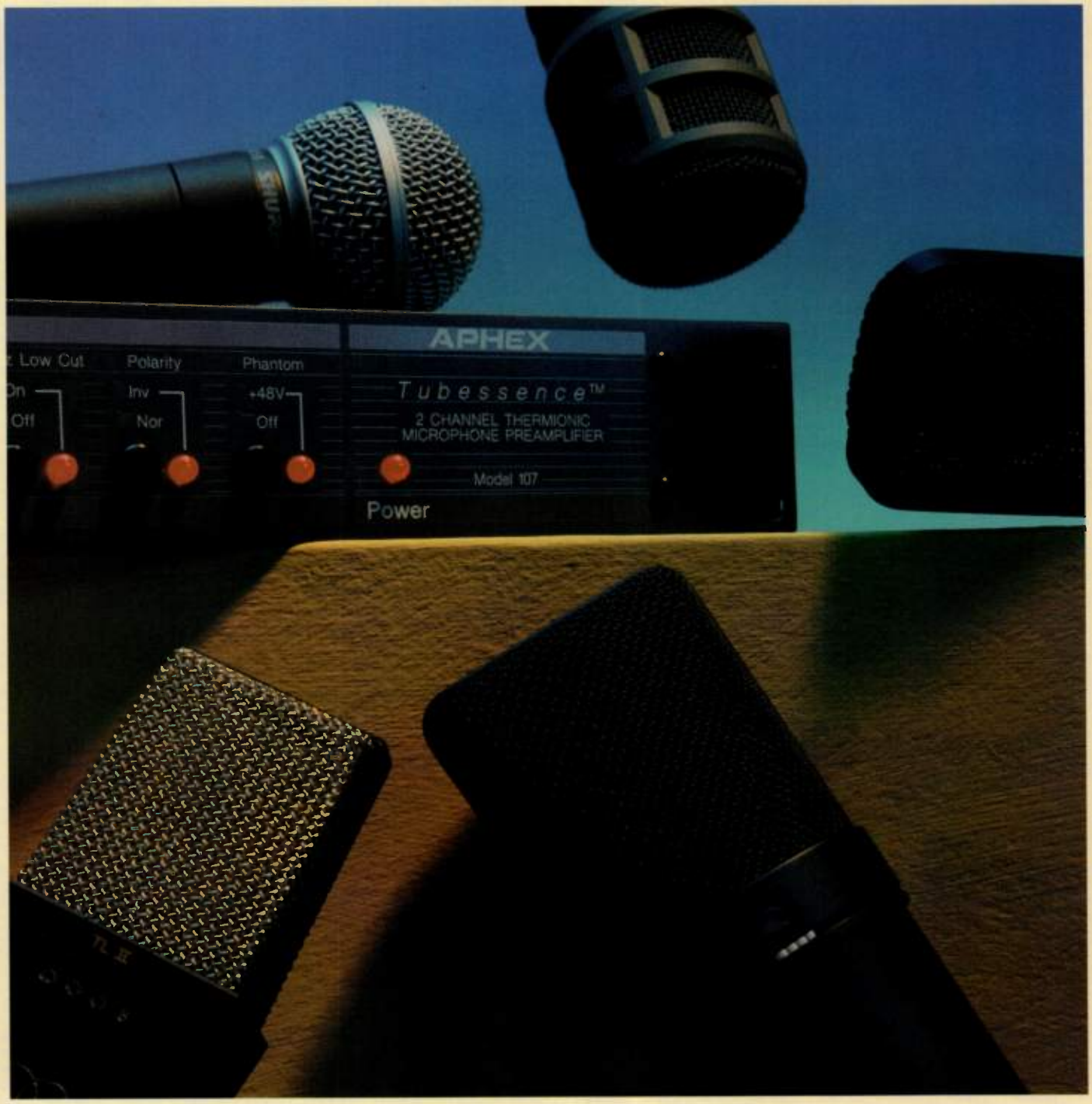

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be accelerated, in the end, your system will perform only as fast as its slowest component. It's like dropping a Corvette engine into a Model T. The Model T will go faster, but it won't handle the curves like a Corvette, because it doesn't have a racing suspension.

The microprocessors in most Macintoshes can be upgraded to 68040s; many can be upgraded up to PowerPCs. Likewise, 80286- and 80386-powered PC-compatibles can be upgraded to 80486s, and '486-to-Pentium upgrades will be available soon. Accelerating the computer, however, doesn't necessarily mean that its performance will suddenly match that of a higher-end model, because so many other considerations come into play.

On the Macintosh, one of the biggest issues is the performance of the computer's SCSI controller. The Mac IIci, for example, is an excellent candidate for an accelerator card, but that machine has a relatively slow SCSI controller that is capable of sustained throughput of only about 2 MB/second. Compare that to a Quadra 840AV, which is also powered by a 68040, but has a SCSI controller that is capable of sustained throughput of about 4.5 MB/second. In order to see a digital movie or hear a digital-audio file, that data has to stream off its storage medium and into RAM. If the datastream has to pass through a bottleneck (such as a slow SCSI controller) during that process, the result can be stuttering audio and jerky video.

If you're considering accelerating a PC-compatible, your biggest concern is the type of expansion bus on your computer. The expansion bus is where sound, video, and other cards are installed. The ISA (Industry Standard Architecture) bus commonly used in PC-compatibles can throttle multimedia performance.

A popular solution to this problem has been to design the computer's motherboard with local bus slots that can transfer data much faster than the ISA bus. The two most common local bus designs are VESA (Video Electronics Standards Association) or PCI (Peripheral Component Interconnect). If your PC doesn't have at least one local bus slot for a video card, you should seriously reconsider any plans to perform a brain transplant. A more effective solution may be to replace the entire motherboard, which is not nearly as expensive or difficult as it sounds.

Once you've settled those issues, you'll need to decide whether to go with a multimedia upgrade kit, or buy each component separately. Considering the cheap speakers that come with most of these kits and the fact that most manufacturers bundle proprietary CD-ROM drives with their offerings, you're better off choosing your own components. If you still want to buy a PC-compatible kit, you have plenty of choices; just make sure yours comes with a wavetable sound card.

SOUND CARD OPTIONS

Speaking of sound cards, digital audio cards, such as those from Digidesign, have been popular on the Mac for years. A few Macs—namely, the Quadra AVs and the Power Macs—are capable of recording and playing 16-bit digital audio right out of the box. Sound card manufacturers, however, have not yet embraced the Macintosh market.

The MacWaveMaker ($579), from Morning Star Solutions, is one of the few sound cards available for the Macintosh. Featuring Kurzweil's 32-voice MASS wavetable synthesizer, it offers 357 instrument sounds and fifteen different drum kits, plus auxiliary MIDI In and MIDI Out ports. Unlike most PC-compatible sound cards, the MacWaveMaker 7-inch NuBus card is not capable of hard-disk audio recording, but Morning Star is working on a

The One-Box Wonder vs The Custom Configuration

Compaq Presario CDS 924			Compaq Prolinea MT 4/66		
Component	Type	Price	Component	Type	Price
CPU	80486-DX2/66	$1,899	CPU	80486-DX2/66	$1,949
Memory	8 MB		Memory	8 MB	
No. of slots	5 ISA		No. of slots	5 ISA	
Hard-disk drive	525 MB IDE/ATA		Hard-disk drive	525 MB IDE/ATA	
Video card	Local bus		Video card	Local bus	
			SCSI host adapter	Adaptec AHA-1520A	$179
Sound card	FM synth		Sound card	Ensoniq Soundscape	$279
CD-ROM drive	Internal Mitsumi		CD-ROM drive	Glyph GCD-100	$395
Video monitor (NEC MultiSync 2V)	14-inch; .28 dot pitch 1024 x 768 resolution	$355	Video monitor (NEC MultiSync 2V)	14-inch; .28 dot pitch 1024 x 768 resolution	$355
Multimedia speakers	AppleDesign	$179	Multimedia speakers	AppleDesign	$179
Total Cost		$2,453	Total Cost		$3,336

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daughterboard to provide that capability (with 16-bit resolution, of course)

Meanwhile, the PC-compatible soundcard market is so crowded that shopping for one can be a daunting experience. There are literally hundreds of cards to choose from, some of which support only 8-bit resolution. If the sound card you're evaluating seems incredibly cheap, make sure it's not an 8-bit card. And contrary to what many salespeople tell you, compatibility with Creative Labs' Sound Blaster card is *not* the only consideration you should take into account.

Sound Blaster compatibility is an important issue only if you want to use your computer to play lots of different games. Most musicians want a high-quality, wavetable synth on their sound card, and maybe a DSP chip. If you're not interested in playing every game that's out there, Turtle Beach's non-Sound Blaster-compatible MultiSound Monterey won **EM**'s 1995 Editor's Choice award in its class. (The $399 sound card was reviewed in the October 1994 **EM**.)

On the other hand, if you *do* want to play games on your PC—and let's face it, many of us do—many wavetable-synth and DSP-equipped sound cards also feature an FM synth onboard to maintain backward compatibility with the Sound Blaster. At the same time, many popular games now support wavetable synthesis, in addition to FM. If you're playing a game such as Id Software's *Doom*, you're going to want to hear that higher quality audio; buying a card that's merely Sound Blaster compatible is not going to deliver it.

If you already have a 16-bit FM sound card, you can upgrade it to wavetable synthesis by snapping on a daughterboard, such as Roland's Sound Canvas DB ($229 for the General MIDI instrument set; $299 for Roland's GS

HISTORY LESSONS

One of the great things about the multimedia industry is that talent and ingenuity are still valued more than big-ticket hardware and elaborate facilities. Just ask John Malcolm Smith, an audio specialist for multimedia developer Human Code. Smith (with composer Mark Wilson) recently recorded 35 hours of audio and created 4,500 digital-audio files for *The Cartoon History of the Universe*, an interactive CD-ROM recently published by Putnam New Media. And he did it on the cheap.

"We had a real minimalist setup," admits Smith. "This was a low budget, do-what-you-can-to-get-the-best-sound project. We couldn't ever afford a proper recording studio. We ended up working out a deal with an abandoned studio facility that basically had nothing but power. But at least we could go out there and do our sessions."

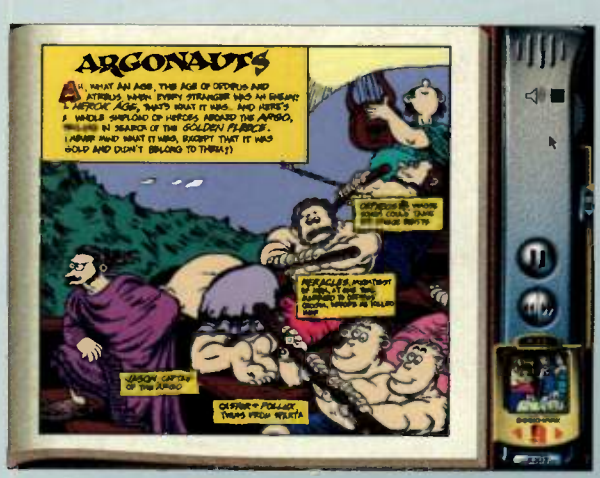
The project was so low-budget and low-tech, that Smith had to construct his own mic setup to record voice-overs. "A Sennheiser shotgun mic was the highest fidelity mic we had, so I did most of the voice-overs with a lavelier mic that I rigged to a custom headset," he says.

Smith's custom headset consisted of a pair of cheap sunglasses with the lenses removed. He mounted an Audio-Technica AT-831B miniature cardioid condenser lavalier mic to the arm of the eyeglass frame using a guitar whammy-bar, a rubber band, and a foam-rubber pencil grip. "Actually, we did have a cheap headset for the mic," says Smith, "but the mic arm was always squeaking and drifting out of alignment. The makeshift rig worked much better."

As you may already suspect, Smith didn't have access to any high-class modular digital multitrack decks, so he recorded the voice-overs on a Sony MZ-1 MiniDisc recorder. In order for *Cartoon History* to run on most Macs, Human Code had to develop for the lowest common denominator in terms of sound, which is 8-bit resolution. Therefore, Smith digitized each voice-over, sound effect, and musical composition at 8-bit resolution and 22 kHz sampling rates using an Articulate Systems' Voice Impact Pro and Macromedia's *SoundEdit 16* running on a Macintosh Centris 650.

In order to save space on the disc, Smith later downsampled his digital-audio tracks to an 11 kHz sampling rate. He says his tracks had much better fidelity after this downsampling process than they did when he digitized them at 11 kHz in the first place. Smith used CE Software's *QuicKeys* program to automate the process and ensure that the same downsampling settings were used for each of the 4,500 digital-audio files that needed to be converted. He monitored his mixes on a pair of AppleDesign multimedia speakers.

Flush with their success from the *Cartoon History* project, Smith and Human Code are now beefing up their collection of audio tools. "We're gearing up to buy a vocal isolation booth and a large-diaphragm condenser mic," says Smith. "We've already bought a DAT machine, so I think we may be able to avoid going out to abandoned studios anymore. Things will be a little more normal around here."



The audio for Putnam New Media's *Cartoon History of the Universe* was produced more with talent and ingenuity than money and gear.

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instrument set). Turtle Beach's Maui wavetable-synth upgrade card achieves the same result, but it occupies an expansion slot. The advantage to this approach is that you can use multiple cards in the same computer (see sidebar "Gone to Maui," below).

Save yourself a major headache by having your dealer install the sound card for you. If you prefer to install the card yourself, the first step you should take is to document your computer's existing IRQ (Interrupt Request) settings, I/O (Input/Output) addresses and DMA (Direct Memory Access) channels. A utility program such as CyberMedia's *PC 911* ($79.95) will make it much easier to determine how your computer is configured. (You might also want to read "Square One: Installing PC Sound Cards" in the May 1994 **EM**.)

MIDI INTERFACES

You probably already have a MIDI interface. If you don't, you have two basic choices. Almost all sound cards come with one, although few manufacturers supply the necessary breakout cables needed to make the interface usable. If the card you choose doesn't come with cables, expect to pay about $49. Don't expect anything fancy. The sound-card MIDI interface from Creative Labs, for example, consists of one MIDI In cable and one MIDI Out.

Turtle Beach's MultiSound Monterey isn't Sound Blaster-compatible, but it's one of the best wavetable sound cards on the market.

If you need a multiport interface or the ability to read and write SMPTE time code for video work, you'll definitely need a separate MIDI interface. Fortunately, your choices are bountiful on both the Mac and the PC platforms.

GONE TO MAUI

Every *Windows* user has a system-configuration war story to tell. Few, however, will be able to top Chris Hall's tale. This composer/producer has installed not only a Sound Blaster SCSI-2 sound card into his 80486-DX2/66 PC-compatible, but *four* Turtle Beach Maui wavetable-synth upgrade cards, as well.

"That was a trick," says Hall. "You have to know the port address, IRQ, and other settings for your machine. You also need to know what's happening in your DOS AUTOEXEC.BAT and CONFIG.SYS files, as well as your *Windows* .INI files. Otherwise, it can be a horrifying experience."

Hall produces musical scores for such television series as *The Nature of Things* and is a partner in Toronto's vWAVE production company, a firm that he and three of his close friends recently formed to produce multimedia projects. They're currently working on music and sound design for two new 3DO games: *Dragon Rising* and *NHL Hockey*.

The $199 Maui comes with 256K of sample RAM, but Hall has expanded his to the maximum 8 MB. "Having four Maui cards in your PC is like having an 8-output, 32 MB sampler at your disposal," he says. "With that many outputs, I can isolate different instruments onto different outputs for EQ and effects-processing purposes. With that much memory, I can use a few large samples or a lot of small ones."

Although he has plenty of pro-audio gear at his disposal, Hall often finds himself using nothing more than Twelve Tone Systems' *Cakewalk Professional* 3.0 sequencer, Turtle Beach's *Wave* 2.0 waveform-editing software, and the sound cards in his computer. "I've used E-mu and other pro-audio samplers," says Hall, "but I haven't found anything that offers the level of control that *Wave* does. It's seriously powerful. It's got reverb, delay, chorus, time compression and expansion, and everything else that I need. I've become wired to that program."

On some sessions, Hall also uses Innovative Quality Software's *Software Audio WorkShop* hard-disk recording software, which he runs on a second '486 computer. Using Music Quest MQX-32 MIDI interfaces and SMPTE time code, he slaves the two computers together; when he's scoring for video, he slaves both computers to a video deck in the same way.

"If I decide to use a real fretless bass part or a real guitar part, I need to have a multitrack running," says Hall. "If I don't care to fire up my ADAT, I'll use *SAW* to record the bass part onto the hard-disk drive of my other computer. I'll use SMPTE time code to sync up the two machines and then play a *Cakewalk* sequence to trigger the Mauis on the first computer and to play back the bass or guitar parts from *SAW* on the second computer."

According to Hall, some of his recording-industry colleagues dismiss multimedia tools. "I have a good friend who's a successful American producer," says Hall, "and he's said of the Turtle Beach stuff, 'Well, it's not +4 dB, it doesn't have XLR outs, it's not pro audio.' He's implying that it's noisy. But this is the same guy who will take a bass part that he's mixing on his SSL console, send it out to a hissing, 1950s-era bass amp, and bring it back into his mix! To me, that's an abhorrent thing to do."

"A lot of people will look at the Maui and say, 'Oh, that's amateur stuff,'" Hall continues. "But I'm making money with it! I'm using it to deliver television show scores on a weekly basis! What matters to me is how the final product sounds, and I don't have a problem with how I'm sounding these days. Neither do my clients. They just keep coming back."

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LISTEN UP!

Of course, the most sophisticated sound card in the world is useless without a great set of speakers. When shopping for multimedia speakers, look for units that are self-powered and magnetically shielded. Passive speakers require a separate amplifier. Trust me, you really don't want to use the noisy 4-watt amp on the sound card.

Shielding is essential because the magnetic field that emanates from the driver magnets on an unshielded speaker pulls the electron guns in the video monitor out of alignment. That, in turn, will distort the image projected onto the monitor's screen. After prolonged exposure to such a magnetic field, these guns will become permanently misaligned.

If you've been composing music for other markets, you probably already have a pair of pro-quality studio monitors. These are certainly an important investment, because they'll come pretty close to telling you what your mixes *really* sound like. (See the near-field monitor shootout "Boom Boxes" in the November 1994 **EM**.) However, you'll also want to take a reality check by listening to your mixes on one or more sets of multimedia speakers. The challenge here is to produce tracks that sound good across the entire spectrum of computer speakers. This spectrum includes everything from the 2-inch speaker in a Macintosh, to a pair of $10 battery-operated match-boxes, to 5-channel surround-sound systems with powered subwoofers.

If pure sonic excitement is what you're after, the best way to beef up the sound of your multimedia system is to install a powered subwoofer. Place one of them under your computer workstation and you'll feel—as well as hear—the exploding bombs, roaring monsters, rumbling thunder, and thumping bass lines that make multimedia titles and games so exciting.

Another interesting development is the increasing number of multimedia surround-sound systems on the market. Creative Labs recently added QSound software technology to its Sound Blaster 16 ASP, and NuReality has developed a series of audio enhancement products based on surround-sound technology from SRS Labs. Altec-Lansing demonstrated its new ACS500 tower speakers ($450) at the fall COMDEX show. These are the first multimedia speakers to feature a built-in Dolby Pro Logic surround-sound decoder.

Although each of these systems is slightly different, they're all based on the principle of locating sounds beyond the normal stereo soundfield. The effect is to fool your brain into thinking that some sounds are originating from behind you, as well as from the left, right, and center.

SEEDY ROM

Because most multimedia titles are optimized for playback on single- or double-speed CD-ROM drives, there's really no advantage to playing the discs back on the more state-of-the-art triple- or quad-speed drives. However, if you're

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NEC Corp.
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Glyph Technologies
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MACINTOSH AUDIO CARDS:
Digidesign
tel. (415) 688-0600
fax (415) 327-0777

Morning Star Solutions
tel. (508) 692-0373
fax (508) 692-6535

MULTIMEDIA COMPUTERS:
Apple Computer
tel. (800) 776-2333
or (408) 996-1010

Compaq Computer Corp.
tel. (800) 345-1518
or (713) 370-0670
fax (713) 374-4583

MULTIMEDIA SPEAKERS:
Apple Computer
tel. (800) 776-2333
or (408) 996-1010

Yamaha Computer Related Products
tel. (800) 333-4442
or (714) 522-9011
fax (714) 739-2680

MULTIMEDIA UTILITY SOFTWARE:
Disc-to-Disk (versions for Mac and *Windows*)
Optical Media International
tel. (800) 347-2664
or (408) 376-3511
fax (408) 376-3519

PC 911 (*Windows*)
CyberMedia
tel. (310) 843-0800
fax (310) 843-0120

PC-COMPATIBLE SCSI HOST ADAPTERS:
Adaptec, Inc.
tel. (408) 945-8600
fax (408) 262-2533

Future Domain Corp.
tel. (714) 253-0400
fax (714) 253-0913

MULTIMEDIA UPGRADE KITS:
Creative Labs
tel. (800) 998-5227
or (408) 428-6600
fax (408) 428-2394

Turtle Beach Systems
tel. (800) 645-5640
or (717) 767-0200
fax (717) 767-6033

PC-COMPATIBLE SOUND CARDS:
Ensoniq Corp.
tel. (610) 647-3930
fax (610) 647-8908

Roland Corp.
tel. (213) 685-5141
fax (213) 726-8865

using a CD-ROM drive to search large databases, or if your primary application is to copy digital-audio files from CD-ROMs and audio CDs, then it may be worth it to buy a faster drive.

Another important consideration for musicians is the type of interface used to connect the CD-ROM drive to your computer. If you're interested only in checking out multimedia titles and games on CD-ROM, the type of interface you buy won't affect how the title performs. However, it may affect your plans down the road if you decide to upgrade. If the interface works only with a Mitsumi double-speed drive, you'll have to buy a new interface if you decide to switch to a quad-speed NEC drive.

CD-ROM drives for the Mac use a SCSI interface, but drives designed for PC-compatibles might use SCSI, IDE/ATA, IDE/ATAPI, or even a proprietary interface. We consider an external CD-ROM drive with a SCSI interface to be the best buy for musicians, because most samplers that are capable of downloading from a CD-ROM drive also use SCSI interfaces. Buying a device that's compatible with more than one piece of equipment makes simple economic sense. (For more on CD-ROM drive technology see "Disc-o-Mania" in the January 1995 **EM**.)

NOW FIND A PLACE TO PUT IT

Although many multimedia titles are shipped on CD-ROM, you'll still need acres of hard-disk storage, because some titles can load as much as 10 MB of data onto your drive. If your plans include producing audio for multimedia, you'll need even more storage capability. And if you decide to get into digital-video applications, you'll need *gigabytes* of hard-disk space.

Unfortunately, some hard-disk drive manufacturers responded to the demand for high-capacity, high-performance disk drives by spewing out marketing hype. Audio and video applications *do* require certain performance characteristics from a hard disk, but having an "AV" label on the drive is not one of them. (See "Multimedia Musician: Are AV Drives for Real?" in the September 1994 **EM**.)

First, look for a drive that handles thermal recalibrations in a manner that doesn't interrupt the flow of data during read and write operations. Some drives solve this problem by not performing T-Cals during read/write operations; others, using embedded servo technology, don't perform T-Cals at all.

Second, look for a high-capacity drive. Recording audio at 16-bit resolution and 44.1 kHz sampling rates consumes about 4.5 MB of storage per track, per minute. In other words, you'll need at least a 540 MB drive to store 60 minutes of audio. Recording full-frame, broadcast-quality video at 30 frames per second eats up 1.6 GB of storage per minute. Even taking into account the lossless compression algorithms that most nonlinear, digital video-editing systems (such as Radius' VideoVision Studio) apply to the video stream, you'll still need 1 GB of storage for every 8 minutes of video.

Third, you'll want a drive that is capable of delivering high sustained throughput. Whether you're using a

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Isn't it time you had some serious fun with your music? And at just $699.00 retail, the KC20 is seriously the most bang for a buck you're going to find at your dealer's. Check it out today. Your guitar player may hate you for it, but hey, it's about time they shared some of the limelight.

KAWAI

Digital Magic.

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SCSI, IDE/ATA, or IDE/ATAPI device controller, you'll want a hard-disk drive that can deliver at least 3 MB/second of sustained throughput. Some high-performance drives can produce sustained throughput of 17 MB/second or more. In the end, however, the real-world performance you experience will be determined by the dual bottlenecks presented by your computer's bus and device controller or host adapter.

I CAN SEE CLEARLY

With most color Macintoshes, you can be assured of getting at least 8-bit color (yielding a palette of 256 colors) and 640 × 480 resolution. On some color Macs, you can add video RAM to increase the computer's color depth (16-bits yields a palette of 65 thousand colors; 24-bits delivers 16.7 million colors) or to display the video on a larger monitor. The Quadra 630 is a notable exception. You can display 16-bit color at a resolution of 640 × 480, or 8-bit video at a resolution of 832 × 624, but you can't upgrade beyond that without installing a video card in the machine's Processor Direct Slot. Unfortunately, if you take that path, you'll be barred from installing Digidesign's AudioMedia LC ($995) hard-disk audio recording card, because it requires the same slot.

With most PC-compatibles, video is handled by an add-on card. Support for 16-bit color (a palette of 65 thousand colors) is common, with many cards supporting 24-bit color (a palette of 16.7 million colors).

Don't forget that the video output from your computer is less than half of the visual equation. Pairing a high-resolution video card with a low-resolution monitor is akin to critically monitoring your ADAT production through a set of Walkman headphones. Of course, that doesn't stop some manufacturers from bundling cheap monitors with their one-box wonders. You'll also find that some dealers—including some of the major chains—will advertise high-performance computers with "monitor included." Often, all they're really doing is quoting the regular price for the computer, plus a couple of hundred bucks for a cheap video monitor.

My advice is to bite the bullet and buy a good-quality monitor. Editing text, waveforms, and musical notation is precision work, and your eyesight is valuable. Look for a monitor that has a dot pitch (the distance between the dots that compose an image on the screen) of no more than 0.28 mm. The closer the dots, the better the definition. You'll want the monitor to be capable of at least 640 × 480 pixel resolution, although most monitors with a 0.28 mm dot pitch support higher resolutions (e.g., 800 × 600 or even 1024 × 768). You might also consider buying a multifrequency monitor that offers the advantage of operating in a variety of different resolution modes and functions with a variety of video cards and computers. I bought an NEC MultiSync II nearly eight years ago and have used it on my Macintosh IIci and several Amiga models. I'm still using it on an 80486 computer.

Musicians are best served by external, SCSI-controlled CD-ROM drives, such as this NEC MultiSpin 3XP Plus.

As a rule, avoid buying a computer that has a monitor grafted onto it. These types of computers have their place, but it's not in a musician's studio. You need a monitor with a tilt-swivel stand, because you'll be moving around the room tending to keyboards, sound modules, MIDI interfaces, tape decks, and other equipment at the same time you're using your computer. These types of computers also have a limited number of expansion slots, which can be a problem in itself.

Large-screen monitors (17- to 21-inches) are wonderful. Be prepared, however, to spend nearly as much—if not more—for a large-screen monitor as you did for your computer.

If you spend a lot of time editing waveforms or laying out publication-quality musical notation, you might also want to look at picking up a QuickDraw accelerator card for your Mac or a *Windows* accelerator for your PC-compatible. These devices speed up screen refreshes, and some offer such features such as hardware pan and zoom, which make for lightning-fast screen-scrolling and magnification.

CAN I PLAY NOW?

Sometimes it's just easier to let someone else make the decisions. Buying a PC or a Mac pre-equipped for multimedia applications means that you don't have to worry about installing anything. In addition, multimedia upgrade kits provide everything in one box, at one price, and from one manufacturer. Taking the easy way out, however, can cost you.

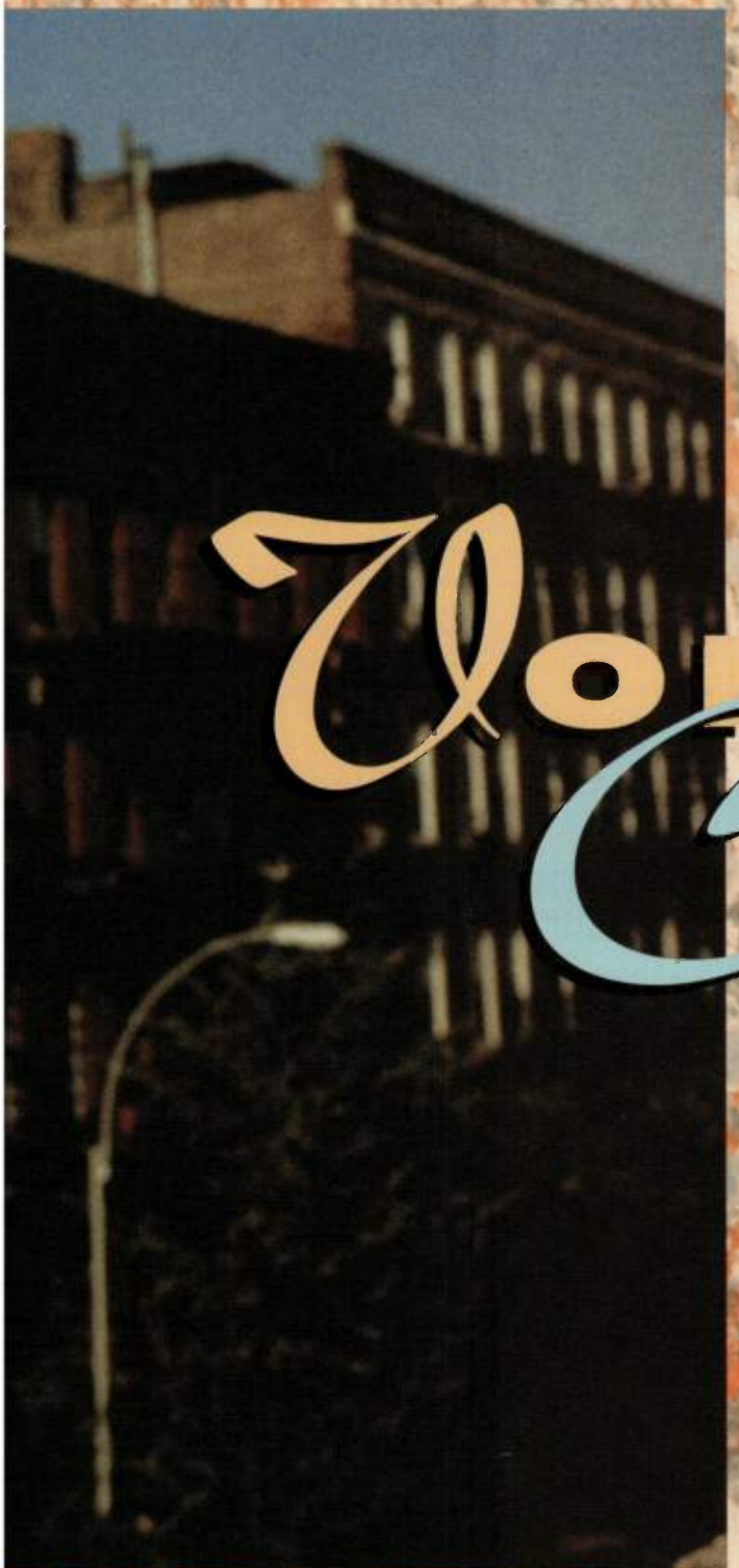
Fortunately, both manufacturers and resellers have responded to the market's fears when it comes to multimedia computers and add-on components. No longer must you sacrifice freedom of choice in order to avoid the hassles of configuring a system to your specifications. And Microsoft's Plug-and-Play standard will eventually make PC-compatibles as easy to configure as Macs.

Whichever multimedia path you decide to take, don't be satisfied with just checking out other people's stuff. Channel some creative energy into producing multimedia works of your own. Few artists are lucky enough to be around during the birth of both a new art form and a new industry. Take advantage of the opportunity, before somebody else writes all the rules.

EM *Associate Editor* **Michael Brown** *keeps trying to convince us how much work it is to write about multimedia technology, but we know he's really just playing games.*

CREATIVE Space

Sarah McLachlan fumbles towards the vocal comfort zone.



Voices Carry

Sarah McLachlan loves to sing with herself. On her critically acclaimed and commercially successful third album, *Fumbling Towards Ecstasy*, the Canadian chanteuse delivers every crystalline high note, growl, gasp, and whisper. That's no small achievement, considering that each song on the record is a virtual orchestra of evocative singing and stacked vocal harmonies. But recording such passionate, multilayered performances might have been difficult without the nurturing environment of producer Pierre Marchand's Quebec project studio.

"We had the luxury of working only when it felt right," says McLachlan. "The recording process was very casual. I'd get up, have breakfast, and when I got to the studio, the microphone would already be set up and waiting. If my voice just wasn't happening that day, we'd stop working. When I felt better, we'd start again. Unfortunately, the recording process hasn't always been this great. On some of my other albums, I felt pressured and everything seemed forced."

Because McLachlan's folk-influenced songwriting is very sensitive and personal, it's easy to see how a pressured recording environment can disrupt her muse. The importance of maintaining "creative comforts" during a project was proven when *Fumbling Towards Ecstasy* was completed in just six months, as opposed to the two years it took to record her previous album, *Solace*.

Photograph by Dennis Keeley

By Ellen Snell Adams

VOICES CARRY

"It took forever to make that record," exclaims Marchand, who produced both *Fumbling Towards Ecstasy* and the problematic *Solace*. "The album was tracked in five different locations, and the recording definitely suffered from all the traveling. We started with a small recording setup in a cottage and then moved around to some funky little places in Vancouver and New Orleans. Every time we tore down the studio and set it up again, there were problems. We'd get nothing but buzzes and bugs. In constrast, *Fumbling Towards Ecstasy* was made in one location—my studio. There's just no comparison. It was much easier to work here."

THE COMFORT ZONE

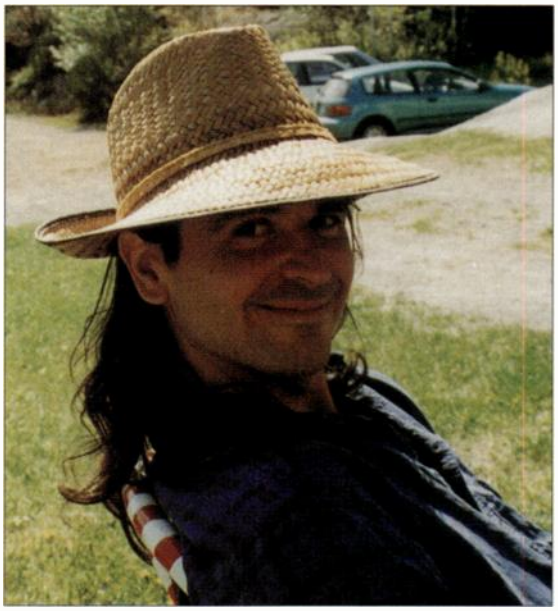
The interior design of Marchand's Wild Sky Studio evokes the tattered warmth of a gypsy wagon, but there is nothing ragged about the recording equipment. Amidst the Moroccan-style rugs, cast-off furniture, and parachute-cloth ceiling drapes is an impressive collection of high-tech, high-quality pro audio gear. (See table "Under the Wild Sky" on p. 75.) A room-length picture window adds to the open ambience, as does the fact that the studio does not have a separate control room.

"I'm not a fan of sealed-off rooms," explains Marchand. "I don't think many musicians are comfortable working in air-tight compartments."

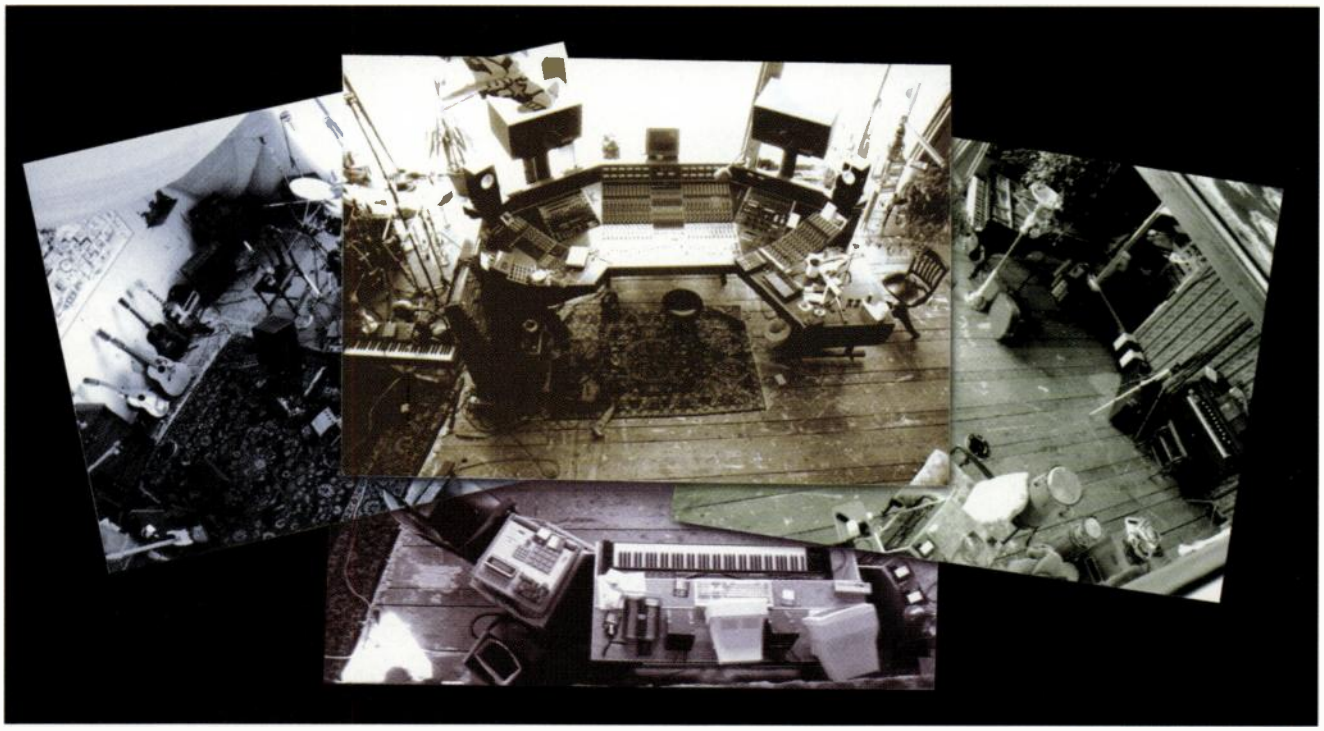
But the lack of a control room at Wild Sky makes monitoring an issue, because an engineer can't blast the monitor speakers while acoustic instruments are recorded. Any loud sounds will obviously leak into the vocal and instrument mics, possibly compromising the clarity and timbre of whatever is being recorded. To prevent leakage, Marchand monitors through headphones, along with the artist.

"I have these old Sony MDRV-6 headphones that are absolutely marvelous; I don't know why they don't make them anymore," says Marchand. "They really sound good—very flat and accurate—and can be collapsed down to fit into a jacket pocket. A lot of engineers and musicians call me about them, asking where they can find some. They're still a popular model."

As good as the MDRV-6s sound, however, Marchand does not make critical tonal decisions while wearing headphones. He records a "sound check"



***Fumbling Towards Ecstasy*, producer Pierre Marchand**



The funky, home-spun vibe of Marchand's Wild Sky Studio put McLachlan at ease.

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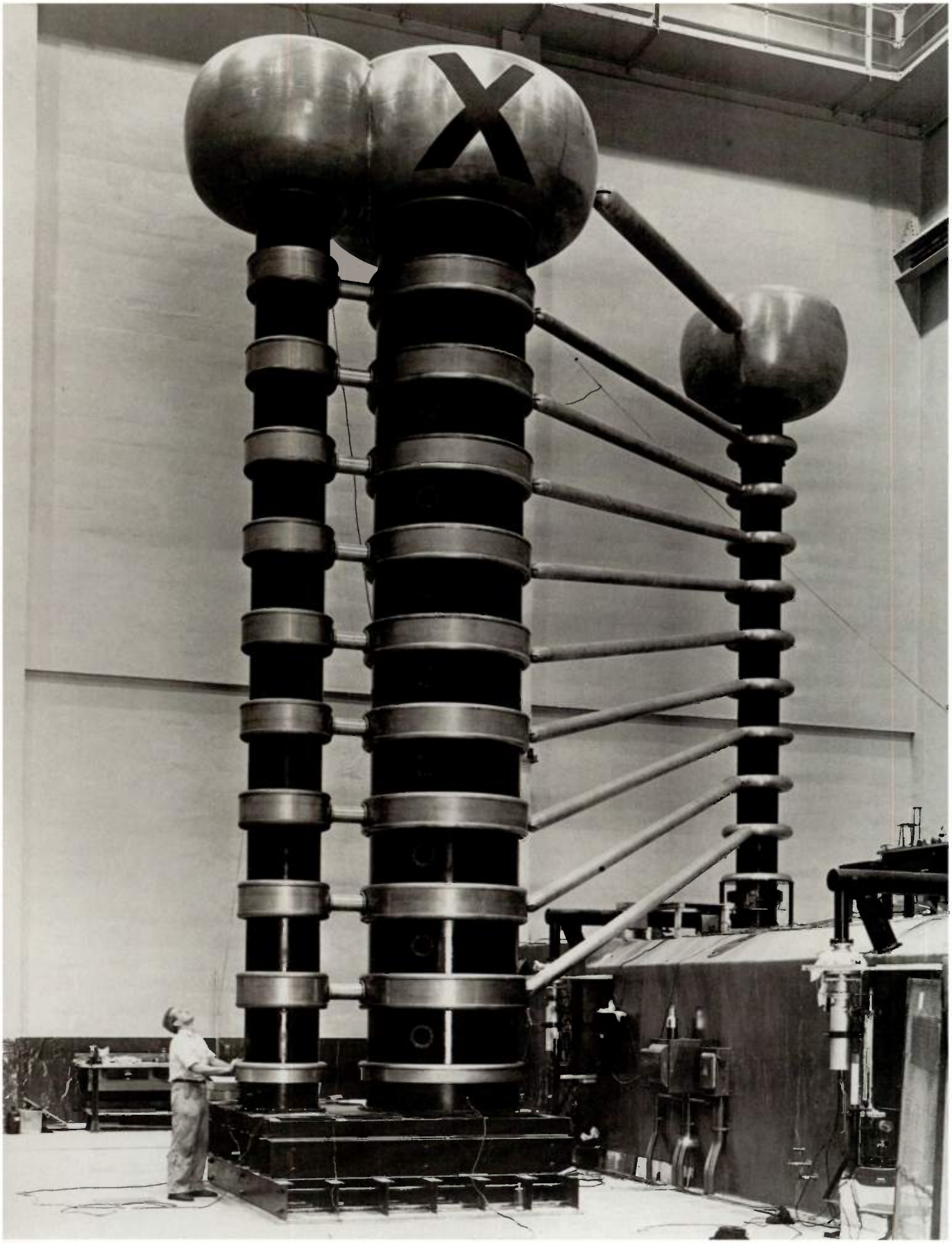

The X Project, Korg Power Plant, 1994.

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while the singer or instrumentalist is warming up and uses the track to audition EQ settings.

"I record the warm-up track flat—without EQ—then patch in one of my [outboard] graphic equalizers," explains Marchand. "When I play the track back, I'll fool around with the EQ settings until I find something I like. After I've dialed in an EQ that sounds good, I simply repatch the equalizer into an input module and start recording the 'real' tracks. Because I've already made my tweaks, it's no problem listening to the performances over headphones. Anyway, the whole recording process seems easier without being separated by big [control room] doors. After a take, I can slip off my headphones and talk directly to the artist. I don't have to shout through a little talkback mic."

However, the lack of an isolated tracking environment still invites unplanned noises to sneak into the mics during recording. Wild Sky's beautiful, panoramic picture window is hardly a barrier to outside sounds.

"Oh, yeah, there was certainly some sound leakage through the window," admits Marchand. "I know that crickets and rain are on some of the tracks along with Sarah's vocals. But you really can't hear them. The main consideration was getting a performance. If her track was good, we'd keep it and just not worry about the leakage."

VOCAL ESSENCE

Besides possessing an impressive vocal range, McLachlan's dynamic control is awesome. She can swoop almost instantly from a soft, intimate whisper to a terrifying banshee wail. It's not an easy task finding a microphone capable of capturing McLachlan's varied moods. Marchand auditioned a slew of models before choosing a tube mic to construct the vocal sound of *Fumbling Towards Ecstasy*.

"I have a pretty decent microphone collection—some old RCA ribbons, a few tube mics, and the usual crew of condensers—and I put up a bunch of them to see which delivered the best sound," says Marchand. "The tube mics seemed to work best for Sarah. Neumann's U67 did a good job, but the ultimate signal path was a Telefunken U47 [tube mic] routed through a Neve 1078 EQ/mic preamp and EQ and a Tubetech CL-1B tube compressor. I kept the compression ratio on the CL-1B pretty minimal, approximately 2:1, with a fast attack and a slow release. The compression threshold was set so that when she sang softly, no compression was active."

Microphone placement was dictated by the song. Soft ballads were usually recorded with McLachlan's lips close to the mic, while other tunes sounded better with more air between the singer and the microphone. In all cases, Marchand used a windscreen to deflect plosives.

"The mic position depended on the effect we were going for," he says. "Obviously, if Sarah wants to be up close and whispery, she moves closer to the mic. Typically, she stays about a foot or two away from the mic, which captures a nice bit of room ambience along with the vocal. Sarah likes to cut her vocals while seated at the piano, so most of the vocals on the album were recorded with her sitting down. Perhaps it's more conventional to record vocal tracks while the singer is standing, but I've found that making the singer comfortable is essential if you want to get a great performance."

McLachlan's preference toward sitting at the piano while she sings produced a happy accident when she recorded the vocal track for the song "Fear." During an instrumental section, instead of sitting quietly, McLachlan began noodling on the piano keys. The surprise performance was picked up by the vocal mic and sounded so wonderfully eerie that Marchand used it on the final mix.

"The sound of the solo on 'Fear' was really just mic leakage," he admits. "Sarah actually played a pretty bizarre but cool little solo. I enjoy it when something unexpected turns out to be amazing."

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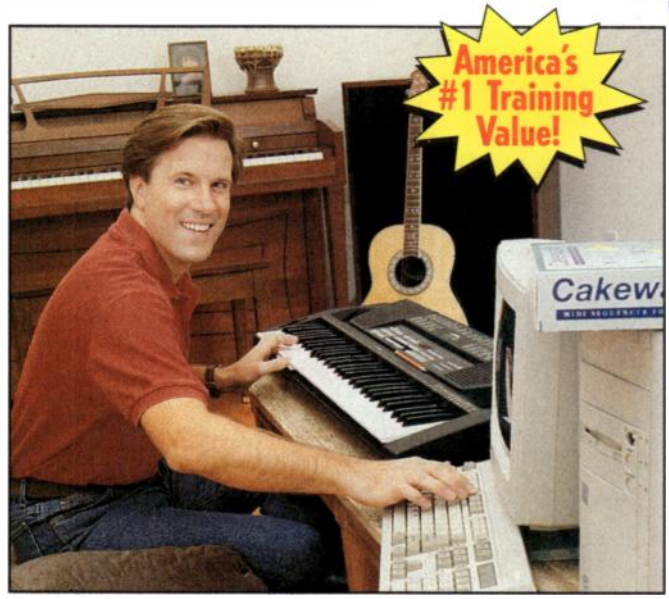

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It's no surprise that Marchand's style of music production matches the comfortable vibe of his studio. In fact, his "hands-off" approach to recording the vocal tracks on *Fumbling Towards Ecstasy* can almost be labeled an "antiproduction" technique.

"This may seem a bit controversial," states Marchand, "but I don't believe you can direct someone how to sing [in the studio]. I don't think it's really productive to ask for a bit more of this or a bit less of that. A good vocal performance comes from deep within the singer, and to assume that you can consciously change a singer's style or channel someone toward a different direction is rather optimistic. I mean, you can't *make* somebody sing good. What you can do is make the singer comfortable enough so that he or she feels inspired to deliver a great performance. Beyond doing that, I'm not sure that it's truly possible to 'produce' a vocalist."

MULTIPLE SARAHS

To maintain a sense of passion and freshness, most of the lead vocal tracks were recorded three times (on three different tracks) from start to finish. There were no punch-ins or "fixes" made on any version of the lead vocal.

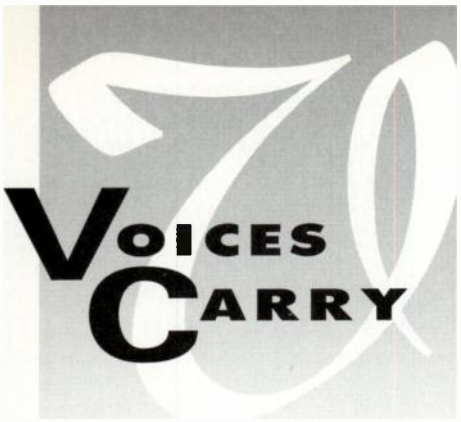
After the three tracks were completed, Marchand would listen for the best performances. If necessary, he would then submix the stellar parts of each track to a single, exquisite composite track.

"We tracked all the vocals—leads, backgrounds, and harmonies—with the attitude of 'Hmm, let's try another,'" says Marchand. "The multiple takes were not because Sarah was singing poorly; we did them simply to discover different vocal phrasings and deliveries. We were always curious about where things would go. On the song 'Ice,' for example, Sarah improvised all these wonderful ooos, ahhs, and harmonies. I think we ended up with twenty tracks of vocals!"

It doesn't take a math genius to figure out that twenty vocal tracks on a 24-track recorder doesn't leave much room for rhythm tracks, and *Fumbling Towards Ecstasy* is definitely not an a capella album. The instrumental arrangements on the record are almost as compelling as McLachlan's voice. To make tracks available for all of the vocal gymnastics, Marchand mixed the

UNDER THE WILD SKY

Consoles	Helios 32x24x2, Mackie 32•8, Speck Xtramix
Recording Media	Akai DR4d hard-disk recorder, Fostex D-20B DAT, Otari RADAR hard-disk recorder, Panasonic SV-3700 DAT, Studer A827 analog 2-inch, 24-track deck
Monitor Speakers	KRK 9000, Tannoy Eatons, Westlake BBSM10, Yamaha NS10M
Microphones	AKG C451E/CK1, AKG D112, Beyer M88, Neumann U67, RCA BK5a ribbon, Realistic PZM, Sennheiser MD-421, Shure SM57, Telefunken U47
Keyboards and Sound Modules	Alesis D4, Kurzweil K2000, Roland MKS-20, Roland S-750, Roland TR-808, Yamaha KX88
Signal Processors	Alesis 3630 compressor/gate, Aphex Compellor, Aphex Expressor, Apogee AD500 A/D converter, Ensoniq DP/4, Eventide H3000SE, Korg A3, Lexicon PCM70, Roland RE-301 Space Echo, Tech 21 SansAmp, Tubetech CL-1B tube compressor
Computers and Software	'486-33 MHz, Steinberg *Cubase Score*, Voyetra *Gold*
Synchronization	Fostex 4030 synchronizer with 4035 controller, Voyetra V-24S MIDI interface with SMPTE
Power Amps and Preamps	Bryson 4B power amp, Hafler SE120 power amp, Neve 1073 mic preamp/EQ, Stewart HDA-4 head phone amp



rhythm tracks to a Fostex D-20B DAT recorder with SMPTE time code.

The DAT tracks were then locked to the multitrack deck, providing Marchand with 22 tracks available for vocals. (One track on the multitrack recorder was needed for time code and another as a guard track—where nothing is recorded—to ensure that crosstalk didn't compromise the sync tone.) The multitrack transport was controlled by a Fostex 4030 synchronizer which chased the time code on the DAT.

"When we finished tracking the vocals, I'd mix the various sections—lead vocal composites, harmony arrangements, background parts, and so on—back to DAT," says Marchand. "Because the DAT and multitrack were locked to SMPTE, I could roll to the original [multitracked] rhythm tracks and punch in the vocal mixes from the DAT. Everything synched up perfectly."

Besides freeing up available tracks, DAT submixes also save wear and tear on the analog multitrack tape. By using the SMPTE-locked DAT rhythm tracks as a reference, Marchand prevents the actual rhythm tracks from running across the multitrack's record and playback heads countless times during vocal recording. (A noted engineer/producer once chided the Rolling Stones for sabotaging the audio quality of their recordings by continually tracking and retracking parts until the tape was nearly in tatters.) Such care ensures that the analog tracks retain a clean sparkle rivaling digital resolution *and* produce the sensual warmth that typifies analog sound.

"Recording *Fumbling Towards Ecstasy* was easy and a real joy," says Marchand. "The experience was great, the sounds are good, and Sarah's performances are wonderful. What more can you ask for? This album was a lot of fun to make."

NO FUMBLE

The commercial and critical success of *Fumbling Towards Ecstasy* proves that Sarah McLachlan hasn't let much slip through her fingers since her parents vetoed her first record deal when she was seventeen years old. Today, she demands—and gets—total artistic freedom over her albums. Full creative control is a rare prize for artists of any discipline, but such power is especially uncommon in the pop music field. That McLachlan has achieved such clout in the music industry within a relatively short career is a tribute to her commitment.

"I design all my album covers, I do all the merchandising stuff, and I conceive the videos," she says. "But everything pales in comparison if I don't broaden my artistic horizons. I've never had any problems recording vocals, but working at Wild Sky, in a beautiful, comfortable environment, really helped me to focus on myself so I could stretch and reach for my best."

Ellen Snell Adams *is a freelance journalist based in Austin, Texas.*

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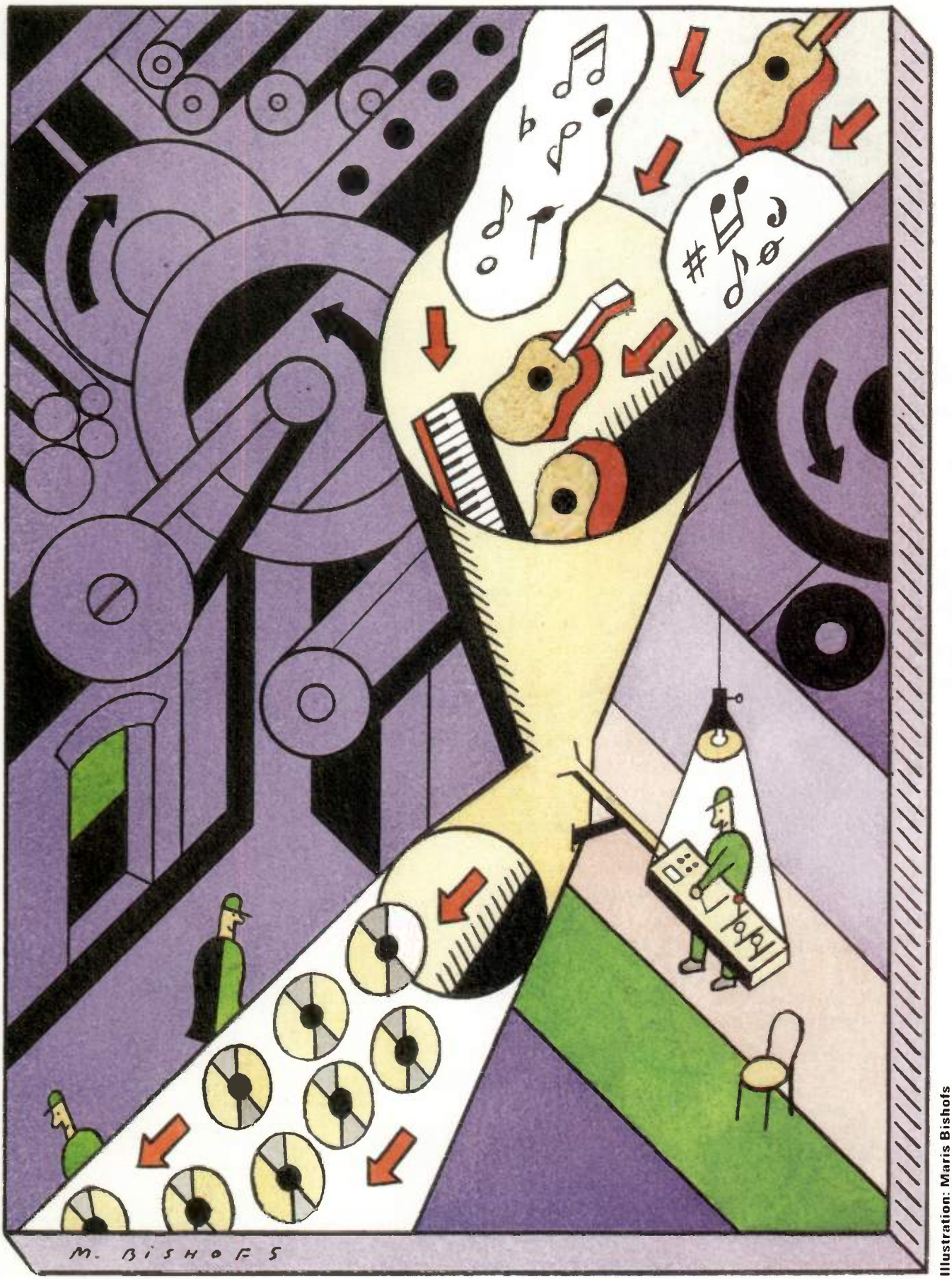

Illustration: Maris Bishofs

all Mixed up

Part One of a mixing master class on forging industrial-strength master tapes.

The act of mixing scares the pants off me. It doesn't matter that I've been sitting in front of recording consoles for twenty years, or that I've mixed hundreds of audio productions. It doesn't even matter that my mixes have been heard all over the world and that music-industry honchos actually respect my work. All I think about when I sit down to mix is this: I have the power to turn perfection into doo-doo. Gulp!

It's a humbling thought to realize that all the passion and grace chiseled day-by-day and hour-by-hour into a recording project can be vaporized by a poor mix. The bottom line of any audio production is that the person who mixes the tape controls what the final product sounds like. That's a pretty awesome responsibility—and not one to be taken lightly.

Mixing is more than just moving faders around and playing with signal processing. It's a detail-oriented horror show of grand possibilities and crushing disappointments. Producing consistent good work requires preparation, critical listening skills, and a set of quality tools.

But you don't *have* to turn into a trembling mass of panicking synapses every time you approach a mixing console. Anyone can be taught to produce sterling mixes. Our master class will teach you how to safely negotiate the mixing console's sonic minefield. We'll break you in slowly, because there's a lot of ground to cover. This month, we'll show you how to assemble a powerful mixing station; how to prepare mind, body, and ears for the rigors of sound sculpting;

By Michael Molenda

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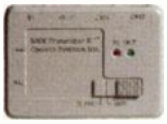

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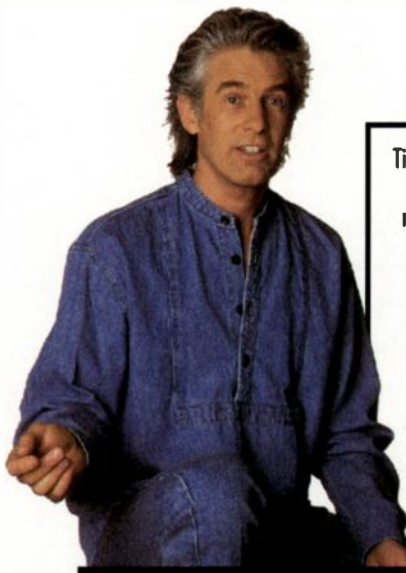

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and how to ferret out and disarm sonic sabotage. Next month, you'll receive EQ and signal-processing tips for punching up the impact of specific instruments. But right now, let's take it slow (I've already admitted how the very thought of mixing can turn me into a Jell-O mold) and discuss how to get your studio ready to churn out sizzling mixes.

SYSTEM REQUIREMENTS

I usually advocate thumbing one's nose at limitations, but let's face it, producing great work is easier (and less risky) when you have excellent tools. To really produce master-quality mixes in a personal studio, you need a certain class of technical collaborators. If you don't have these tools, it doesn't mean you *can't* produce killer mixes, it just means you'll travel a bumpy road to excellence. Here's my gear recommendations for assembling a slamming, yet reasonably affordable, home mixing station.

Multitrack deck. For obvious reasons, modular digital multitracks are all the rage. But a well-maintained analog multitrack is no slouch. As long as your tracks are carefully recorded, both analog and digital machines deliver enough audio quality to produce killer mixes.

Mixer. Pop for as many input channels as you can afford, because stereo signal processors and virtual tracks really gobble up a mixer's real estate. If you own a single ADAT, DA-88, RD-8, or analog 8-track recorder, I recommend at least a 16 × 8 × 2 model. Most 8-bus mixers offer dual-input capabilities that double the available returns, which means that a 16-channel console is essentially a 32 × 8 × 2. Even if you never think you'll use 32 channels, dual-input boards are a great value. (And take it from me; you'll soon be patching all kinds of things into those "extra" inputs.)

The basic EQ requirement for optimum tonal tweaking is 3-band with sweepable mids. You'll also want at least four aux (effects) sends to maximize signal processing options. The number of dedicated aux returns is not an issue if you have enough channel inputs available. (I never use aux returns, opting instead to return effects on channel strips where I have full EQ and fader power.)

Solo-in-place is a must, because it maintains a signal's stereo placement when solo mode is active. Make sure you have channel mutes, too. An insert send/return on each channel is critical for patching compressors, noise gates, and other processors into the signal path. If price is no object, definitely search out full-featured consoles that also include MIDI muting, long-throw faders, line trim pots, direct outs, and an onboard alignment tone generator.

Monitor speakers. Just make sure that you employ *professional* monitors and not inexpensive, consumer electronics-store speakers. (For more ranting about monitors, see "Boom Boxes" in the November 1994 **EM**.) You don't have to buy monsters, either. Countless hits have been mixed on compact, near-field models that are typically loaded with a 6-inch woofer and a 1-inch tweeter.

Signal processors. I'm addicted to genteel excess, so if your board has four aux sends, I recommend matching the complement of sends with four different effects boxes. (After all, variety *is* the spice of life.) For my money, multi-effects processors are better values than dedicated reverbs or delays. If you produce vocal music, make sure that at least one box delivers lush reverb. Of course, all processors must offer pristine audio quality and low noise.

Dynamics processors. Sometimes the difference between a good mix and a great mix is a hint of compression, so it's important to have a pro-quality stereo compressor in your arsenal. If you can afford two, all the better. (I typically compress *everything* to squeeze out every dB of sonic impact.) A quad noise gate is essential for keeping problematic tracks sparkling clean. And if you're looking for something else to buy, pick up a stereo (or dual) single-ended noise-reduction processor to combat audible hiss.

Two-track. I have only two words for you: DAT machine. Yeah, they're expensive, but they are also easy to use, are a breeze to maintain (say goodbye to tape bias adjustments), and sound stupendous. Besides that, DAT is the de facto standard for just about every recording studio, duplication plant, and record company in the world.

An affordable dream system. Want me to spell it out for you? (Sheesh, everyone's bugging me to name names these days; I feel like I'm in the hot seat at the McCarthy hearings or something!) Okay, here's the stuff I'd use to turn my personal studio into a master mixing room: The console would

For his ethereal *Siesta* soundtrack, producer Marcus Miller bathed Miles Davis' trumpet in a lush reverb and complemented the instrument's plaintive midrange with a fat, underlying bass track.

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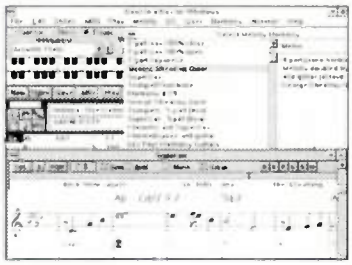

Band-in-a-Box 6.0 for Windows breaks new ground with over 50 new features...

STANDARD MUSIC NOTATION and leadsheet printout of chords, melody and lyrics. Enter your songs in standard notation & print out a standard lead sheet of chords, melody and lyrics. Make your own fakebook!

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PC Magazine Jan.15,1991
Technical Excellence Awards

– FINALIST –
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TECHNICAL EXCELLENCE PC MAGAZINE

After Hours / Entertainment
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"Complete" Upgrade PAK to version 6.0 for Windows ***$69***
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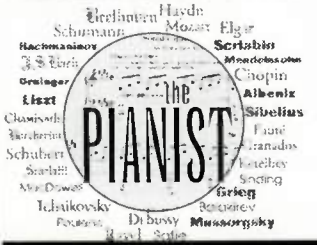

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RECORDED IN REAL-TIME ON A MIDI GUITAR! *Hear the music with CD-quality through your sound card or MIDI system. Most pieces have bass/drums as well as guitar so you get a full sounding jazz trio for the tunes!*

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"Solid sequencing at an unbelievable price" Electronic Musician Sept. 93

PowerTracks Pro 2.2 is a professional full featured MIDI sequencing, notation and printing program, and is so easy to use! And we include versions for Windows 3.1 AND DOS, so you'll be able to use PowerTracks PRO on all of your machines!

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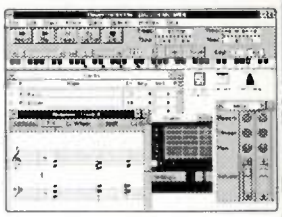

MUSIC NOTATION
Enter and display music in standard Music notation. Intelligent automatic features such as "Correct beaming/tying of notes/rests options", "Jazz Eighth notes" option (this automatically allows jazz swing eighth notes & triplets to be notated properly!), etc. Reads in any MIDI File & displays it as notation!!

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POWERTRACKS FOR DOS VERSION INCLUDED FREE. *Yes! We include the DOS version for FREE in the same package. NOTE: The DOS version doesn't support music notation, or other graphical features.*

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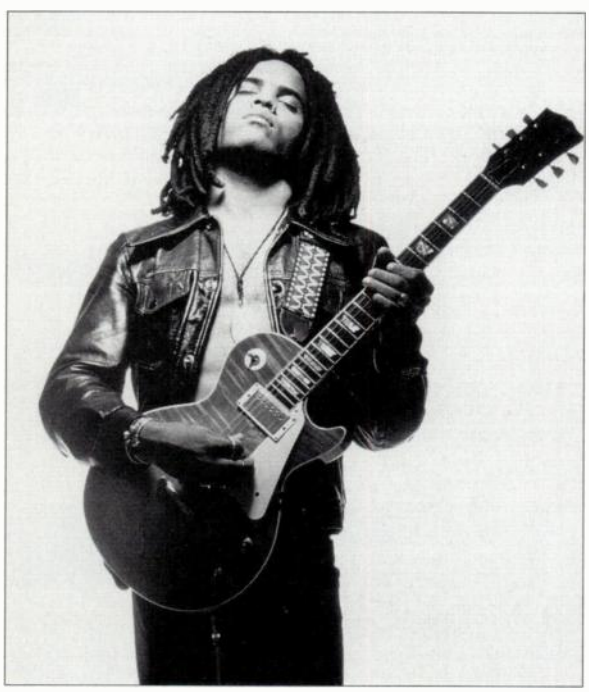
30 DAY UNCONDITIONAL MONEY BACK GUARANTEE ON ALL PRODUCTS

be either a Studiomaster P7 ($4,295 for 16 × 8) or a Mackie 16•8 ($3,197). I'd grab a pair of Audix Studio 1As ($599/pr.) as my monitor speakers—although I'm itching to try out KRK's new K•RoKs ($449/pr.).

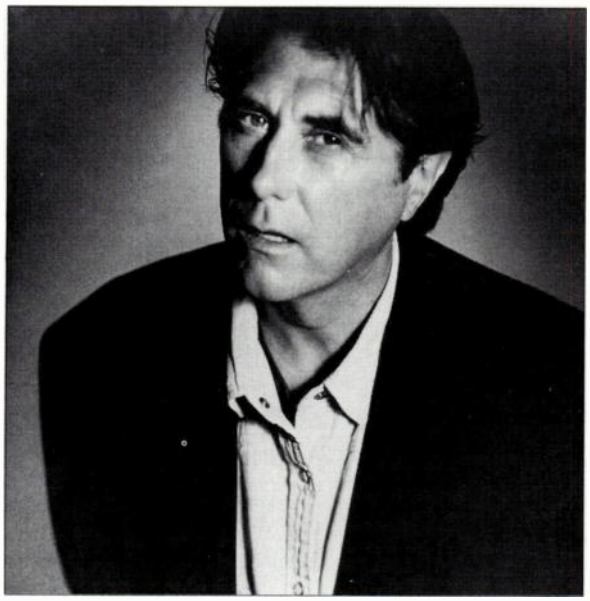
My primary multi-effects units would be Ensoniq's DP/4 ($1,495), the Alesis QuadraVerb II ($799), and Lexicon's Alex ($399). As far as affordable compressors go, I don't think you can beat the dbx 166A ($549). Aphex's 105 ($449) is an excellent quad noise gate, and I'd add some single-ended noise reduction with dbx's Model 296 Spectral Enhancer ($349). Tascam's DA-30 MkII ($1,499) is one of the hottest DAT decks around, but if I were on a tight budget I would make do with Sony's tiny TCD-D7 DAT Walkman ($699). And if you badger me to name a multitrack recorder, I'll choose the Alesis ADAT ($2,999). Now, are you satisfied?



Lenny Kravitz's obsession with '60s production styles leads him to mix everything with the stark, organic sound of a band playing live in a small room. (He even includes the hiss of the guitar amps.)

PREPPING FOR ASSEMBLY

Great mixes don't just drop from the sky, so you won't do your music any favors if you stand around waiting to get kiboshed by inspiration. The typical mixing session is smothered in minuscule details, so preparation and planning are recommended survival tactics. A mixing game plan doesn't have to be as complicated as a space shuttle launch, but you should have an idea of what you want the finished master to sound like.



Bryan Ferry's lush sonic vistas are produced by the careful layering and mixing of multiple counterpoint lines. To achieve this, timbral elements are carefully separated to avoid tonal clashes.

Get rough. Rough mixes are excellent preproduction tools, not just audio throw-aways used solely to audition performances. If you've made a number of roughs throughout the recording process—and you *should* have—listen to them in a single critical listening session and determine whether any signal processing, EQ tweaks, or level adjustments are also appropriate for the final mix. Don't laugh. Sometimes a 10-minute rough mix can sound better than the final mix that you slaved over for ten hours. Rough mixes often exhibit an immediacy and passion that should be retained on finished masters. If you "check in" occasionally with the rough mix of a song, you may avoid mixing the life out of your music.

Integrate systems. Isolationism is not always a functional ideology for a mixing engineer. It helps to reference your mixes to commercial releases to ensure that you're achieving some level of excellence. Whenever someone plays me a mix that sounds dull, muddy, painfully trebly, or otherwise sonically skewered, I can assume they never referenced their work to a well-produced CD. If they had, they would have noticed immediately that the commercial release sounded vastly superior to their audio catastrophe.

I never mix anything without comparing my track to the work of an engineer or producer that I respect. My console can switch between two simultaneous playback sources, so it's easy to reference a DAT mix to a CD, or even a CD to the multitrack master during preliminary sound sculpting. I listen to determine whether my mix has the same sonic sheen and frequency spectrum integrity as the commercial release. Does my mix exhibit more or less bass? Is it muddy? Does my mix sound thin or tinny compared to the CD?

I'll also check relative levels. Is my vocal mixed louder or softer than the CD production? How up-front are the snare drums, kick drums, guitar solos, and background vocals on each version? Finally, I'll switch rapidly between the CD and my mix. Are the overall bass, midrange, or treble frequencies diminished when I click in my mix? Ideally, you want to see if a radio deejay could seamlessly crossfade from a hit song right into your mix without any sonic inconsistencies. Your mix should sound just as sonically robust as anything you hear on VH-1 or major-market radio. (Within reason—after all, few of us have Sting's recording budget.)

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*Manufacturer's suggested retail price.

Sterilize operations. Poor audio hygiene can sabotage mixing sessions. Ensure that your equipment delivers optimum performance by keeping heads, tape paths, and fader mechanisms spotless. I've visited countless home studios that could double as pigsties, and the owners never seem to grasp the correlation between their messy hovels and their messed-up master tapes. (Can you say, "Duh?") A filthy playback head can rob your tracks of high-end information and increase the chance of catastrophic signal drop-outs. And even a tiny speck of dust in the fader path can produce an audible crackle during a level adjustment or a fade out. Get the picture?

But tape decks and mixer surfaces aren't the only things you should keep clean. Your multitrack master must be pristine, too. I always schedule a "track cleaning" session before the actual mixdown where I erase count-offs, alternate takes, throat-clearing and clothes-rustling between vocal sections, and other bits that I don't want to hear. Believe me, it's easier to do track maintenance before the mix than it is to hit mute buttons on the fly. I know an engineer—with a well-deserved reputation as the Oscar Madison of recordists—whose tracks were so contaminated with amp buzzes, blips of overrecorded reference tracks, duff performances, and other audio garbage that he regularly crashed the mute automation of $100,000 Euphonix consoles. Don't set yourself up for a stressful mix. Erase every piece of sonic junk from your multitrack master before you even consider mixing.

Keep tools handy. In a best case scenario, mixing is still an angst-ridden, detail-oriented operation. You should strive to keep your mind focused on what's blasting out of the monitors. For

Glam-rock revival band Suede uses "good" distortion to drive the brutal passion of their anthems.

Meet the greatest partner a songwriter ever had.

Hit songs are easy to write. Just create a great melody, rich harmony and infectious rhythm. The first two you can cover with your keyboard or guitar, but tapping your foot just doesn't cut it for the third. Not these days, anyway. That's why the SR-16™ Drum Machine is the greatest partner a songwriter ever had.

Choose from 400 patterns, fills and variations to set the tempo and groove. They were played by a real drummer, so they're high on feel. Got something extraordinary in mind? Program your own parts in seconds.

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When it's time to record, string your patterns together in a song — effortlessly. The SR-16 emphasizes ease so you can emphasize creativity. Four outputs, all the right MIDI stuff, and foot-switchable fills and variations make as much sense on stage as in the studio. After all, a true partner will go with you anywhere.

The SR-16's got a tiny footprint, but it completely covers the job of creative support. And why not? At Alesis we design solutions for the real world.

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SR-16 16 BIT STEREO DRUM MACHINE

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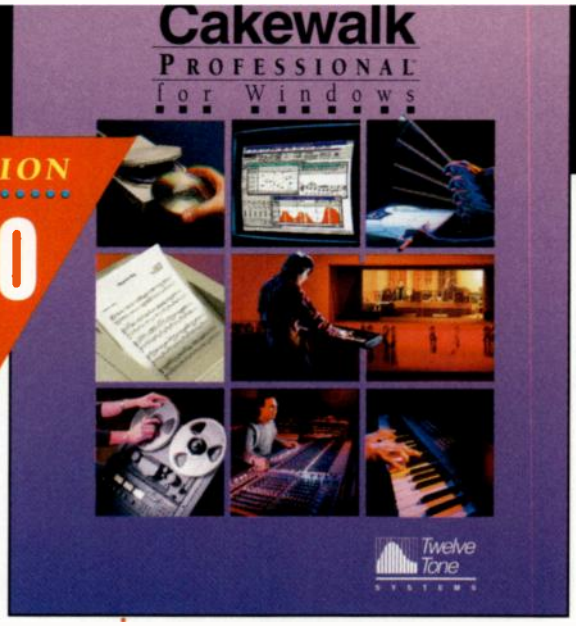
ALESIS

PLAY HARD.



WORK EASY.

Tired of music software that's hard to work with? Spending more time making tech support calls than you are making music?

Then bring in the Professional.

Cakewalk Professional remains the leading MIDI sequencer for Windows today. It's powerful, fast, stable, and yes — extremely usable.

And while other music software companies scramble to release something on the Windows platform, Twelve Tone Systems is now shipping the third major release of its award-winning sequencer.

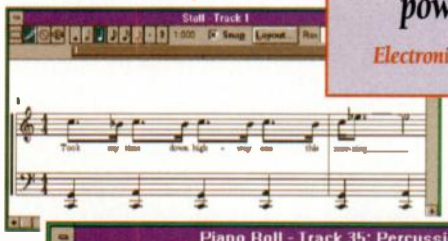
Here are some of the new 3.0 features:

BANG ON THIS

So what *else* is new in 3.0? Plenty.

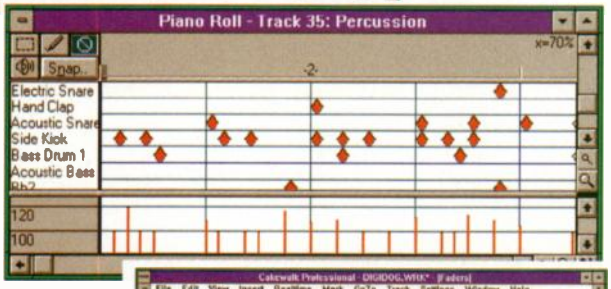
- Percussion Editing
- MIDI Machine Control
- Enhanced Swing Quantizing
- Printing Up to 24 Staves per Page
- Expanded Instrument Definitions
- Bank Select
- Way More

> *"Simply put, it's a professional powerhouse."*
> *Electronic Musician, 3/94*



GRAB A GROOVE

The new Groove Quantize option lets you "steal the feel" of one track, and use it to quantize another. Cakewalk's own groove format supports note start-times, durations and velocities. Also works with DNA Grooves.



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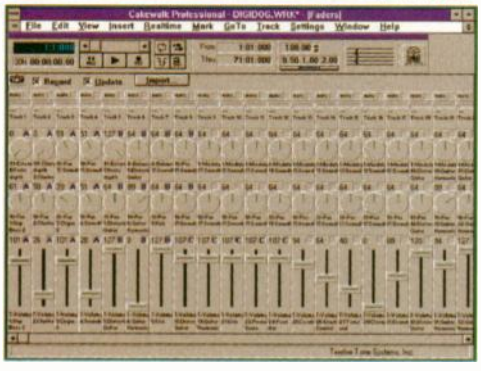

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me, this means having everything I need within arm's reach. If I have to get up from the board to look for something, I've lost a valuable bit of concentration. Be sure to have all your track sheets, notepads, pencils, masking tape, marking pens, reference CDs or cassettes, and grease pencils close by and within easy sight lines. Keeping all these things at hand may seem overly fussy, *until* you forget the perfect spot to mark a fader level because you had to walk into the next room to find a grease pencil. It happens.

You can also save yourself a lot of fumbling around if you clearly mark which instrument or vocal part is on each mixer channel. Most consoles include a surface above or below the channel faders that's especially designed for writing track information. Typically, this polished surface invites the use of black grease pencils or erasable markers, but it's much neater to lay a strip of masking tape across it and jot down channel data with a pen. Then, when the mix is completed, you simply remove the tape. You don't have to deal with scrubbing away old grease marks. And if you decide you may want to remix a track, you can carefully remove the masking tape and save your marks by affixing the adhesive strip to an equipment rack or keyboard stand.

On my channel ID strips, I usually write in what's on the channel strip (lead vocal, rhythm guitar, snare, left room mic, etc.); whether any processor is patched into the channel insert or direct out (compressor 1, gate 3, etc.); and, if there's room, any critical mix moves (verse 1 out, fade at bridge, mute during solo, etc.) I also put a small piece of tape at the far left side of the console, up near the aux sends, to identify which effects units are assigned to which sends. You'll be glad you marked everything clearly when a mix starts to get intense—especially if you have a friend helping you manage complicated fader moves. There's nothing more frustrating than getting to a critical section of a tune and hearing yourself, or your collaborator, mutter "Where's the acoustic guitar?" or "Which aux send is the delay on?"

Avoid interruptions. Again, this should be obvious. You can't devote full attention to a music production if you're constantly answering the phone or running out to snatch a glimpse of your favorite television show. Plan your sessions so that you can commit your mental resources to the mix. Take the phone off the hook, and don't decide to start a mix fifteen minutes before *The Simpsons* starts. Inattentiveness usually ensures that you'll be remixing. Why waste your time?

Take breaks. Planned breaks are different than interruptions. Your ears will definitely need a rest after approximately four hours of constant mixing. Don't be macho! Continuous exposure to high and moderate decibel levels causes a temporary frequency shift that can sabotage critical tone-shaping decisions. A personal trainer can't stop your hearing from shutting down in the middle of a brutal 12-hour mixing marathon, so don't be an idiot! Get away from those monitors every two or three hours. Grab a cup of tea or take a short walk, but don't listen to any music for awhile. A revitalized pair of ears will deliver tremendous rewards in terms of enhanced performance.

But even if your ears didn't require a rest period, it always helps to clear your head occasionally. When you start obsessing over details the first thing that self-destructs is your objectivity. A good recordist must be able to negotiate technical details *and* keep some distance from the process. After all, we're not building the starship *Enterprise*, we're making music. Don't get so lost in the detail work that you crush all the fun and energy you put into your music in the first place.

Inspect your work. Someone once said that great authors don't write, they *rewrite*. Well, conscientious recordists should always be ready to remix. Unlike live performances, a CD release is a tangible, audio document with a frighteningly long shelf life. If you produce something that you can't bear to listen to, you'll be haunted by it for a very long time. Take it from me, I've been there.

Once you've completed a final mix, put it away for a few days. When enough time has passed that you've forgotten about all the pain and suffering it took to produce that master, take out the tape and play it. Listen with fresh, critical ears. Does the mix still rock your socks? My advice is this: If it doesn't kill you, remix it. Don't play little rationalization games ("Well, the guitars sound kind of lackluster, but I really like the reverb decay on the lead vocal..."), because you can be sure your audience won't debate the merits of various mixing decisions. Either your

The hypnotic quality of the Cocteau Twins is enhanced by heavily processing the voice of singer Elizabeth Fraser. Over-the-top deployment of reverb, delay, and assorted modulation effects transforms Fraser's natural instrument into a dreamy "electronic" presence.

CD will explode from the speakers and grab listeners by the ears, or they'll eject your masterpiece in favor of *Perry Como's Greatest Hits*. If it's not a great mix, don't release it. I repeat: If it's not a great mix, do not release it.

COMMON OPERATING GOOFS

Just like the friendly faces on F.B.I. "Most Wanted" posters, awful mixes also have distinguishing characteristics. The real tragedy is that these identifying marks of criminal mixes tend to be repeat offenders. Here's my J. Edgar Hoover Memorial Mixing Manhunt of problems that should be hunted down at all costs.

Audible hiss. Digital recording mediums may have terminated tape hiss, but tape was never the sole source of hiss, hums, and buzzes. Microphone preamps, improper gain staging, and dysfunctional signal-processor and sound-module outputs can soil signals *before* they get to tape. (Analog tape often gets a bad rap for messing up the sonic house.)

Use a noise gate to shut down audio blemishes while a signal is inactive. In mixes that are thick with elements, the noise may be masked when the signal is active. If you're trying to clean up a sparse soundscape, a single-ended noise-reduction device can diminish the ugliness. Don't forget that a quick fix is to simply use your console EQ to cut frequencies at or above 10 kHz. For poorly recorded analog productions, it may help to insert a dual-channel, single-ended noise-reduction processor into the stereo bus to "de-hiss" the entire mix.

Distortion. In the audio world, there's good distortion (raging Marshall amps, silly fuzz boxes, etc.) and bad distortion (toasted signals). Bad distortion won't win you any engineering awards and can render your music productions unlistenable. Luckily, bad distortion is fairly easy to trace and terminate.

Improper gain staging is a common culprit, so make sure that you're not overdriving your console's mic/line preamps, channel faders, or subgroup levels. Simply turn each level down a bit and see if the distortion diminishes or disappears. Some mixer EQ sections—British consoles are famous for this—can add pops if certain frequencies are boosted too much. The fractured frequencies depend on the signal, and the danger zone typically hovers at boosts of +10 dB or more. Again, the solution is easy: Cut back on the amount of frequency boost. Don't forget that overdriven signal processor inputs can also produce distortion.

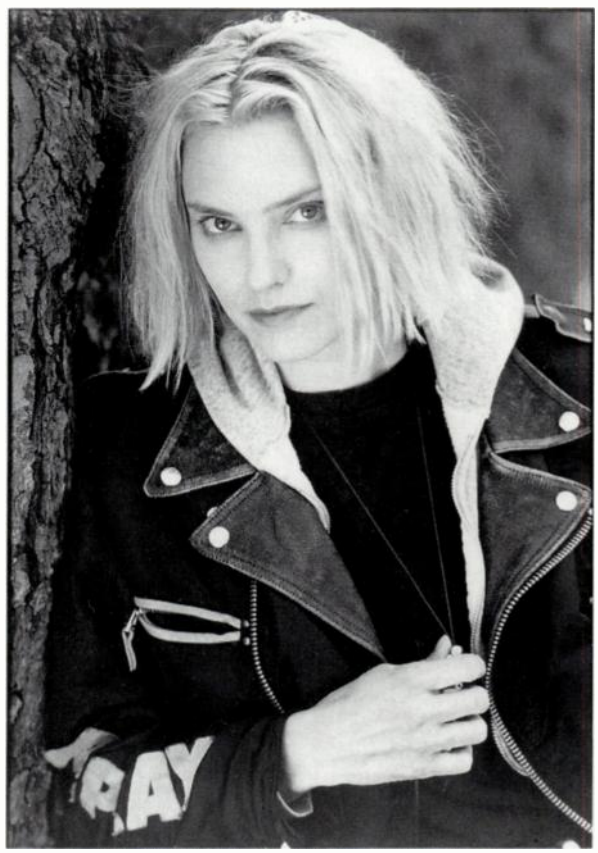
Mud. Is your bottom a bit sluggish? Experiencing a lack of clarity in the low end? Don't bother reaching for the Geritol, just start cutting bass frequencies. Novice engineers tend to really boost low frequencies—especially since rap and dance music producers started having "bass wars." (How low can *you* go?) Now, it's fine to pump the bass with selected elements, but if you boost everything, all you'll get is Woodstock II. Make sure that the kick drum, toms, bass, and other low-end partners aren't clogging up the sonic real estate. If so, cut back the bass on one or two instruments. Choose which boom you want to be the biggest and carefully EQ the other bass elements to support, rather than fight, the primary instrument.

Wacky levels can also fling mud on a mix. I recently ordered a track remixed on a compilation album I'm producing because the electric bass was louder than the lead vocal. With the bass so upfront in the mix, the entire track was smothered in low frequencies. Vocal, guitar, and drum articulation was compromised to the point that nothing jumped out of the track. The result was a dull, lifeless production. Of course, if the engineer had referenced his mix to a commercial CD, he would have (hopefully) noticed that his bass track was overmixed in relation to the commercial production. Are we learning things here?

The ouch factor. On the other side of the tonal dysfunction coin, is the terror of searing treble. Call me old-fashioned, but I don't believe that listening to music should be a painful experience. I must be supporting the minority opinion, however, because countless demos and CD releases crank the high-end to Marquis de Sade levels.

I realize that there's a method to some of this madness, because a crispy mix retains an aggressive snap and punch when duplicated onto cassettes or vinyl records. But put those same cranking highs on a CD release, and you could be facing charges for aural manslaughter.

There are usually two main reasons for over-the-top treble on a production. Either the engineer has some level of high-frequency hearing loss, or he or she was fatigued during the mix. The latter situation is easy to remedy: Don't



On Aimee Mann's *Whatever* album, remix genius Bob Clearmountain mixed her voice very dry to create the illusion of intimacy.

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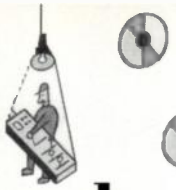

mix when you're tired, ill, or upset, and take frequent "ear" breaks during difficult sessions. The former, unfortunately, is another story.

Hearing loss is the recording industry's dirty little secret, as many engineers and producers are working with damaged instruments. (I thought it was extremely courageous for legendary producer George Martin to discuss his severe hearing loss at the 97th Audio Engineering Society Convention last November.) If your colleagues are constantly hassling you for producing thin or overly bright mixes—or if you perceive your tracks to be dull-sounding until you start boosting every instrument at 10 kHz—take the hint and get your ears checked.

Dynamic dingbats. Ever lose your car keys? It's frustrating, isn't it? Well, it's just as annoying to hear elements dropping in and out of a mix. For example, we've all heard tracks where the lead vocal is extremely present when the singer is shouting, but then it gets buried in the instrumental wash during crooning sections. And it's not just voices that can be affected by this sonic dipsy-do. Guitar parts can get lost, bass notes can disappear, and even drums can suffer from diminished impact. What's going on?

Welcome to the wacky world of performance dynamics! Musicians are not machines, so certain notes are often played louder or softer than others during a performance. For minimalist-inspired productions, these dynamic fluctuations are usually fine. However, keeping a single-note melody line up-front and personal in a crowded mix can be difficult if performance dynamics waver considerably.

The solution is to compress important signals so that they are always punchy and present. Usually, a ratio of 2:1 and a threshold setting of -5 dB can improve an instrument's presence without completely overwhelming the artist's performance dynamics. If you want an instrument right in the listener's face, crunch the heck out of it by increasing the threshold to -10 dB or more. Keep in mind that compression can increase the volume of low-level signals, so bass response, as well as lip smacks and other noises, may be accentuated. (For a more thorough explanation of compression, see "Square One: Dynamic Duos, Part 1" in the December 1994 **EM**.)

Numbing boredom. I listen to hundreds of demo tapes each year, and 95 percent of them just go to sleep in my cassette deck. I mean it. The sound just crawls up into the tape transport and takes a nap. Nothing slaps me in the face and *forces* me to listen. So it's "ho hum" and Eject.

Great mixes, on the other hand, are ruthless in their seduction tactics. You can't help but be mesmerized by the sense of three-dimensions of sound caressing every corner of the listening environment. The highs shimmer, the lows pound, and the mids snap with clarity and articulation.

Unfortunately, there's no technical tweak for setting a fire under a lackluster mix. Arranging tonal textures in a way that generates aural excitement is an elusive skill. I can only advise that you listen to your favorite albums and try to identify which elements catch your interest. What jumps out at you the instant the song blasts from your stereo system? What keeps you listening? Obviously, the power of the song and the vocalist are major seductive factors, so try to focus on instrumental and tonal enticements. Once you get a handle on what excites you about *other* people's mixes, dig in and keep mixing until you get excited.

STAGE TWO

Okay, the preliminaries are over! Next month, we'll start shooting signals down the assembly line and coaching you on how to hammer them into shape. I'll even open up my personal trick bag of EQ tweaks, compression settings, and signal processing ideas for acoustic and electronic drums, guitars, electric bass, lead vocals, and other musical elements. So until then, listen, study, and mix, mix, mix!

EM *Editor* **Michael Molenda** *is not allowed near power tools or heavy machinery.*

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Musical Monopoly

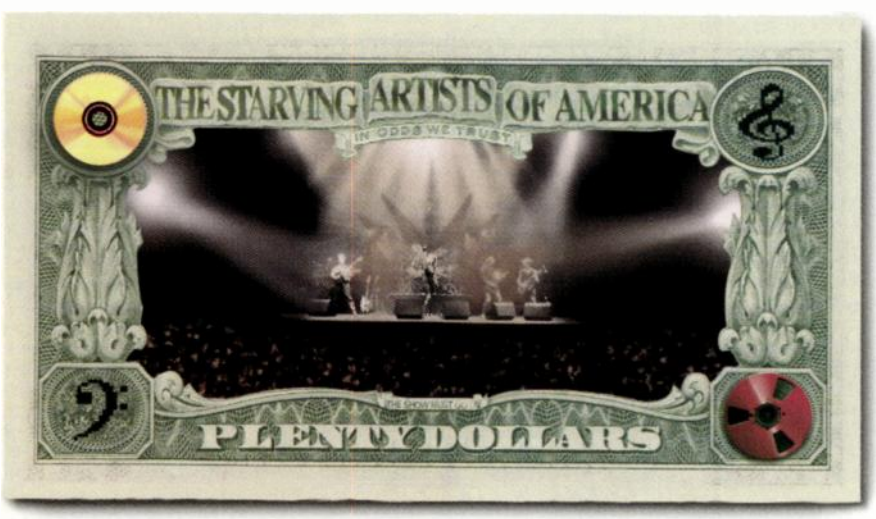
An entertainment lawyer's tips on financing your creative stock.

By Michael A. Aczon

So, your act is assembled. You have rehearsed the songs to death, played a bunch of clubs, and are now ready to take on the world. All you need is money. Money for equipment, studio time, a cool haircut, a promotional package...the list is endless. Unfortunately, your resources are tapped out and major-label stardom can't wait a second longer. Fret not, the solution to your dilemma lies in an understanding of financing techniques.

A number of basic financing vehicles are available for your project and career. Many musicians tend to mistakenly lump "money people" into two general categories: evil people who merely wish to exploit musicians like any other commodity, or benefactors looking for a write-off instead of a payoff. If you are seeking third-party financing, these misconceptions will certainly prevent you from hammering out a viable financing scheme.

Third-party financing is simply trading something of value that you have (the ability to create intellectual property, such as a record or songs, which eventually leads to money in the form of future royalties) in exchange for immediate cash. Financing can come in a number of forms, all being variations of this "fair trade" theme.



DMITRY PANICH

FINANCE STRATEGIES

Prior to seeking third-party financing, you need to understand the distinction between financing a project and financing your career. Don't let the lure of ready cash tempt you into ignoring or overlooking this distinction, because it could affect your career forever.

When making a deal to finance a *project,* the boundaries of the investors' involvement are finite. It is crucial for you to identify exactly what the project is (a recording project, a video, equipment for your studio, a showcase, a number of specific songs, etc.). Detailing your project in this way works well for both parties: The investor has a clear idea of how much money will be spent over a given period of time; and you have a clear idea of what royalties the investor will participate in.

On the other hand, when an investor

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puts up money for your *career*, it could result in infinite investor participation. For example, what if an investor pays for a demo project in exchange for all of your future earnings in the entertainment industry? If you were to embark on a 15-year cash-producing binge as a recording artist, songwriter, and movie star, a piece of the millions of dollars you generate is a monetary return far in excess of the relatively small sum the investor put up for the demo recording. Newspapers and courtrooms are filled with stories of parties who at one time supported an artist in the early days in exchange for "a piece of the pie when they made it."

With the basics out of the way, let's look at a number of possible financing scenarios.

DEBT FINANCING

Any way you cut it, you need to pay back a loan. Debt financing, or a loan, can come in many forms: charging your project on a credit card, a personal loan from a financial institution such as a bank or credit union, or signing a promissory note with a private party for a specified sum of money. All of these types of loans have a specific dollar figure that is invested, a specific time when it is to be paid back, and, usually, a specific interest rate for the "use" of the money. Collateral, such as equipment, is often pledged to secure the debt. Should the money not be repaid, the collateral may be sold to repay the debt.

The up side is that once the loan is paid off, your obligation to the lender is over; no looking over your shoulder should you make it to the big time. The possible down side is the project may not take off in relationship to the money borrowed and you may be saddled with a sizable debt to pay off.

EQUITY FINANCING

Taking on financial allies to further your career can be a blessing or a curse (see "Working Musician: Getting Down to Business" in the January 1993 **EM**). In many states, two types of partnerships—general and limited—are available for your project or career. In a general partnership, all partners participate in the management and control of the business venture. The limited partnership, on the other hand, requires a general partner who will manage the business and one or more limited partner(s) who participate only on the money level. Limited partners, then, do not participate on the management side and are liable only to the extent of their investment.

No matter how great the benefits of a general partnership may seem, think carefully before jumping in. Putting a person with business savvy on your team to allow you to handle the creative

INVESTORS GONE AWRY: A CAUTIONARY TALE

The Capital Investments, a fictitious rock band, put the word out on the street that they were looking for cash to finance their demo project. Along came Joe Dolarz, a long-time fan of the band who told them he would lend them $5,000 for the project that "you guys can pay back when you finish the demo." The band bought new equipment with the money but were once again strapped for cash for the studio time.

Another investor, Bigg Bux, offered to "pick up the recording tab" in exchange for "a couple of points from the outcome of the project." Bux also expended $5,000—enough to track five songs, but only to mix three. In the interim, it looked like the project had come to an end and Dolarz needed his money back, so he asked for the return of his $5,000 with interest. Rather than sell the equipment they purchased, the band signed a document prepared by Dolarz that granted him "repayment of his $5,000 with interest and a 20% partnership interest in the Capital Investments when the group made it big."

The band hit the streets again and made yet another deal, this time with Amy Investor, who paid for the mixing of the final two tracks and the pressing of a CD. She also agreed to have a few of her artsy movie-industry friends listen to the album in exchange for "the copyright in the masters, the songs on the masters, and all income generated from those copyrights." Investor's cash outlay was $10,000.

The CD was released and ended up as half of a multimillion-selling soundtrack for the movie *Wall Street II*. The Capital Investments signed a record deal with a major label, as well as a movie contract about their rags-to-riches story. All of the investors came to visit the Capital Investments as they were sunbathing in Maui to celebrate their success. Here is the outcome:

Dolarz's expectations. Dolarz now feels that the interest on his loan should be 20% and that he is entitled to his 20% interest as a partner in the group because, "If it weren't for me, they couldn't have made the recordings that made them big." In addition, as a partner, Dolarz has started a campaign to fire the group's drummer. ("His image is all wrong," he maintains. Dolarz is now in court seeking enforcement of his contract with the band.

Bux's expectations. Bux feels that the group's success is an "outcome of the project" and therefore he should be paid a percentage of their gross earnings. Being a "good guy," Bux has offered not to hassle the group in court if they give him an executive producer royalty of 5% of the *Wall Street II* record and 10% of the publishing revenue from the songs on the record.

Investor's expectations. Investor is seeking all royalties generated from the sales of the records and songs made famous by *Wall Street II*. With a now-successful publishing catalog, Investor was able to negotiate a several hundred-thousand dollar copublishing deal with a major music-publishing company, allowing her to sign other writers and songs to her new venture.

What the Capital Investments believed. The Capital Investments were simply trying to finish a project. They gave away pieces of the pie in exchange for cash and ended up giving away more than they could make, as well as taking on a partner they didn't anticipate having.

What the band is saying now. Help!

aspects sounds tempting, doesn't it? However, the skills and leadership that led this partner to success in his or her field might not translate well to the music business. Also keep in mind that this partner would have an equal say in the management aspects of your career, which could cause problems if he or she isn't familiar with the music industry. ("Hey, mind if I tag along and make comments while you mix your record? I'm only protecting my investment, partner.")

A variation of the partnership arrangement is the joint venture. A joint venture is very much like a partnership, but has a more narrowly defined scope. In a joint venture, two or more ongoing businesses can team up for a specific recording project and continue with their ongoing businesses without being wed together forever.

For example, a major production company possessing both a strong reputation and cash may decide to enter a joint venture agreement with a smaller, less experienced, but artistically gifted company to produce one project together. While the smaller company may not be able to attract investment dollars to the project, the addition of the larger company's name lends the stability and experience that will entice money people to invest. If the project takes off, the joint venturers may decide to work on other projects together.

Corporations are very much like limited partnerships from the investor side, as the investor is relatively anonymous regarding the creative side of the artist's career. The amount of investment by "outsiders" dictates how much input they may have in the management of the company, which is usually administered through a board of directors voted on by the shareholders. Caution should be noted in choosing this vehicle, as it may require a great deal of time (and legal fees) to organize. Additionally, a number of formalities may be required by your state when it comes to incorporating. When choosing your form of business, it is best to consult with an experienced business advisor prior to raising money.

WHERE'S THE MONEY?

Unfortunately, there aren't listings in your local yellow pages under "Benefactors." The money for financing a creative project usually comes from the

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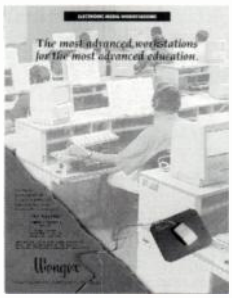

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Three Fs: family, friends, and fans. The Three Fs are more willing to front the money for your project if you have put some time and effort into your plan of attack, especially when it comes to explaining how they will be paid back.

You should be warned about investor types that prey on the talented, yet broke, by buying a piece of management, publishing, or artist royalties in exchange for what appears to be "an investment." (For a fictional case study, see the sidebar "Investors Gone Awry: A Cautionary Tale.")

Additionally, I warn against seeking investors through want ads and the like without the assistance of counsel. You may inadvertently violate federal and state securities regulations in your search for money.

FINALIZING THE DEAL

Although volumes could be written about investors, it should be clear that the more detailed your relationship (hopefully documented in writing with the aid of competent counsel), the fewer problems you may run into when royalties start to flow. Many start-up companies formed as labors of love to support a handful of artists have blossomed into full-fledged businesses, subject to corporate buy-outs and mega-distribution deals. Of course, one of the most sophisticated and ideal investors is a legitimate record company that understands what you have and makes the investment of dollars, personnel, and reputation necessary to send your act into superstardom.

An investor wanting to get into the business may see your career as the entry point into the promised land of backstage passes and wild parties. Trading away a piece of your future to these investors may be enticing, but many investors involved in other business ventures do not realize how difficult it is to get a pay-off in the music industry.

Remember that if you are carrying along extra baggage in the form of third-party investors looking for their share of the pie, your ticket to the show may be delayed until you straighten out your affairs. While en route, do not forget that your music is the key to it all, and you should remain confident that your many creative talents have value, too.

Michael A. Aczon *is an entertainment lawyer in the San Francisco Bay Area.*

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Rock and Soul Expeditions

Hybrid "Audio-ROMS" play on Macs, PCs, and CD players, too.

By Michael Brown

Rhino Records has been snapping up the rights to vintage rock and soul recordings by such artists as the Kinks, Otis Redding, and Aretha Franklin since the early 1970s. The company has remastered many of these recordings and reissued them on compact disc. After hooking up with Compton's NewMedia in a 1994 deal to develop interactive CD-ROMs based on those holdings, the two companies faced a decision and a challenge: For which platform—Macintosh or *Windows*—should they develop? And how could they preserve the sound quality of those remastered recordings?

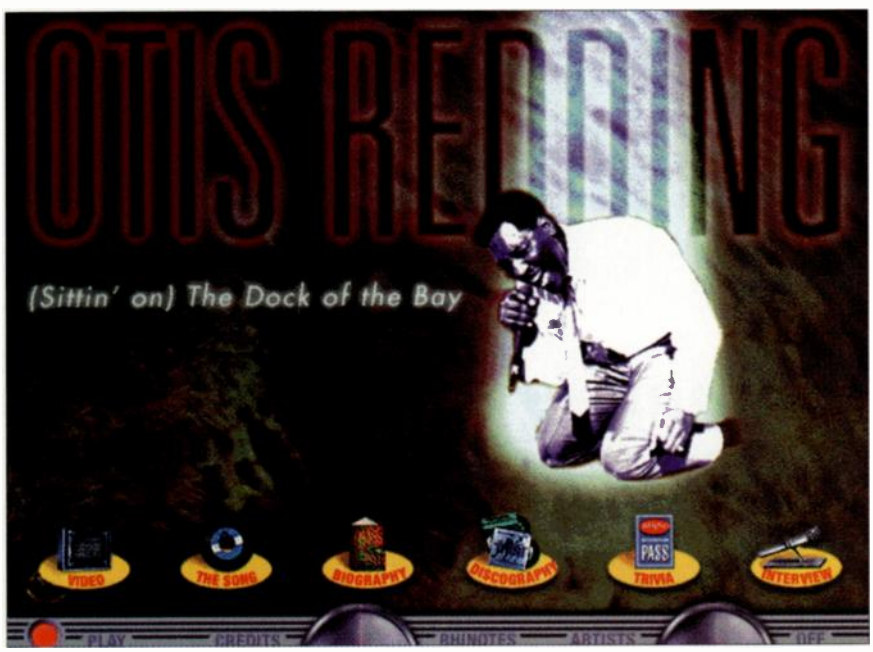
Compton's calls their solution "Audio-ROMs." These are compact discs that contain both digital-audio tracks that will play on a CD player *and* a multimedia program that will run on either Macintosh or *Windows* computers.

Compton's tapped Nancie S. Martin, president of Jouissance Productions, to produce the first two of these titles: *Rock Expedition: The 1960's* and *Soul Expedition: The 1960's*. Both are scheduled for release in the first quarter of 1995. Martin, the former editor of *Tiger Beat, Playgirl,* and several other magazines, was associate producer and project manager on Peter Gabriel's *Xplora 1* interactive CD-ROM.

"These programs give you an opportunity to learn more about these artists while you listen to their music," says Martin. "Or you can just drop the disc in your CD player and dance."

Soul Expedition contains ten R&B hits from the 1960s, including eight songs that made it to number one on Billboard's chart. Aretha Franklin, Wilson Pickett, and Otis Redding are among the R&B artists profiled.

Rock Expedition contains ten pop and rock hits from the 1960s, including four songs that made it to number one. This collection is eclectic, but you won't find material from such important



FRANK WIEDEMANN

The *Rock* and *Soul Expedition* CD-ROMs share a common user interface, with gadgets that call up music, *QuickTime* movies, and information about the artists.

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Audio for Video Projects

Chris Taylor–Crossroads Studios

It can be sync'd to a 24-track for extra tracks; it can stand on its own for 8-track digital recording, as in our audio for video suite; it can be stacked with other RD-8s or ADATs™ for multitrack digital recording—and all without any extra hardware

Post Production Projects

Brando Triantafillou–Editel, Chicago

We use it as the master machine with two ADATs for Post Scoring and Composition for commercial TV productions. I also like the fact that the Fostex RD-8 can act as a stand-alone digital recorder; it has the balanced time code inputs and outputs that I use with automation, and it has a really good layout of the front panel controls.

ELECTRONIC MUSICIAN 1995 EDITORS CHOICE

MIDI Projects

Frank Becker–Frank Becker Music

The computer sequencer and the RD-8 can be synchronized either by SMPTE with the RD-8 as master, or by MIDI Machine Control with the computer sequencer acting as master.

Location Projects

Paul Freeman–Audio by the Bay

We rolled twenty-eight 120 minute tapes of full field audio on the RD-8 in more dirt, more heat and more cows, for 18 days, with grime and a river, and the RD-8 never had a hiccup.

Composing Projects

Christopher Hoag–Composer

Personally, I believe the Fostex RD-8 is intelligently laid out, easy to use and, more importantly, it sounds good.

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FOSTEX

artists as the Rolling Stones, The Who, or Jimi Hendrix here. Rhino doesn't own the rights to any of their work. You *will* find Iron Butterfly's "In-A-Gadda-Da-Vida" (no, not the full-length, 17-minute version), the Kinks' "You Really Got Me," and Sonny and Cher's "I Got You Babe."

BREEDING HYBRIDS

As producer and project manager, Martin's task was to pull together the creative team for the project and to oversee the development of these hybrid CD-ROMs. Rhino provided all of the recordings in the form of standard audio CDs. Martin and her team designed the graphical user interface and handled the rest of the authoring chores. Compton's NewMedia digitized the video footage and will distribute the titles.

Unfortunately, the current generation of computers and CD-ROM drives don't possess enough bandwidth for graphics, video, and Red Book digital audio to stream off the disc at the same time. Although 16-bit audio can be compressed to reduce its storage and bandwidth requirements, current audio-compression algorithms severely degrade audio quality. One common solution is to convert the audio from 16-bit resolution and a 44.1 kHz sampling rate to

NATALIA POPOVA-DUNHAM

***Soul Expedition: The 1960's* features Aretha Franklin performing her signature tune "Respect."**

8-bit resolution and either a 22 kHz or a 11 kHz sampling rate.

SQUEEZE IT

The tools and techniques used in the sample-resolution and sample-rate conversion processes can make the difference between a full and rich-sounding soundtrack and audio that sounds thin, hollow, or muddy. When you're producing an original score for a multimedia title, you always have the option of reorchestrating a composition that's giving you trouble. You have no such option when you're working with music that your audience is intimately familiar with. Martin brought in audio producer Charles Maynes to perform the work for the *Rock* and *Soul* titles. Martin and Maynes had previously worked together on the *Xplora 1* project.

"The first step was to transfer all the material from the CD to hard disk in the digital domain," says Maynes. "I used a Tascam CD-601 CD player with digital outputs and a Digidesign Pro Tools system with a TDM [Trans-system Digital Matrix] bus."

Using a technique that he developed while working on *Xplora 1*, Maynes compressed the dynamic range of the Red Book audio before he down-sampled it from 16-bit resolution and a 44.1 kHz sampling rate to 8-bit resolution and a 22 kHz sampling rate. However, Maynes didn't use a conventional outboard compressor to accomplish this goal.

"Compressors work on an attack-and-release basis," says Maynes, "so they generally have a hard time discerning quick attacks. If the compressor fails to prevent a quick attack from going over the threshold, it can result in an artifact.

"Some of the material that we were working with," Maynes continues, "had certain passages that were louder than at any other point in the song. That can be a problem if you're working with 8-bit resolution, because the loud portion will sound right, but everything else will be buried in noise. But I didn't want the music to *sound* compressed, because that wasn't the intent of the original artist."

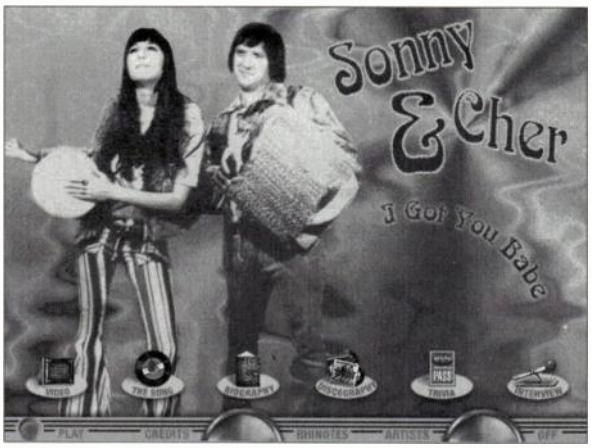
SCALING THE PEAKS

Maynes used the break-point automation feature in Pro Tools to solve his compression problem. "It's like taking the fader automation on a console and setting it at a reference of zero," Maynes explains, "and then drawing down the loudest peak when it plays past that point. Once all of that was in place, I would take the entire set of audio and move it up to +6 dB, or however loud I could make it to get it close to zero on the VU meters. That way, I could raise up everything except for the peaks."

Using Digidesign EQ and dynamics modules, Maynes removed hiss by cutting frequencies above 14 kHz. He boosted certain other frequencies, using the Nyquist theorem as his guide, to ensure that higher frequencies punched through the Mac's sound hardware and speaker. (The Nyquist theorem states that the highest frequency a sampling system can reproduce is equal to or less than one-half the sampling frequency.)

"The Nyquist cutoff for a 22 kHz sample would be about 11 kHz," says Maynes, "but because of the sloppiness of the Mac's filters, you don't generally get much information beyond 8 kHz. To solve that problem, I aggressively added as much as 8 to 10 dB of EQ right at 10 kHz, where the filter was almost entirely closed. That forced the higher frequencies through the filter, so the high end would be much more apparent.

"The limitation is the digital-to-analog converter that drives the



SHARILYN NEIDHARDT

Who'd have thought you'd encounter Sonny and Cher on an exploration of the rock music of the 1960s?

Mac's speaker," Maynes continues. "Frequency response starts to roll off at about 5 kHz and then continues until 11 kHz, at which point there's virtually no information. By aggressively boosting a lot of high frequencies, I impose a nonlinear slope on the filter itself. The filter might be rolling off at 6 dB per octave, but you can compensate for that by boosting 10 kHz by 10 dB. That way, the top-end information will be there when it gets to the speaker."

Maynes used the shareware program *Sound Hack* to get a sneak preview of how the music would sound once it was down-sampled. *Sound Hack* will play *Sound Designer II* files directly out of the Mac's internal speaker by performing a 16-to-8-bit conversion on-the-fly.

"That feature saved me from having to create a new file just to hear how a song would sound after it had been converted," says Maynes. "It also gave me an idea as to which frequencies needed to be boosted before I committed to the real thing."

WHAT A HACK JOB

Maynes also used *Sound Hack* to down-sample the digital audio files. "That was the best down-sampling program at the time," says Maynes. "But it's time consuming. A single process takes about four-times real time. If you have a 2-minute file, it will take about eight minutes to do the bit-resolution conversion from 16-bit to 8-bit. Then it would take another eight minutes to do the sample-rate conversion from 44.1 kHz to 22 kHz."

Although he's happy with how the *Rock* and *Soul Expedition* CD-ROMs turned out, Maynes would have preferred to work with more pristine original material. "It would have been great to have worked with first-generation masters," he admits. "Most of this material had been digitally remastered, but I think you inevitably experience some frequency loss no matter what de-clicking and de-hissing machinations you use.

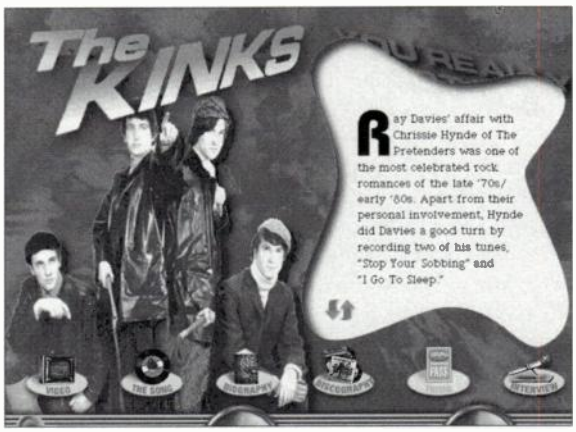
"It's that old garbage-in/garbage-out situation," Maynes continues. "If you start out with CD-quality audio to begin with, you can get good sound from a CD-ROM. But if you start out with low-end audio, you'll end up with a CD-ROM that sounds terrible."

COMPUTER CROSS-DRESSING

The need for cross-platform compatibility drove Martin to choose Apple's *Apple Media Kit* for the authoring work, but her team also used a host of other tools.

"One of my biggest gripes about current authoring systems," says Martin, "is that none of them handle text very well. Coming from a magazine background, it was just unacceptable to me to have poor-looking text with those ugly scroll bars down the side. That's not what people want to look at."

Martin's team solved that problem by creating text layouts with the desktop publishing program *QuarkXPress*. When the layout was complete, they copied the image right from the screen—using the Macintosh's snapshot utility—and layered it over the other graphic elements using Adobe's *Photoshop*. "You can do drop-caps and text-wraps with *QuarkXPress*," says Martin, "things that no one has figured out how to do in an authoring system."



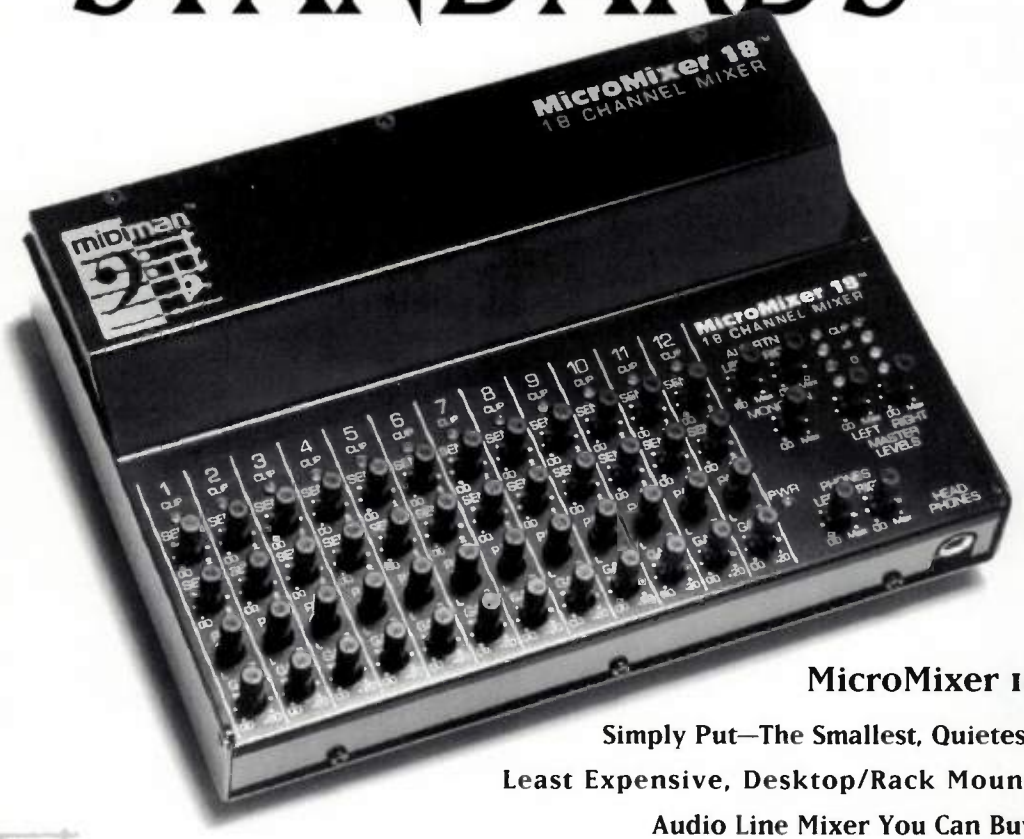
GINA DI BARI

The artists at Jouissance used desktop publishing software to design the text elements of the *Rock Expedition* and *Soul Expedition* interactive CD-ROMs.

LAYOUT LOWDOWN

Much as if she were laying out feature stories for a print magazine, Martin brought in a different graphic artist to design the background screens for each artist on the two discs. "We want the end-users to get the feeling that they're flipping through an album collection," says Martin. "We tried to pair the visual style of each of the graphic

WORLDWIDE STANDARDS



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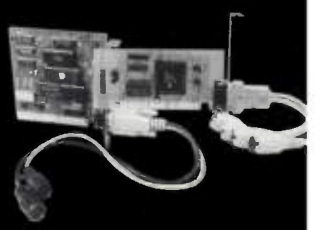

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artists with the musical style of the artist they were assigned to illustrate.

"We gave each of the artists a picture and an audio tape of the band or performer they were assigned to illustrate," Martin continues. "And we told them that they had to build a screen around the picture, the name of the artist, and the name of the song. They also had to leave room for us to embed the user interface gadgets along the bottom of the screen."

With this approach, Martin sought to develop a template that could be used again should Compton's and Rhino decide to publish additional titles in this series, or if they want to produce a retrospective of a single artist.

The video material in the *Rock* and *Soul Expedition* titles was captured using Radius' *VideoVision Studio*, and the resulting *QuickTime* movies were edited with Adobe *Premiere*. Most of the authoring work was performed on a Macintosh Quadra 800 with 24 MB of RAM and a 500 MB hard-disk drive. Martin also had 1.2 GB, 1.7 GB, and 3.0 GB external hard-disk drives, all of which were filled to capacity by the end of the project. An 80486-DX2/50 PC-compatible was used for the necessary *Windows* development work. Audio producer Charles Maynes performed his work on a separate Quadra 700 with 20 MB of RAM and 660 MB and 2.1 GB hard-disk drives.

Martin was allotted four months to complete the project, but the biggest hurdle she had to overcome wasn't a short development cycle. Rather, the hard part was securing licensing for the visual materials necessary to tell the stories of these performers.

"Rhino didn't own the rights to the videos," says Martin. "Those materials had to be licensed from other sources. Jouissance wasn't responsible for the licensing aspect of the CD-ROM project, but it affected us in a major way. We learned that you should start the licensing process *before* you do any design work, because we had to make some design changes as a result of unresolved licensing issues."

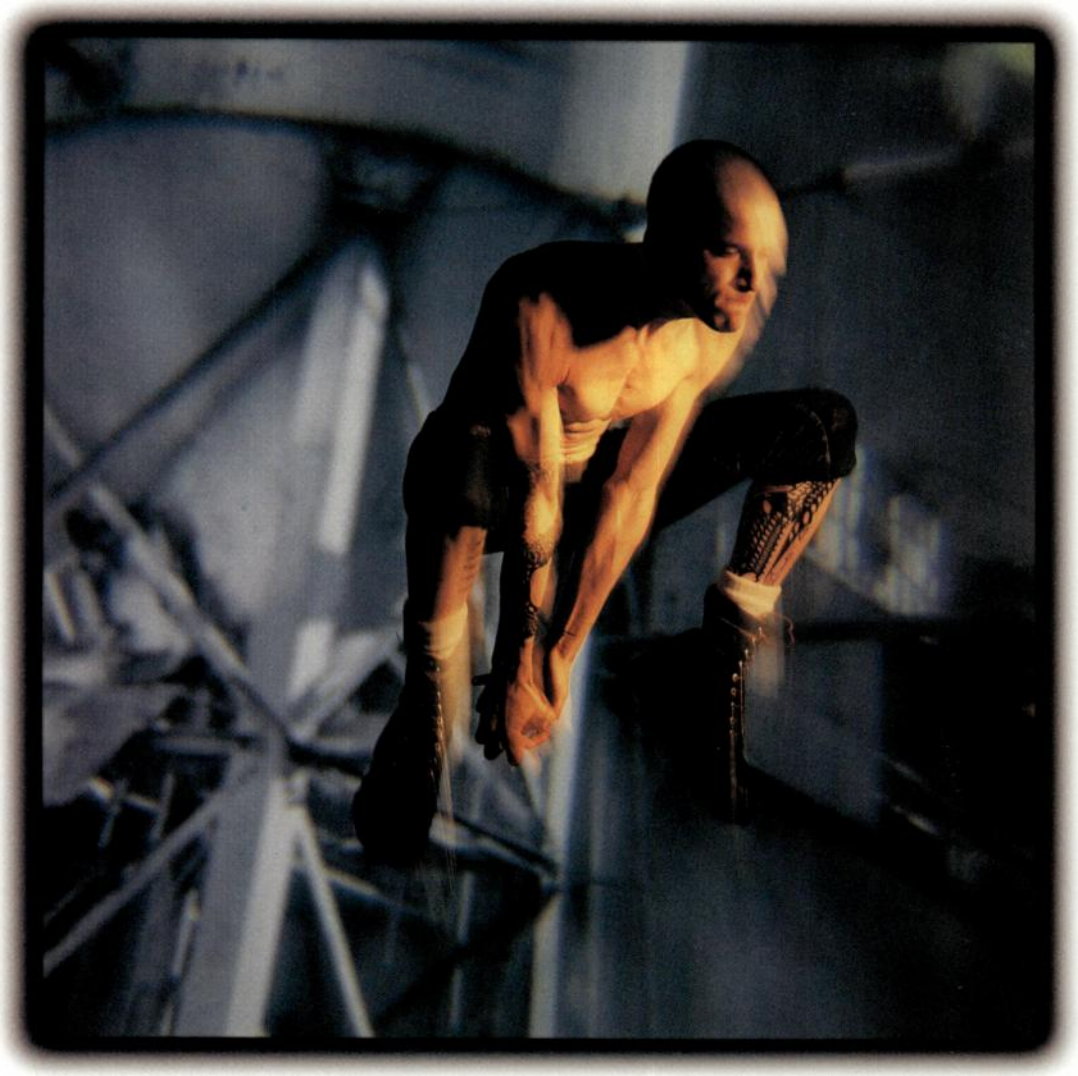
▼ Current-generation computers and CD-ROM drives are short on bandwidth.

THE CD IS DEAD! LONG LIVE THE CD!

Although these discs will carry a manufacturer's suggested list price of $29.95, Martin expects to see their street price as low as $22. "We expect these CDs to be real mass-market products," says Martin. "For just a few dollars more than you'd spend on an audio-only CD, you'll get an interactive CD-ROM."

Of course, if interactive CD-ROMs are *truly* to become mass-market products, computer manufacturers are going to have to sell many more multimedia computers into homes. They'll also need to solve the bandwidth problem that forces multimedia developers to compromise the quality of their digital audio.

The product manager said we could graphically represent the Tri-Power sound anyway we wanted provided we told you it provides "more gain before feedback without requiring EQ or displaying funky off-axis honk."



[Perhaps he was expecting a chart.]

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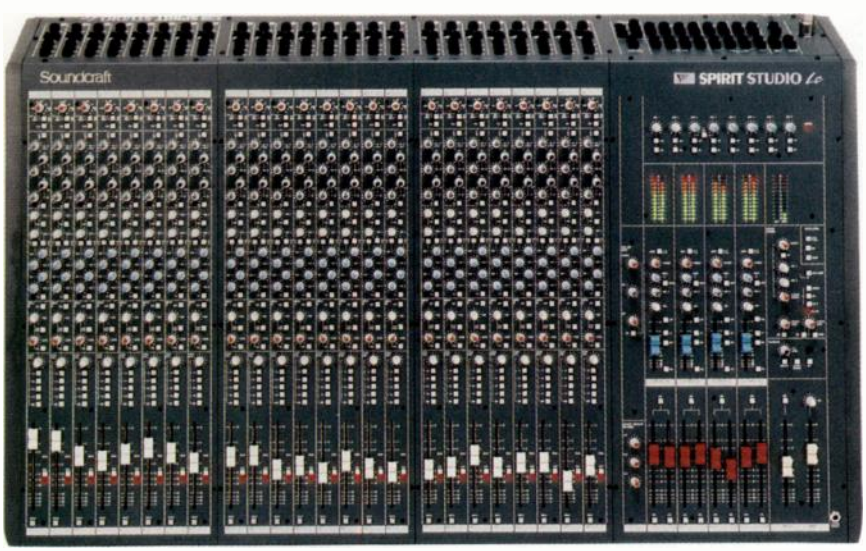
On the Right Path

The mixing console is the Union Station of the recording studio.

By Scott Wilkinson

Over the last few months, we've examined various types of effects and how to use them in the studio and on stage. Along with sound sources, tape decks, and the power amp and speakers, these effects occupy the outskirts of all sound systems. Now, it's time to turn our attention to the central hub of activity, the mixer, which accepts many different signals at once and sends them anywhere you specify.

The path each signal follows through a mixer is somewhat circuitous, with many options and forks in the road. But unlike the protagonist in Robert Frost's poem, these signals can (and often do) take all roads simultaneously. In the end, all these signals are combined (hence the name "mixer"), so we can hear them from a pair of speakers or headphones.



At first look, the plethora of knobs, faders, and buttons on the typical mixing board can seem like a road map to confusion. However, if you patiently trace the signal path, all will be revealed.

CHANNEL INPUTS

The mixer signal path starts at the *channel inputs*. The outputs from microphones, guitar amps or DI (direct-injection) boxes, and synthesizers are connected to these inputs. Each channel input includes several controls, arranged vertically, that determine the specific signal path and levels at various points. The exact configuration of these controls varies from one mixer to another, but they usually follow a similar overall pattern. **Fig. 1** illustrates a simple, generic channel input, while **Fig. 2** provides a road map through this input and the rest of the mixer.

Starting at the top of **Fig. 1**, the first control is the *mic/line* switch. This switch selects the appropriate input connector. (Mics are typically connected to a balanced XLR jack, while synths and guitars are connected to ¼-inch jacks. Both input types are present on many mixers.) The mic/line switch also determines whether the channel input's internal mic preamp is engaged or bypassed. Some mixers also include a *phantom-power* switch near the top of each input, which sends 48

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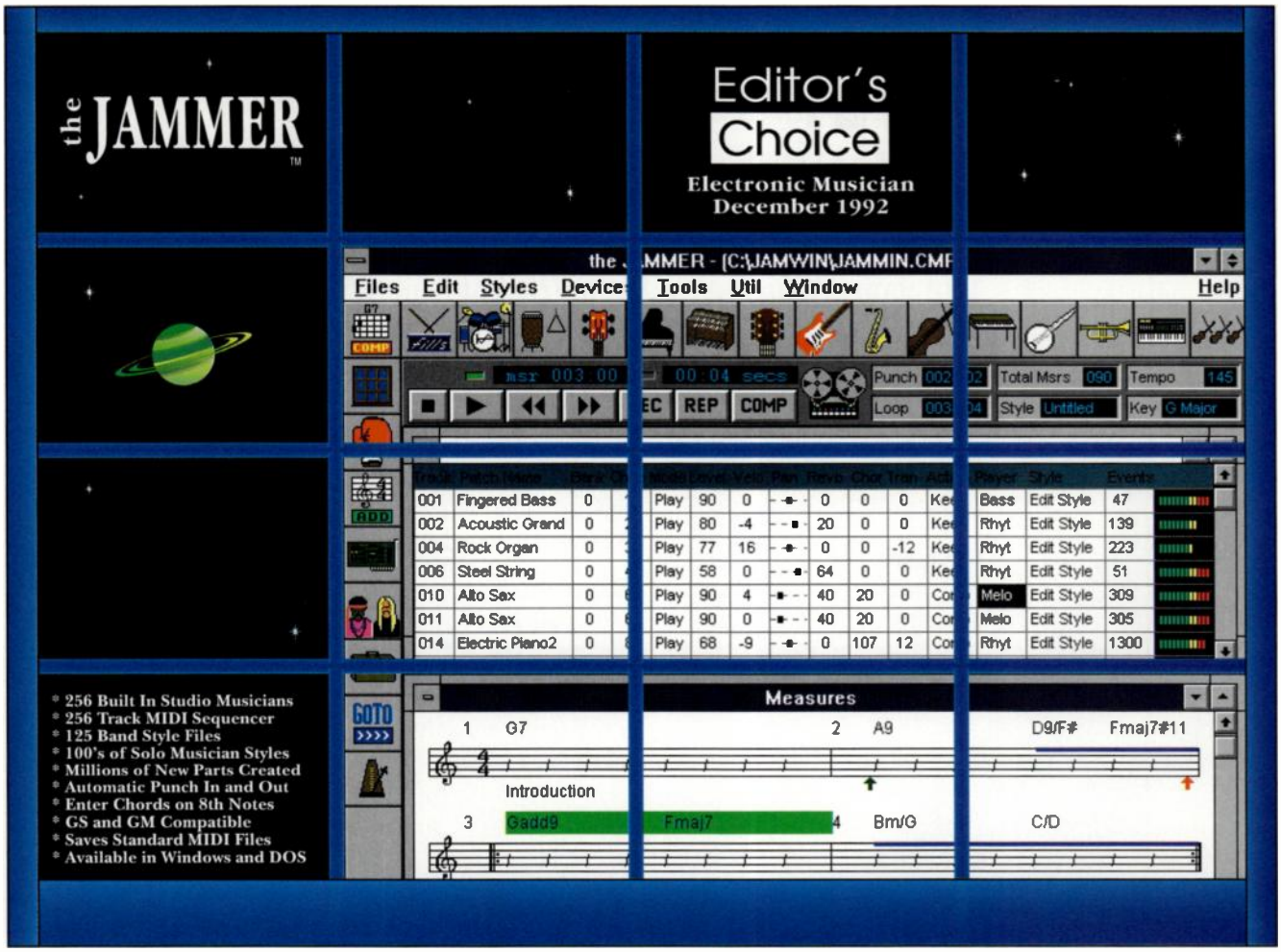

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VDC to charge a condenser microphone. Many mixers only have a global phantom-power switch, which sends phantom power to all or none of the mics.

The next control is called the *trim* or *gain pot*, which adjusts the gain of the input signal. This is important because different sound sources output signals at different levels; the trim pot helps even out the playing field. It's also important in the process of *gain structuring* (see "On the Level: Gain Optimization for Crystal Clear Sound" in the May 1991 **EM** and "Recording Musician: Gain Stages" in the November 1993 issue).

The trim pot feeds directly to the *insert point*, a ¼-inch, 3-conductor (tip-ring-sleeve) connector that lets you detour the input signal out of the mixer, through an external device (such as a dynamics processor), and back into the channel input before it proceeds any further. (For more on insert points, see "Square One: Dynamic Duos, Part 1" in the December 1994 **EM**.) If you don't connect anything to the insert point, the signal continues, unaltered, to the rest of the channel input. Note that some mixers have separate insert send and return jacks, instead of a single tip-ring-sleeve connector.

The next landmark in the primary signal path is the *equalization* (EQ) section. These controls let you tweak the tone of the input signal by raising (boosting) or lowering (cutting) the amplitude of certain frequency bands. At the very least, most mixers include *high-* and *low-shelving* EQ, which cuts or boosts the frequencies above or below a certain threshold, respectively. For example, the high EQ usually cuts or boosts the frequencies above 10 kHz, while the low EQ acts on frequencies below 100 Hz. (These frequency thresholds vary between mixers.)

Many mixers also include at least one *mid-band EQ*, which cuts or boosts the frequencies within a certain band in the middle of the entire frequency range. The mid-band EQ often includes

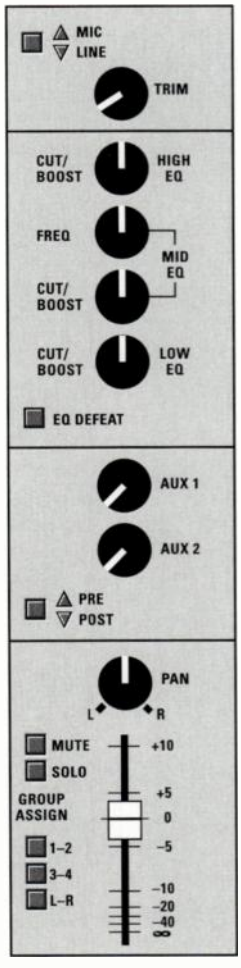

FIG. 1: A simple hypothetical channel input.

a *frequency* control, which lets you specify the center of the affected band; this is called a *sweepable mid*, because you can sweep through different center frequencies. A sweepable mid-band EQ is great for zeroing in on specific frequencies. However, the width of the band (called the *bandwidth* or *Q*) usually is fixed in low- and midpriced mixers. In many mixers, the EQ section also includes an *EQ defeat* switch, which lets the signal pass through without being affected by the EQ settings.

Next on our tour are the *aux send* controls. I'll defer the discussion of these controls until we've passed through the rest of the channel input. The *channel fader* is perhaps the most recognizable control on any mixer; it invites curious fingers to move it up and down just to see how it feels. This fader is the final arbiter of the signal level in the channel input before it proceeds to the master section (which we'll get to shortly).

The signal reaches the master output section via the *pan pot* and *group-assign buttons*. The group-assign buttons let you specify where the signal is sent after it leaves the channel input. The possible destinations include the *main left/right* (L/R) *output* and several *group outputs* (sometimes called *subgroups*). These destinations are also called *buses* because they combine the signals from different channel inputs and take them to the same place (a particular output connector), just like a school bus takes different students to the same school. It is on these buses that the input signals are mixed.

Notice that the group-assign buttons in **Fig. 1** are labeled in pairs: 1-2, 3-4, and L-R. (Our hypothetical mixer has four group buses and two main buses.) Once you select a pair of buses with a button, the pan pot controls the relative balance of the signal between them. If you want a signal to go only to the group 1 bus, press the 1-2 group-select button and turn the pan pot all the way to the left. If you want a signal to go only to the group 4 bus, press the 3-4 group-select button and turn the pan pot all the way to the right. You can send each input signal to any or all of these buses, including the main L/R output.

Finally, each channel input can be silenced by pressing the *mute* button, or isolated by pressing the *solo* button. (The solo button mutes all the other channel inputs.) It's a good idea to mute all unused channels during mixdown to reduce the inevitable noise

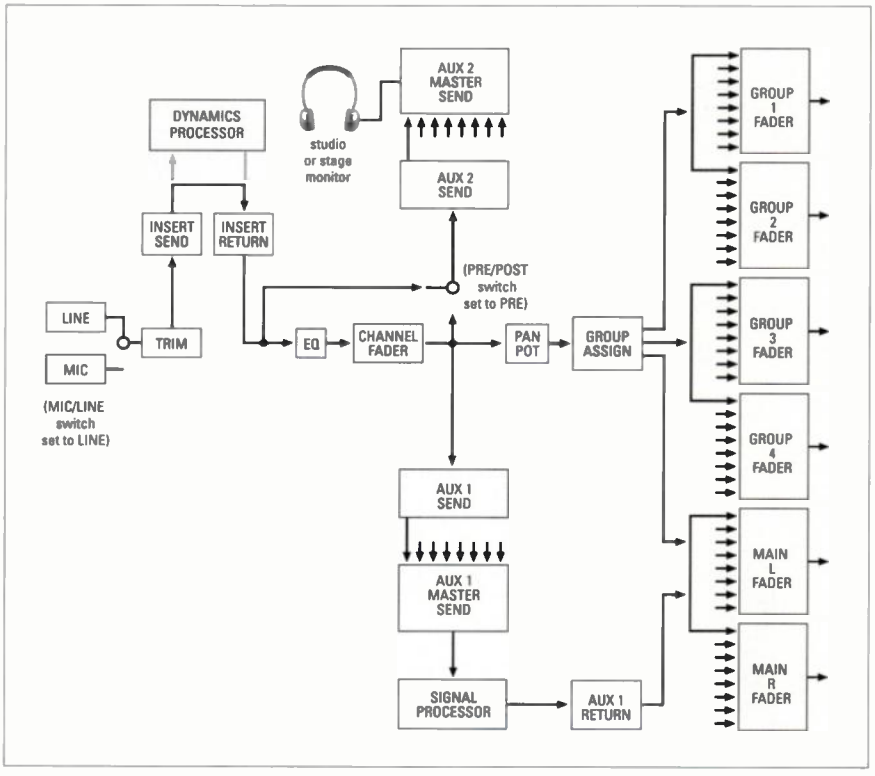

FIG. 2: The signal path through one channel input in a mixer is somewhat complex. The boxes with extra arrows are fed from all channel inputs; these are the aux send, group, and main buses.

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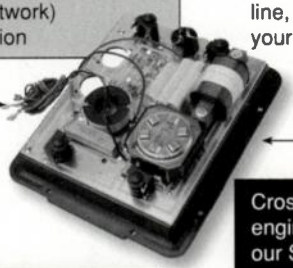

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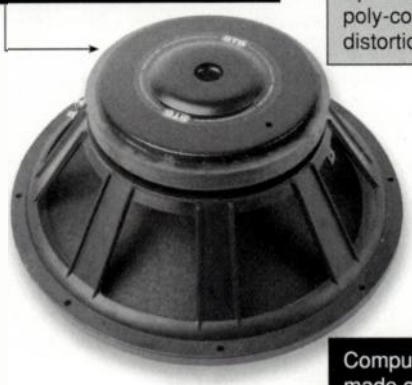

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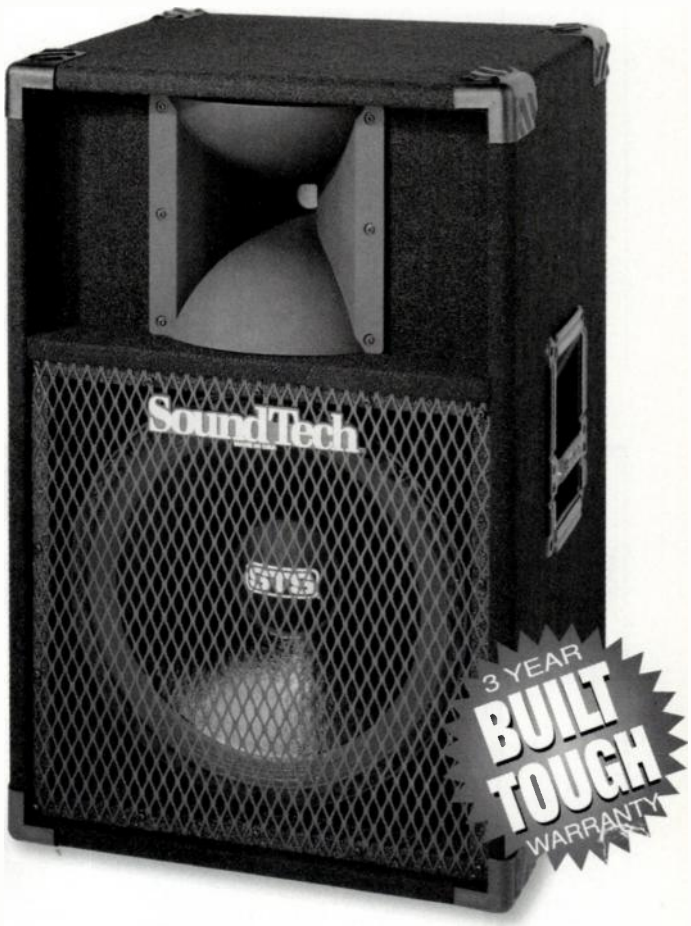

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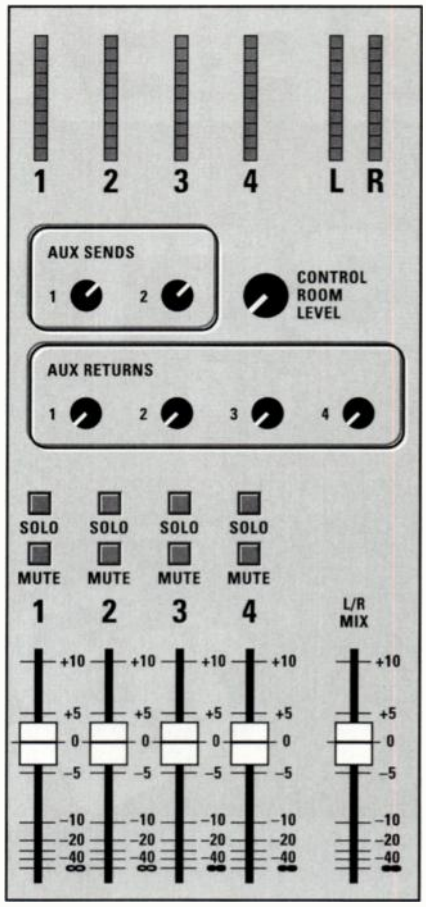

FIG. 3: The master module includes level meters, master aux send and aux return controls, a control-room level control, solo and mute buttons for each group, and faders for each group and the main L/R output.

that accumulates as more channels are added to the mix. In most inexpensive mixers, the solo button bypasses the pan pot, placing the signal in the center of the stereo field. However, some mixers include a feature called *solo in place,* which retains the pan position of the soloed channel.

AUX BUSES

Immediately after the insert return at the top of the channel input, the signal path splits (see **Fig. 2**). One path proceeds through the rest of the channel input, while the other is sent through its own independent level control and on to an external device.

If the split occurs before the channel fader, the aux bus is called a *pre-fader aux send.* Sometimes the pre-fader aux send splits from the primary signal path before the EQ section as well; in other words, it is *pre-fader, pre-EQ.* In some configurations, the split occurs before the fader, but after the EQ, so the

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bus is referred to as *pre-fader, post-EQ.* Like all buses, the pre-fader aux send is shared by all channel inputs.

After the signal passes through the channel fader, it is split once again (see **Fig. 2**). One path continues through the remaining channel-input controls and on to the group and main buses, while the other is routed through an independent level control and out of the mixer to an external device, such as a reverb or multi-effects unit. This path splits after the EQ and channel fader, so it is called a *post-fader aux send.* (Because the EQ usually precedes the channel fader, a post-fader send is post-EQ and post-fader.) Like the pre-fader aux send, this bus is shared by all channel inputs.

Now we can return to the aux section of the channel input (see **Fig. 2**). The individual level of each input signal on the aux 1 bus (which is a post-fader aux send) is controlled by the aux 1 knob, while the level of the signal on the aux 2 bus is controlled by the aux 2 knob. The aux 2 bus can be switched to operate as a pre-fader or post-fader bus from each channel input. This lets you send some input signals to the aux 2 bus before the EQ and fader while sending other input signals to the bus after the EQ and fader.

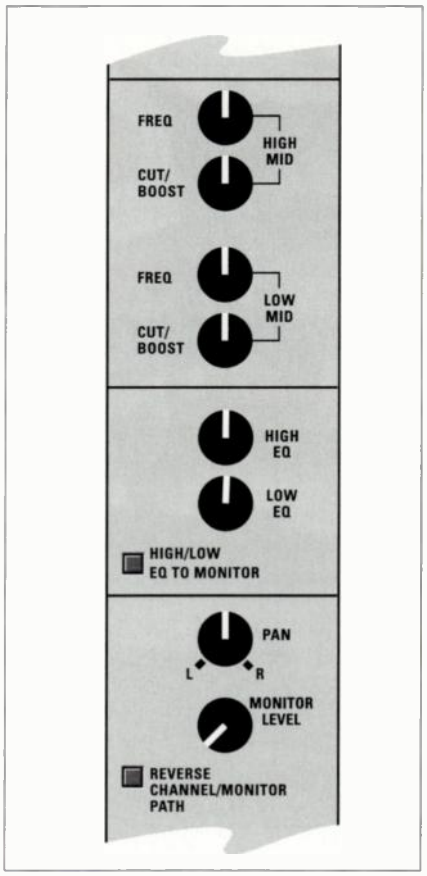

FIG. 4: An in-line mixer includes two signal paths through each channel input. The EQ section is split between the primary input (channel path) and the tape return (monitor path), but you can assign the channel EQ to the monitor path if you wish. The monitor path also includes its own pan pot and level control. You can even reverse the channel and monitor paths.

A pre-fader aux send is often used to route the input signals to a studio or stage monitor system. The aux level knobs in each channel input let you establish a mix for performers that is completely independent from the main mix. If they want to hear more of themselves than the main mix should have, you can simply adjust the appropriate aux send control, without affecting the final mix. In this application, the corresponding aux return is not used, so a different signal can be brought into the mixer if necessary.

You can also send one or more signals to an effects device on a pre-fader aux send. For example, suppose you want to apply reverb to a signal, and

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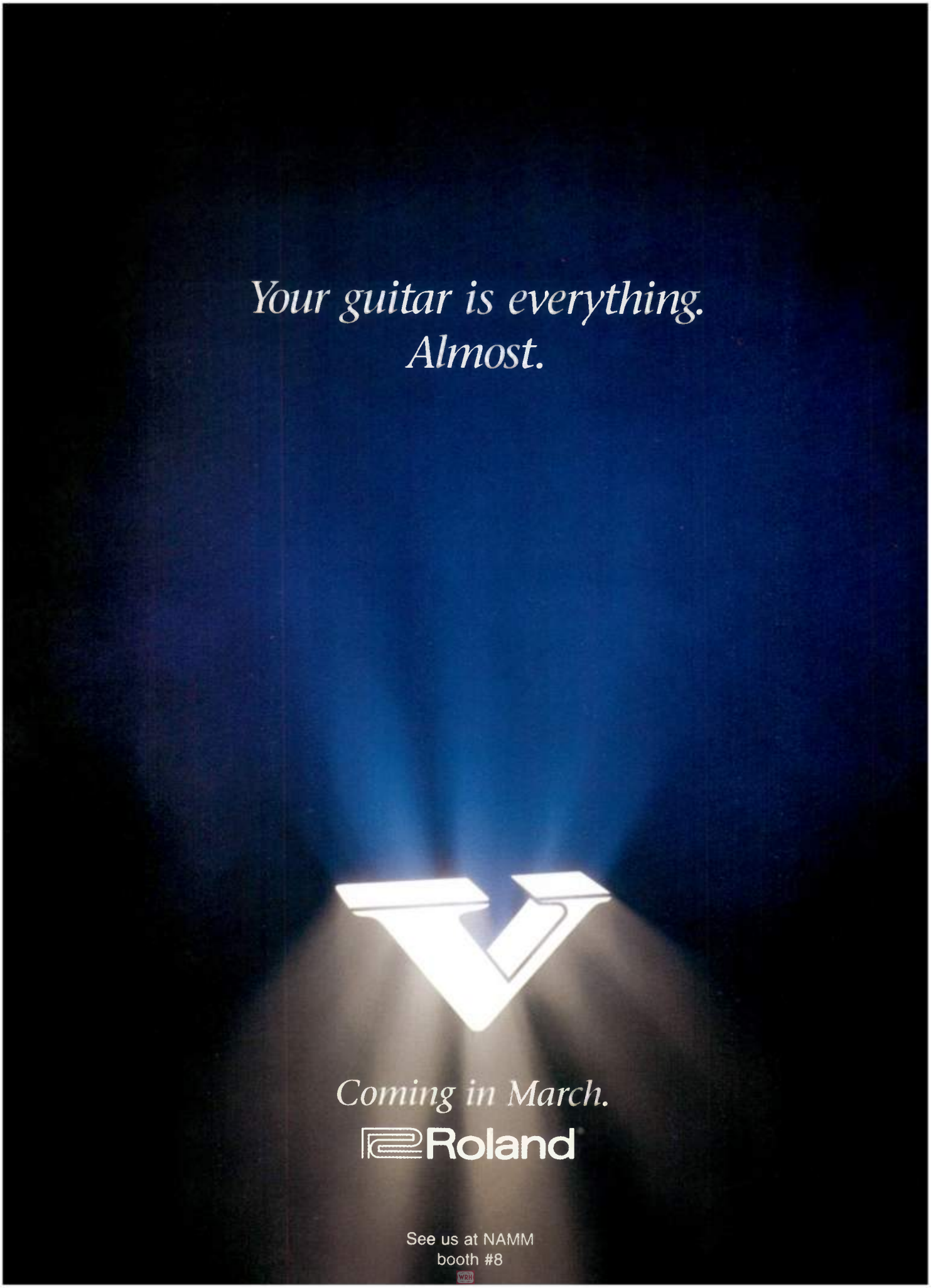
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Post-fader aux sends are typically used to send one or more signals to effects devices, such as reverbs, delays, flangers, etc. In this case, however, the channel fader affects the wet and dry signals equally, because the signal is sent to the effects unit after passing through the fader.

Once the signals from the aux buses pass through the effects devices, they are returned to the mixer at the *aux return jacks*. In most cases, the aux returns are fed directly into the main L/R buses, but some mixers let you route these returns to any group bus, as well. You can also use channel inputs as aux returns, which lets you EQ and reroute the returning signal. However, this takes up inputs you might need for instruments or mics.

MASTER MODULE

Once a signal passes through its channel input, it is routed to one or more group and/or main buses, as described earlier. The master controls for these buses are located in the *master module* (see **Fig. 3**), which typically resides to the right of the channel controls. At the top of the master module, meters indicate the overall signal level in each group and main bus. The overall level of each bus is controlled by the faders at the bottom of the master module. Often, each group bus can also be muted or soloed.

The master module also includes the *master aux send* and *aux return* controls. The master aux send controls determine the overall level of each aux send bus. The aux return controls determine the level of the processed signal returning from wherever they were sent on the aux send buses. In **Fig. 3**, notice that there are two master aux sends and four aux returns. In many mixers, the aux returns are stereo, because many modern effects units produce a stereo output.

Each aux send, group, and main bus has a corresponding output jack on the mixer. As we've already seen, the aux send outputs are connected to the input of a monitor system or effects device. The group jacks are usually connected to the inputs of a multitrack tape deck. This lets you route any group of input signals to any tape track, hence the name "group." (By the way, the groups and main L/R buses often include insert points so you can externally process their mixed signals.)

For example, suppose you are miking an acoustic drum kit with several mics placed around the kit. After you refine the relative mix between individual drums with the channel-input faders, you can control the overall level of the kit with a single group fader. If you want the drums in stereo, pan each mic as desired with the channel-input pan pots and control the overall level with two group faders.

The main L/R buses often include two output jacks each. One pair of outputs is connected to the stereo mixdown tape deck, which is usually a DAT recorder these days. In many mixers, the output from the mixdown deck is connected to an extra pair of inputs with a switch that lets you listen to the main mix or the stereo tape deck.

The other main outputs are connected to the power amp and speakers in the control room. The *control-room level* knob adjusts the overall level of the entire mix as it is played back on this sound system without affecting the level of the signal going to tape.

TAPE INPUTS

Once you have all your microphones, guitars, and synths connected to the channel inputs, how can you hear the tracks you've already recorded on the multitrack? How do you connect the outputs from the multitrack to the channel inputs on the mixer without unplugging and reconnecting zillions of cables every time you want to hear the tape tracks? How do you mix the tape tracks with any sequenced virtual tracks onto a stereo master tape?

Many mixers solve this problem by providing extra inputs for multitrack tape decks called *tape returns*. In many mixers, these tape returns are added to each channel input. This is called an *in-line* design, in which there are actually two signal paths through each channel input: one for the primary input (called the *channel path*) and the other for one track from the multitrack tape (called the *monitor path*). If you have fewer tape tracks than tape-return inputs, you can use the extra inputs for line-level instruments or effects returns. Some mixers include dedicated tape returns that look like separate channel inputs. This is called a *split* design, and the tape returns are generally located to the right of the master module.

In-line mixers include several interesting features. For example, the EQ section might be split into two parts: one for the channel path and one for monitor-path. In **Fig. 4**, the two sweepable mid-bands affect the monitor path, while the high- and low-shelving bands affect the channel path. A switch lets you assign the high and low bands to the monitor path if you need more tonal control over the tape track. In addition, the monitor path includes its own, independent pan pot and level controls. However, the monitor path is usually hard-wired to the main L/R buses; you can't send its signal to any of the group buses.

You can also reverse the channel and monitor paths. This lets you control the tape-track signals with the main fader and other primary controls. Because most modern synths include their own effects, EQ, and panning, you can mix them with MIDI Volume and use the monitor path to send them to the main L/R buses during mixdown. This is very handy in a MIDI studio.

THE END

A mixer is the Union Station of any sound system; it routes incoming signals to various destinations and lets you control these signals in many ways. Hopefully, you now have a basic understanding of what mixers do and how signals flow through them. So head on over to your mixer and see what kind of traffic cop you can be.

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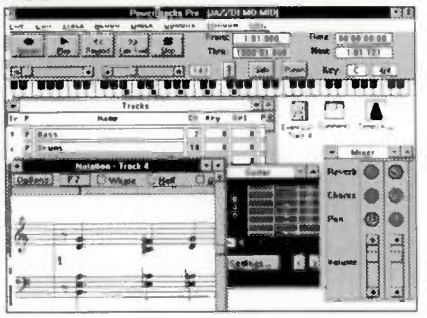

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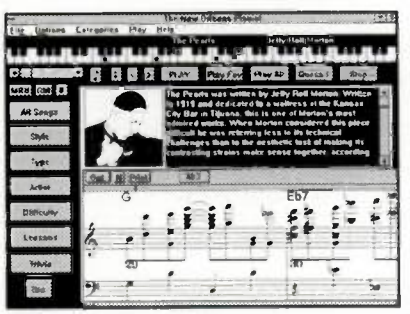

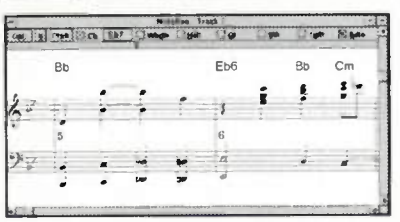

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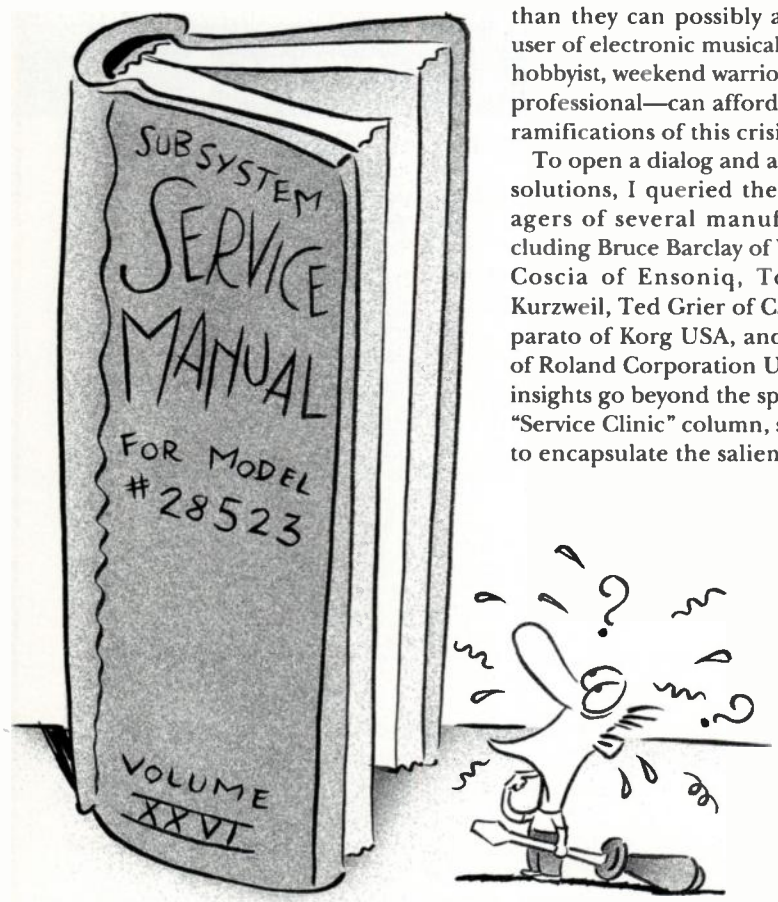
Crisis in Service

Dramatic advances in music technology force everyone to adapt.

By Alan Gary Campbell

Equipment is getting too high-tech to repair in the field. Systems are becoming so complex that troubleshooting is daunting. Consumers, salespeople, and technicians are confronted with more information than they can possibly assimilate. No user of electronic musical equipment—hobbyist, weekend warrior, or seasoned professional—can afford to ignore the ramifications of this crisis in service.

To open a dialog and attempt to find solutions, I queried the service managers of several manufacturers, including Bruce Barclay of Yamaha, Steve Coscia of Ensoniq, Tom Dunn of Kurzweil, Ted Grier of Casio, Tom Imparato of Korg USA, and Bill Thomas of Roland Corporation US. Their keen insights go beyond the space limits of a "Service Clinic" column, so I have tried to encapsulate the salient points.



JACK DESROCHER

THE INFORMATION DEFICIT

Even the most technophobic consumer knows that music technology has changed radically in the last decade. The level of complexity is stultifying; even modest instruments contain one hidden-function menu after another. The level of integration is unparalleled, as the functions of entire subsystems are reduced to single ICs.

If the consumer has trouble comprehending the functions of instruments, the technician hardly fares better with regard to components. Synths, samplers, and effects devices rival the most advanced PCs in sophistication. Technicians are hard pressed to keep up. Kurzweil's Tom Dunn lamented, "One problem facing service centers is finding techs who are able to work at the component level without destroying more than they fix."

Some companies have begun to provide regional training seminars, bolstered by regular mailings of service updates and by online databases. Though important, local training remains problematic and expensive even on a limited scale. "Training on a consistent level to local areas is going to be very difficult," observes Yamaha's Bruce Barclay. "It's something we've been facing for years. We are trying to develop some alternatives."

Even when training is available, it can be hard to convince burnt-out techs to attend. Roland's Bill Thomas

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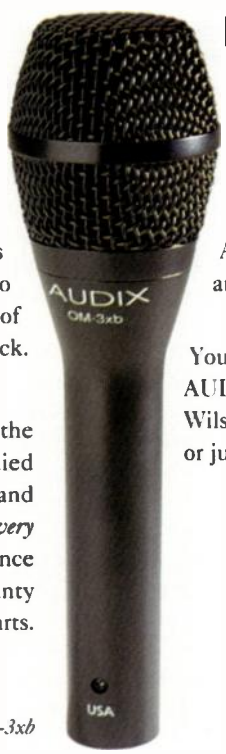

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defends the necessity of periodic seminars. "The biggest problems servicers have today are obtaining information and following the trends of extensive product lines," he notes. "We feel they need to attend training seminars to address those issues. Servicers say, 'What do I need with a seminar? I've been in this business for twenty years.' We're not talking about experience, but *trends*. If they work on more than one manufacturer's gear, they can't possibly know all the trends and what to do to correct them."

Postseminar, continuous education is a must, but information is often difficult to obtain. "The primary issue facing service centers is the lack of holistic product-support information, which includes interactive databases and diagnostics," says Casio's Ted Grier. "Service centers get a cross-proliferation of all manufacturers' customers, and to allow them to have only some data is ridiculous. Having schematics, engineering updates, troubleshooting guides, and owner's and programming manuals integrated is essential."

TECHNOLOGY VS SERVICEABILITY

A recurring concern among the respondents was the difficulty and cost-ineffectiveness of servicing high-tech equipment locally. Grier explains, "Product designs and materials are chosen to facilitate robotic assembly. This is great for manufacturing, but lousy for service. Modern production techniques actually diminish repairability. This forces independent servicers and music stores to send gear to the manufacturer or a regional service center."

Ensoniq's Steve Coscia considers the microeconomics. "At the local level, the tools that techs used previously are not applicable to today's multilayer PCBs with surface-mount components," he notes. "The cost of some technology, such as surface-mount rework stations, is beyond the reach of the smaller repair center."

LOCAL SERVICE TRENDS

Clearly, the difficulties of component-level troubleshooting will force a shift toward larger, regional service centers that can afford the required investment in high-tech service gear. Local service will increasingly consist of board and module swaps.

There are already significant trends in this direction. "While Roland still intends to operate a network of local servicers, we are thinning that network," reveals Thomas. "We also want to maintain better communications with the service centers. This will hopefully provide better service and also help the bottom line for local servicers, because there won't be as many next door."

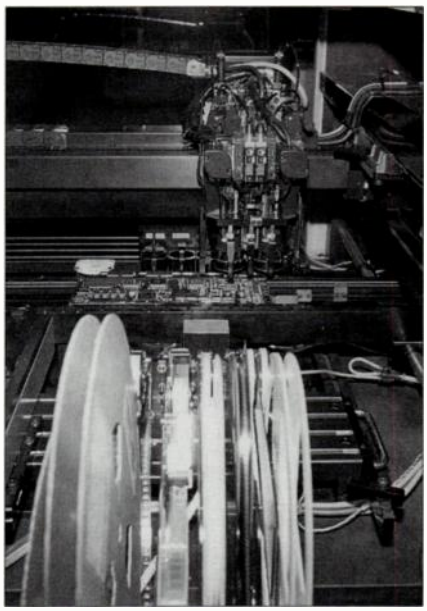
Some companies are attempting a tiered service structure. Tom Imparato describes local service centers as the "heart" of Korg's service network, while regional centers are considered an extension of factory service. "This system reduces the pressure on our in-house techs and frees time to provide more support," he says. "We want to strengthen the network as much as possible, to keep the repairs in the field, reduce costs, and provide quick service."

USER ERROR

With high-tech gear, it can be difficult for the end user to distinguish operating-system vagaries from service problems. This creates the dual dilemma of service calls in response to user error and consumer education through the inappropriate venue of the service center. Coscia decries the gap between what customers expect and what service techs can deliver. He warns, "Technicians now invest more time in the qualifying process than in fixing things. Many units are not really broken, so servicers never get to do their real job. Yet, while they have provided a service, many customers are not willing to pay for it."

Thomas agrees, noting, "If it turns out to be a user error, Roland won't pay for it, nor should we. The warranty is in place for factory defects, not to pay to educate the user. Many of the local service centers have a minimum bench charge, which may apply in such cases. They can't be expected to provide service at no cost."

Respondents were of one mind on this issue: Consumers need to do their homework. Typical concerns were that consumers make certain that there is a repair problem before contacting a servicer, avoid giving a vague or incorrect problem description, and write down the symptoms. "Knowing the details of how you were using the gear, how you had it set up, can help to pinpoint a solution," says Dunn. Grier adds, "The consumer should admit it if they really dropped it in a bucket of water or kicked it off the stage."



COURTESY ENSONIQ CORP

A robotic, surface-mount component insertion machine on Ensoniq's assembly line.

BETTER SERVICE AND SUPPORT

Several respondents had advice for obtaining better service. Imparato cautions, "Consumers should always use authorized service centers, whether the repair is in warranty or not. These are the guys that have access to our parts, technicians, and service bulletins. They can provide the best service."

Barclay feels that consumers also need to find ways to support themselves through user groups. "Nonetheless," he declares, "our focus is going to shift away from technical service support to consumer support. About 75 to 80 percent of calls to customer service departments are consumer support calls."

SUMMARY

The technological worlds of the consumer and the technician are unquestionably changing. As technology becomes more complex, we seek simpler solutions, such as board swaps or user-friendly interfaces. But real mastery of the use or service of high-tech equipment requires information and continuous education.

Nonetheless, it is reassuring to consider that the very technology that is the source of the trouble may, through interactive media and online services, provide at least a partial solution.

EM *contributing editor* **Alan Gary Campbell** *celebrates the beginning of "Service Clinic's" tenth year.*

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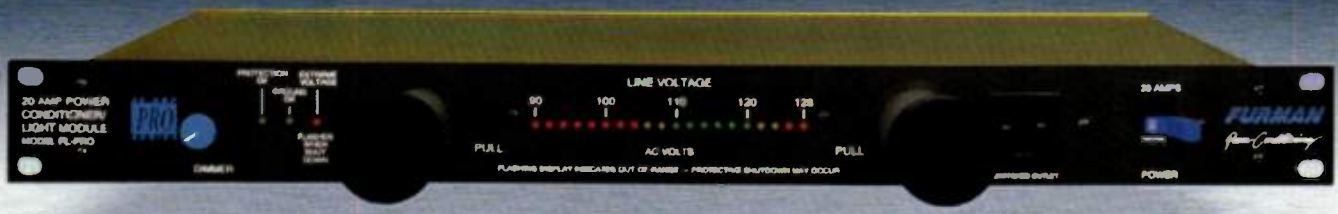

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RECORDING MUSICIAN

Acoustic Alchemy

Put some snap and sparkle into your steel-string sonatas.

By Michael Molenda

When I was making ugly noises with my first garage bands, I wouldn't touch an acoustic guitar with a 10-foot mic stand. Acoustic guitars were what singing nuns and nerdy folk groups in matching shirts played. Ick! They also reminded me of my first guitar teacher, Mrs. Zimmerman, who *corrected* my sheet music for "Hey, Jude" ("No, no, no," she said, "thees cannot be zee right notes!") and shackled me forever to the down-down-up-up-down-up strum for "Michael Row The Boat Ashore."

It took age, experience, and Peter Townshend to banish my fear of acoustic guitars. Today, I cherish the acoustic guitar as an evocative instrument that can sharpen the sting of an angry rock track or caress a ballad. The acoustic's sensitive presence complements all musical styles and adds a touch of class to every track it graces.

That is, unless you blow it by recording a wimpy, boomy, or otherwise butchered guitar sound. Documenting the shimmering beauty of an acoustic guitar isn't something that happens while you're floating on "audio auto pilot." As with other acoustic instruments, inspiring sounds are achieved through concentration, perseverance, optimum microphone placement, and a critical ear.

BRIAN SHUEL

Jumbo acoustic guitars, such as this Gibson SJ-200 held by the Reverend Gary Davis, can sound obnoxiously boomy if you place the mic too close to the sound hole.

PERFORMANCE ANXIETY

Unfortunately, all the perseverance and mic positioning in the world can't improve the artistry of the player or the sonic health of his or her guitar. The dynamic range of most acoustic instruments imposes a huge responsibility on the performer to draw out exquisite sounds. For example, a beginner who can plug a Fender Stratocaster into a Scholz Rockman and crank out some pretty nifty riffs will probably produce nothing but squeaks

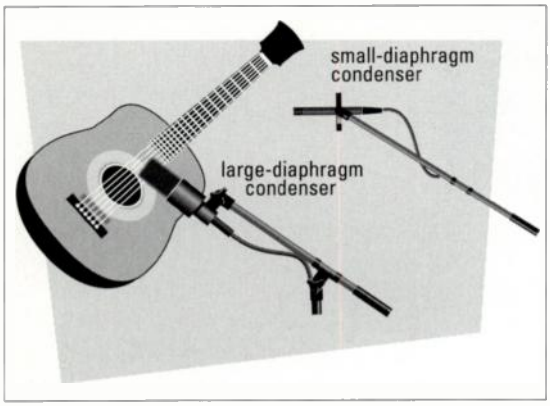

FIG. 1: A great stereo acoustic sound can be produced by pointing a large-diaphragm condenser slightly off-axis to the guitar's sound hole and placing a small-diaphragm condenser up near the fretboard.

and buzzes when struggling with an acoustic guitar. Even seasoned veterans can embarrass themselves when asked to fingerpick (or even strum) a line or two on an unfamiliar steel-string.

In addition, the guitar itself may be a mess. I've recorded mass-produced, "my first guitar" atrocities made out of something resembling cardboard; recently liberated prisoners of attic storage with warped necks; and trashed road warriors with terminal intonation problems. There's little the recordist can do in these situations except hope that the acoustic guitar part isn't featured prominently in the final mix. (That's the great thing about mixing—you can bury vile performances under 40 fathoms of rhythm tracks.)

If a track *is* to be featured, you have a couple of options. First, get a good guitar. Do not waffle. A wonderful acoustic guitar track can only be constructed from a good source sound. No amount of signal processing can save a poor sounding acoustic guitar without destroying the instrument's natural timbre. If you're going to flange the heck out of the track just to make it bearable—which is different, of course, than processing it as a creative decision—you might as well play the part on an electric guitar. It shouldn't be too difficult to get your hands on a decent instrument; everyone knows *someone* who owns a cool acoustic.

Performance issues are tougher to correct, as they often involve rearranging the part to accommodate the player's technique (or lack thereof). If the player is consistently missing or fumbling notes, advise that he or she simplify the part. Be gentle with your criticism, however, because it's nearly impossible to coax an inspired performance from a shattered ego. It also helps if you offer specific suggestions for overcoming technical deficiencies. For example, obnoxious fret buzzes might be caused by improper fingering and uneven pressure on the strings. A quick fix is to change the guitar strings to a lighter gauge, so the player can negotiate chord forms easier. If that does not help, suggest different chord inversions that are more comfortable, such as replacing difficult barre chords with open chords.

The goal is to ensure that the track is clean and articulate. Usually, playing back a less-than-stellar performance is all it takes to convince an artist to rearrange his or her parts, or find a better sounding instrument. Of course, if you're the engineer *and* performer, be sure to heed whatever advice you'd give to someone else!

MICROPHONE MAGIC

Once the source sound is optimized, you can start documenting the guitar's sonic grandeur on tape (or hard disk). For monaural tracks, I typically place a large-diaphragm condenser microphone approximately ten inches from the sound hole. To diminish boominess caused by the rush of air emanating from the opening, I position the mic 45 degrees off-axis from the face of the guitar. Off-axis miking not only prevents a wind storm from hitting the condenser's fragile diaphragm dead-center, it also accentuates the guitar's beautiful upper-partial harmonics. This single mic position usually produces a full yet articulate picture of the guitar's natural timbre.

A natural tone is essential if you wish to maintain the integrity of acoustic instruments, so try to leave those EQ knobs alone during the early stages of sound sculpting. If you want a warmer sound, simply move the mic closer to the sound hole. More jangly tones can be captured by aiming the mic toward the fretboard, near the 12th fret. Saving any EQ tweaks for the mixdown also keeps tracks cleaner, with less audible hiss, coloration, and distortion.

The simplest, hippest stereo miking I've found is placing a large-diaphragm microphone off-axis to the sound hole and a small-diaphragm condenser off-axis to the fretboard (see **Fig. 1**). This position produces an aggressive stereo spread, with shimmering highs and warm lows. In addition, the two different microphone types enhance stereo separation by producing two distinct tonal images. (Provided, of course, that the two tracks are panned hard right and left during the mixdown.) If you want a more airy sound, simply move the mics further away from the guitar.

These monaural and stereo mic placements should offer clear, precise reproductions of a guitar's tone. Obviously, they are not the only positions that can capture great sounds. I certainly advocate experimentation, especially if you're going for something "different." I've hung a condenser over the player's head to get a more ambient sound; placed a mic *behind* the performer to capture a muted, ghost-like wash; and dropped a Shure SM57 into a bathtub (with the performer sitting on the rim) to record some bizarre metallic-sounding harmonics.

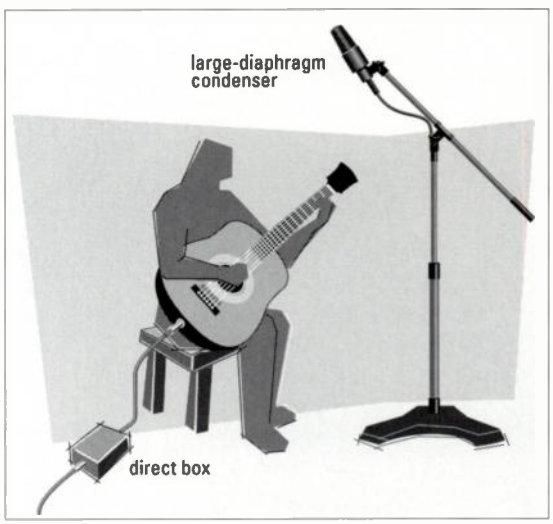

FIG. 2: Slim-line, acoustic-electric guitars can sound huge if you position a condenser microphone approximately six feet above the guitar to capture a lush mix of source sound and room ambience. Use the guitar's direct (electric) sound to maintain articulation.

THE BODY ELECTRIC

Acoustic-electric guitars are popular live performance tools (no microphone required!) that often waltz into recording studios. Ex-Jefferson Starship guitarist Craig Chaquico produced two chart-topping instrumental albums playing nothing but acoustic-electric guitars (see "Creative Space: Craig Chaquico" in the January 1995 **EM**). Inspired by this feat, I recently plugged in my Kramer Ferrington acoustic-electric to record some solo acoustic guitar parts for an Adobe *Premiere* CD-ROM tutorial. Hybrid guitars can indeed sound beautiful, but they can also be a tad brittle when strummed aggressively.

One way to combat this sharp, spikey timbre is a "best of both worlds" approach, where a direct *and* miked signal are combined (see **Fig. 2**). For a monaural track, route the two signals to separate channels on your mixer and submix them to a single tape track. With each signal on its own input channel, you have precise control over which sound—direct or miked—is more prominent in the submix. I typically position the mic (a large-diaphragm condenser, of course) to pick up a fair amount of room sound. Then, I can use the direct signal for articulation and the miked signal for "vibe" or ambience. The mood of the song determines which signal is favored.

An interesting stereo guitar sound can be produced by recording the direct and miked signals onto two separate tracks and panning them hard right and left at the mixdown. Obviously, this method doesn't produce the full frequency spectrum gained by conventional stereo miking, but the two environments (dry and ambient) make for a distinctive stereo perspective.

CHARMING PROCESSES

Conventional acoustic guitar tracks should be organic and natural sounding, so hardcore signal processing is usually not appropriate. However, subtle processing can add sparkle and articulation to steel-string guitars, especially when they are struggling to maintain definition in a crowded instrumental mix.

Because I like to hear every note ringing front and center, I always compress acoustic guitar tracks (while recording *and* mixing) to tighten up performance dynamics. To ensure that the instrument breaks out of a rock or big band mix, try a 2:1 compression ratio with a threshold setting of -10 dB. If your processor has Attack and Release parameters, set them midway between fast and slow. Unless you're going for a specific effect, don't smother the track with compression during recording; you can always fine tune dynamics by recompressing at the mixdown.

If you're recording stereo tracks with different mic positions, use a stereo or dual compressor to process both tracks. However, do *not* use the compressor's stereo link feature to process both tracks identically. Retain the integrity of the diverse sounds by compressing separately. One track may sound better compressed harder (or softer) than the other.

Solo acoustic guitar—or unaccompanied guitar and voice—performances should be lightly compressed during

recording to produce the illusion of natural dynamics. A 2:1 ratio still works, but reduce the threshold to -3 dB or lower.

Although I'm an advocate of "no rules" recording, I'm not a huge fan of imposing effects such as chorusing, pitch shifting, and multitap delays on acoustic guitars. (How's that for being wishy-washy?) There *are* instances where aggressive effects processing is warranted, but keep in mind that subtle treatments retain more of the acoustic guitar's inherent personality. In addition, beware of adding too much reverb to the track during mixdown. A wet mix will make each and every finger squeak sound like a banshee wail.

HAZARD ZONES

Obviously, your recording environment will color the sound of your acoustic tracks. For example, if you record in a bedroom that has plush carpets and thick drapes, the miked guitar tracks may appear somewhat muted. If you desire a more open timbre, place a sheet of plywood (or linoleum) under the recording position to enhance reflections.

On the other hand, if you're recording in a basement where reflections ricochet off the concrete and add a metallic tone to the guitar, try spreading a thick blanket on the floor. You can minimize wall reflections by hanging blankets behind, and on the right and left sides, of the performer.

Room sounds aren't always bummers, however. Ambience can be your friend. Have a friend play an acoustic guitar in different areas of your recording environment, and take note of where the sound is particularly inspiring. Keep these positions in mind when you set up your mics.

STRUMMED OUT

If I do say so myself, I've done a pretty good job of working through my past fear of acoustic guitars. I actually own about four or five acoustics, and I play them constantly. Acoustic guitars have also had a big impact on my production style, as few tracks make it to the final mix without a glistening steel-string part.

However, I still can't bear to play "Michael Row The Boat Ashore." Some traumas just take a little more time to overcome. ●

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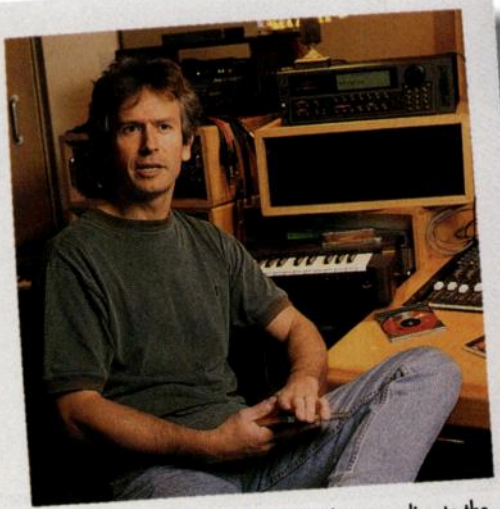
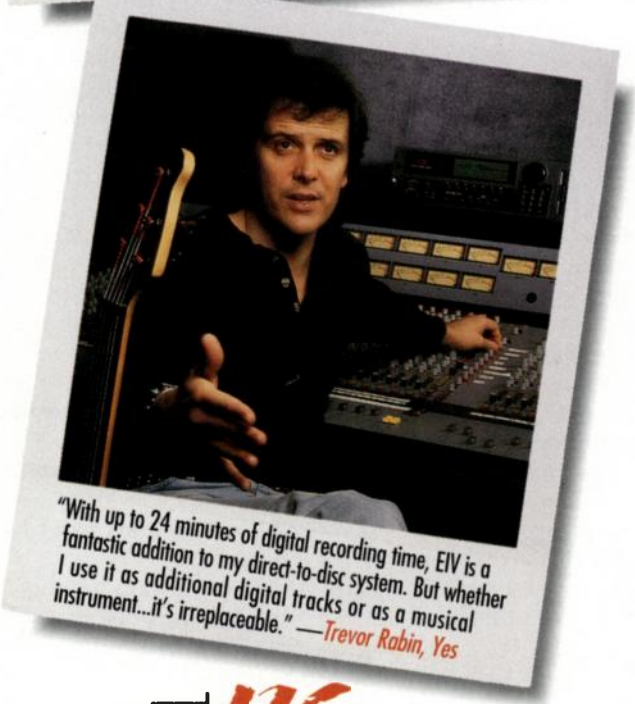


"For recording or performance, it's taken sampling to the next level. The sound quality, the sample memory, the polyphony... it's all there."—*Tony Banks, Genesis*



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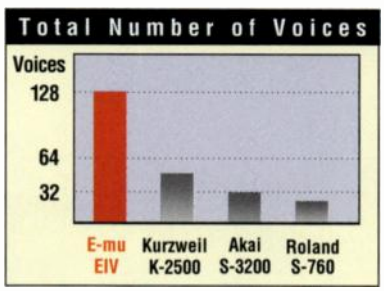

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Reviews

Yamaha ProMix 01

By Michael Cooper

An automated digital mixer at a startling price.

Once in a long while, a revolutionary product sets the pro audio community on its ear. For example, Alesis obliterated the status quo with its ADAT, which provided pro recording quality for personal *and* professional studios.

With the introduction of Yamaha's ProMix 01 digital mixer, we stand on the brink of another revolution. The 18-input, digital, automated mixer features parametric channel EQ, two onboard multi-effects processors, three dynamics processors, and motorized faders, all for under $2,000.

Yamaha's ProMix 01 provides sixteen mono input channels and a stereo channel, with onboard effects, compression, and EQ, all processed and mixed in the digital domain.

Virtually all settings can be recalled and automated in real time, including the parameters for the EQ, effects, and dynamics processors. Snapshot automation is executed by means of ProMix's 50 Mix Scenes, which can be recalled manually or via MIDI Program Changes. In addition, the device's parameters can be recorded to a sequencer in real time as MIDI Control Change messages, providing dynamic automation (see **Fig. 1**).

INS AND OUTS

All inputs and outputs are on the rear panel. The mixer offers sixteen mono input channels, plus one stereo input channel. All sixteen mono input channels can handle input levels from -60 dB to +4 dB, accommodating mic- or line-level sources.

Input channels 1 through 8 have balanced, XLR connectors and 48-volt phantom power for condenser microphones and active DI boxes. The phantom power can be globally defeated with a rear-panel switch. The first eight channels lack ¼-inch inputs, so you must use adapters to patch in electronic instruments. Input channels 9 through 16 are identical to the first eight channels, except they offer balanced, ¼-inch jacks instead of XLRs and don't have phantom power.

The stereo input channel is primarily intended as an effects return, but can also accept a submix from another mixer. The stereo channel interfaces with the outside world via a pair of ¼-inch, unbalanced phone jacks.

A pair of unbalanced, RCA connectors are provided for 2-track tape returns. A switch on the control surface lets you monitor the 2-track return or the stereo mix bus. If nothing is plugged into the stereo input channel, the signal appearing at the tape returns is routed to the EQ-equipped stereo channel so you can equalize the 2-track playback.

If you're mixing to DAT or some other digital medium, you can stay in the digital domain by using the S/PDIF (coaxial) digital output. The board's sampling frequency is 48 kHz, however, so you'll have to convert to 44.1 kHz for CD releases.

All other outputs are analog. Balanced XLRs are provided for the left and right main analog outputs. They can accept unbalanced signals, but will lose 6 dB of output level. Analog RCA outputs carry the same L/R main output signals for connection to a mixdown deck.

Left and right monitor outputs are provided on ¼-inch, unbalanced jacks. The monitor outputs can deliver either the cue mix (main stereo mix or soloed

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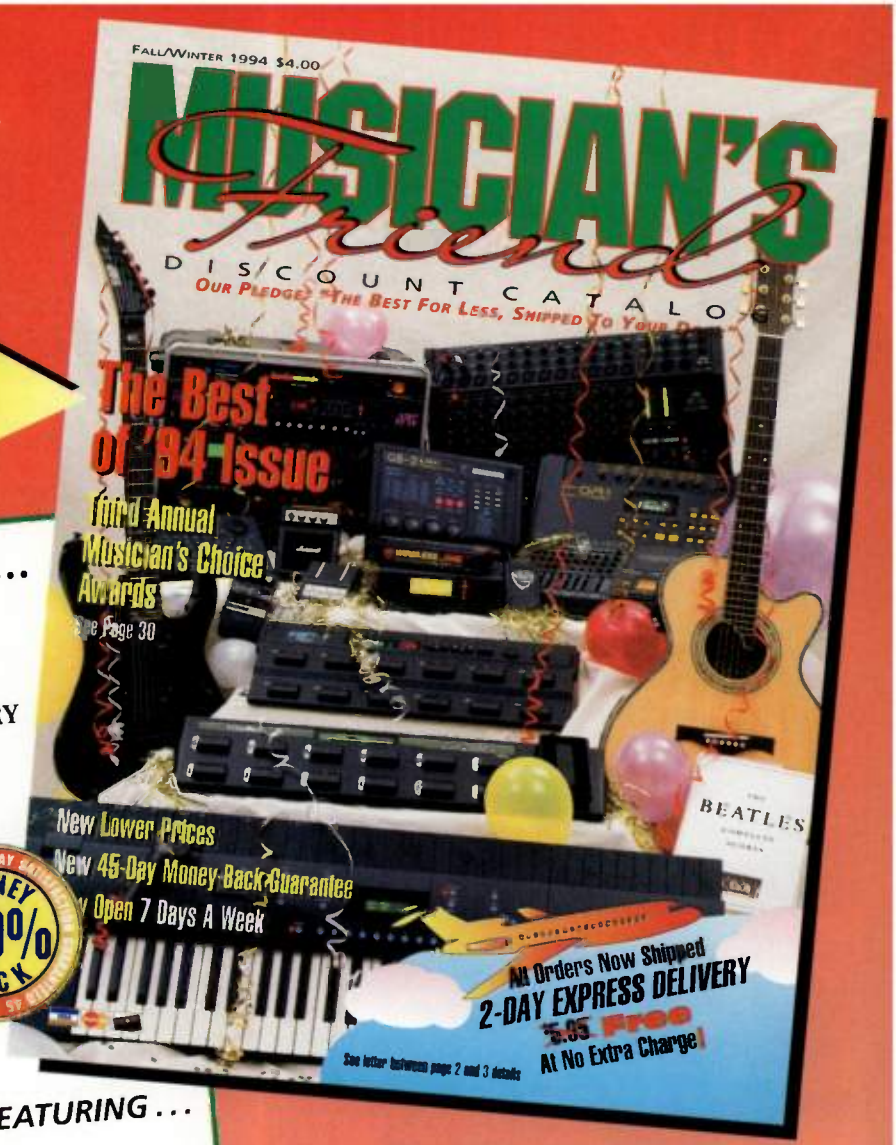

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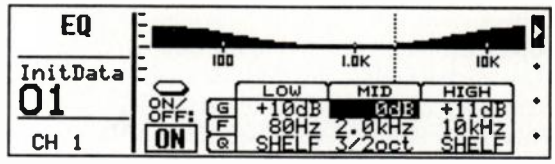
channels), or the 2-track return. The headphone output gets the same mix as the monitor outs and provides enough level for all but the hearing-impaired.

The ProMix offers four aux sends, which can be pre- or post-EQ. Sends 1 and 2 feed the two internal digital effects processors. The internal processor's outputs are returned internally. Aux sends 3 and 4 are routed to external effects via unbalanced, ¼-inch jacks. They are returned to the ProMix via the stereo input channel or a pair of mono input channels. Alternatively, sends 3 and 4 can be used to send a separate, post-EQ foldback mix to stage monitors or a studio's headphone distribution amp. Rounding out the ProMix's rear panel are the MIDI In and Out ports; a power switch; and a permanently attached, 3-prong AC power cord.

What's missing? The ProMix 01 does not have channel inserts, direct outs, or multitrack bus/tape outs. Although these omissions are major limitations for recording, don't write the 01 off for multitracking (see sidebar "Multitracking with the ProMix 01.") The ProMix also does not provide a talkback-mic circuit.

USER INTERFACE

The ProMix's thoughtfully designed work surface has much in common with traditional analog mixers, but differs in key areas. Each mono input channel has its own switchable 20 dB pad and gain pot (the latter offering 44 dB of continuously variable gain). These controls are analog, positioned immediately before the A/D converters.



COURTESY OF YAMAHA

FIG. 2: Three-band parametric EQ is available on each channel, with a graphic response curve (top). Although the default is shelving low and high bands and a peak-type mid band, the high and low bands also can be configured as peaking types.

Each input channel (including the stereo channel) has a 60 mm, motorized fader. The fader also adjusts the channel's effects-send level for *each* of the four effect sends when the board is switched into the appropriate programming mode. The ProMix remembers all fader settings, and when switching the fader's function (e.g., from the input-channel level to the various effects send levels), the faders instantly jump to the last settings you made in each mode. Totally cool.

The RTN/SEND fader serves as the effects-return level control for ProMix's two internal effect processors (1 and 2) and doubles as the *send* level control for aux sends 3 and 4. Its current setting always reflects the level for the parameter that was last summoned. A fader for the main stereo output is also provided. Each input channel, the RTN/SEND channel, and the stereo output have dedicated mute buttons.

The main left/right output levels are displayed on 12-segment, analog LED meters that feature a defeatable peak-hold function. The meters top out around +20 dB to accommodate the S/PDIF output's 20 dB of headroom.

Otherwise, the ProMix's control surface bears no resemblance to an analog board. Controls for panning, EQ, effects, dynamics processing, metering, soloing, and a host of other functions are virtual and are accessed via function buttons to the left of a huge, 240 × 64-dot, backlit, graphic LCD.

Accessing these functions is a breeze. Every channel that has a fader also has a Select button. You simply press the Select button for the channel you want to process and press the function button for the appropriate processor (the EQ, compressor, pan, etc.). Parameter values are adjusted with a sturdy, detented wheel on the right side of the board. The parameter wheel is also used to scroll through internally stored Mix Scenes and effects, dynamics, and EQ programs.

The ProMix's extremely helpful and well-designed LCD shows your edits and helps you navigate through numerous pages of tweakable options. It shows numeric parameter values and graphic representations of all virtual control settings (including EQ curves; see **Fig. 2**), as well as metering for all input channels, sends 3 and 4, and returns 1 and 2. It's the digital equivalent of a comprehensive meter bridge with defeatable, global peak-hold.

All input metering reflects pre-EQ levels, which is a good thing to remember when trying to hunt down the cause of clipping distortion. The only downside to the peak-hold function is that it is defeated on both the digital and analog LED meters whenever you leave the Meter LCD function. That is, you can't see the maximum peaks for an entire mix unless you stay in Meter mode for the duration of the mix.

This minor oversight notwithstanding, I cannot praise the ProMix's elegant LCD screen and user interface enough. A wealth of information is always quickly accessible. For instance, whenever you solo a channel (or combinations of channels) via the Mix Cue function, you instantly see the last selected channel's level, phase, pan, EQ curve, and effects-send settings on the same page of the screen (see **Fig. 3**).

PAIRING

The ProMix 01 allows you to program up to eight mirror-image pairs for adjacent input channels. If channels are paired, their faders follow each other when either is moved, and settings for phase-reverse, EQ, Cue (solo), On/Off

Event Editor

Track# 1 Pro Mix 01 CCs

Goto Bar 66 | Insert event | Filter events

Bar Beat Clook	Event	Ch.	Pitch	Velocities	Duration
66:02:137	Ctrl	5	42	74	
66:02:137	Ctrl	5	43	7	
66:03:014	Ctrl	5	42	72	
66:03:014	Ctrl	5	43	29	
66:03:105	Ctrl	5	42	70	
66:03:106	Ctrl	5	43	51	
66:04:131	Ctrl	5	42	68	
66:04:131	Ctrl	5	43	73	
67:02:150	Ctrl	1	18	126	
67:02:167	Ctrl	1	18	124	
67:02:174	Ctrl	1	18	120	
67:02:190	Ctrl	1	18	117	
67:02:197	Ctrl	1	18	114	
67:02:214	Ctrl	1	18	111	
67:02:221	Ctrl	1	18	109	
67:03:002	Ctrl	1	18	106	
67:03:009	Ctrl	1	18	103	
67:03:026	Ctrl	1	18	101	

FIG. 1: You can store ProMix MIDI Control Change (CC) data in a sequencer for dynamic automated mixing. Here, the CCs on channel 5 govern Send 2's Parameter 1 High and Low bytes. The CCs on channel 1 control Effect Return 2's level.

(mute), and effects-send levels are copied from one channel to the other. (You pick whether the odd- or even-numbered channel will be the target.) This is a real time-saver when mixing stereo keyboard tracks and external reverb returns.

There are some limitations and annoyances regarding the pairing function's implementation. For instance, the ProMix does not offer any record of which channel was edited and which is the original, leaving you to rely on your memory. If you later decide to undo a pair, the channels' settings are not restored to their original (independent) values, as in a true master/slave relationship, and you're left wondering which channel was initially changed to match the other.

Unfortunately, if you patch a channel to a dynamics processor, the connection is wiped out when the channel is paired. It's a minor hassle to repatch the processor to either or both channels in the new stereo pair, but I would prefer to have a default setup where the unedited channel's patch is left intact. Also, an odd-numbered channel must always be paired with the next highest even-numbered channel (e.g., channel 3 can pair with channel 4, but not with channel 2).

GROUPING

The ProMix also lets you group faders without copying settings between channels. If the faders are at different settings, grouping maintains their relative positions. I found this invaluable in preserving the balance between layered synth sounds, paired mics, and miked and DI signals on an acoustic guitar.

It's a real shock to feel grouped faders squirm rebelliously under your fingers when you forget they're grouped and try to move them in ways contrary to their established relationship. When grouped faders move, they make noises similar to a fly buzzing or a cat purring. The noise is no louder than with manual faders, and I didn't find it distracting. If the noise bothers you, Local Off uncouples the faders from the internal processor so they won't move during automated playback.

Four groups are allowed, with no limit on how many faders are included in each group. (Obviously, no fader can belong to two different groups at the same time.)

PREAMPS AND EQ

For the most part, the ProMix looks great on paper (see the sidebar "ProMix 01 Specifications"). But its high-resolution converters would provide little advantage if the mic preamps weren't clean enough to deliver a pristine signal to the board's digital circuitry in the first place. Critical A/B listening tests totally blew me away. The ProMix's mic preamps are extremely quiet, clear, accurate, and tonally well-balanced, a major notch in quality above the many budget outboard mic preamps on the market.

The ProMix offers a 3-band parametric EQ for every input channel, including the stereo input as well as for effect returns 1 and 2 and the stereo output. Shelving EQ is available in lieu of bell-curve EQ on the low and high bands. Bandwidth, or "Q," is adjustable from ⅛ octave to three octaves (in nine steps). Center frequencies can be adjusted from 32 Hz to 18 kHz in ⅛ octave increments, and you can cut or boost up to 15 dB in each band.

I found the equalization highly flexible and musical. The mid band's range overlaps that of both the low and high bands, and the EQ can be bypassed on individual channels for A/B comparisons, a crucial feature. Thirty preset EQ settings are stored in ROM, and twenty user RAM slots are available for storing custom EQ programs. You can

MULTITRACKING WITH THE PROMIX 01

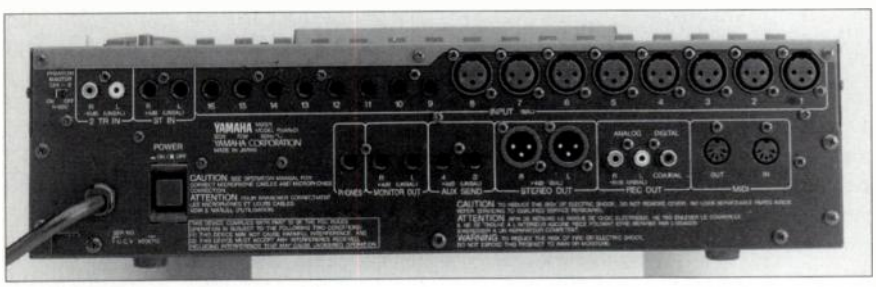
While the lack of inserts, direct outs, and multitrack bus outputs limits the ProMix 01's usefulness for multitrack recording applications, there are ways to press the board into service for such duties. The ProMix is essentially a 4-bus board, the main stereo outs constituting two of the buses and aux sends 3 and 4 constituting the other two.

Used in mono configuration, sends 3 and 4 can each output one channel or a mono submix to separate tracks on your multitrack recorder. You can also configure ProMix's sends 3 and 4 as a stereo pair and pan a number of channels between them (post-EQ) to send a stereo submix to two tracks on your multitrack.

Unfortunately, in both cases, you have to turn the channel faders all the way down and send them pre-fader if you are to extract them from the panned submixes that are simultaneously going out the main stereo outputs to the other two tracks. You'll also sacrifice using sends 3 and 4 for the musicians' foldback (headphone) mix. Also, whatever goes out sends 3 and 4 cannot have internal effects added to it, as effect 1 and 2 returns cannot be routed to the aux 3 and 4 buses. Therefore, the main stereo outputs must be used for submixing drums with reverb.

Of course, you can bypass the ProMix altogether during tracking if you have enough outboard preamps and do not need to sum any signals. Yamaha makes the 8-channel MLA7 mic-line preamp ($549) and the more pristine, 8-channel HA8 mic preamp ($1,679) for such a purpose.

Finally, using the ProMix's S/PDIF output with a digital format converter (e.g., an Alesis AI-1 for the ADAT system) lets you record to two MDM tracks in the digital domain on each pass.



The rear panel of the ProMix 01 is easy to comprehend. Note that the first eight channels have XLR connectors only, while the second eight channels use ¼-inch jacks. S/PDIF digital output is offered, but not digital input.

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name EQ, effects, and dynamics-processing programs. LCD screen-redraw times for the EQ curve take roughly a half-second with dramatic EQ changes, but the results are heard immediately.

EFFECTS

The ProMix 01 offers two onboard, stereo digital multi-effects processors, which are fed by aux sends 1 and 2. Although based on Yamaha's SPX-series processors, the effects use a new chip and all-new algorithms. Available effects include reverbs, ambience, chorus, flange, delay, pitch shift, doubling, phasing, tremolo, auto pan, and combination programs (e.g., chorus with reverb, or delay with chorus). Thirty effect presets and ten user RAM slots are provided, and effects programs can be stored in Mix Scenes.

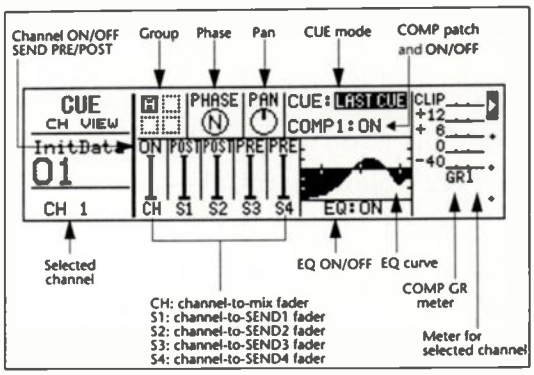
Each of ProMix's four aux sends (including external sends 3 and 4) can be configured pre- or post-fader. The only catch is that when you make an aux send pre or post, it is set that way for *all* channels that use the send.

There's also no master aux send control for aux 1 and 2, so each channel's send must be separately adjusted to optimize the input level to the internal effects processors. (You can't group faders when they're used as effect sends, which would have provided a pseudo-master fader.)

You can EQ effect returns 1 and 2, which is extremely useful for shaping modulation effects and reverb, for example. You can also mute and pan them and monitor them pre-fader in stereo. Happily, the LCD screen alerts you when an effect has been edited, and edits-in-progress are not lost on power-down.

The eleven reverb programs are all based on the same algorithm. They offer only six adjustable parameters, but these are the most important for tailoring custom effects: reverb time (from 0.3 to 30 seconds), high-frequency damping, diffusion, predelay, and lowpass and highpass filters. Unfortunately, there is no control over level, spacing, or type of early reflections.

On a more positive note, the multi-effect programs that combine chorus or flange with reverb allow you to adjust how loud the reverb is with respect to the modulation effect. The reverb always follows chorus/flange in a series patch.



COURTESY OF YAMAHA

FIG. 3: The Cue LCD function shows the pertinent information about the selected channel, in this case, input channel 1.

Unfortunately, the reverbs are a bit fluttery, ringy, and "phasey"-sounding. They are not realistic, and they lack density. Still, they offer better quality than some budget outboard units I've heard and should be adequate for demos. The Reverb Vocal and two Reverb Ambience programs proved the most useful for vocals.

The chorus, flange, phasing, tremolo, and auto pan programs are stereo and allow you to separately tweak the all-important modulation depth and speed/frequency parameters. The tremolo program and some chorus programs let you modulate both amplitude and pitch. Although I wasn't wild about the stock chorus programs, a little parameter tweaking quickly produced some fat effects on guitar.

ProMix's flange programs were a wonderful surprise. They actually overshadow those found on Yamaha's excellent SPX990. Deep jet flanges and lush, weeping guitars are a breeze to produce. The phasing algorithm came in handy on electric guitar, lending a shimmering underwater warble without sounding overprocessed.

Auto pan also earns high marks. It gives you control over panning direction (for example, from left to right) and depth (left/right and front/rear) to produce careening, head-spinning guitar solos that rival any roller coaster I've ridden!

The delay programs offer up to 661 ms of delay time, with independent times for each voice in the 3-part delays, plus adjustable feedback and high-frequency damping. Unfortunately, all but one of the programs that chain delay and chorus in series lack a volume control to balance the levels of the two effects. Also, only one of the three delay voices is adjustable on the program that does offer this control.

However, the delays sound clean and benefit tremendously from the fact that the effects returns have parametric EQ. With the top end of echoes rolled off a bit, vocals and guitars take on an added sparkle and dimension. Similarly, by rolling off the bottom end on a tremolo effect, I could keep a guitar's bass strings from messing with the basic sonic structure of the mix.

Finally, we have ProMix's three stereo pitch-shift programs. These add one harmony, shifted as much as ±1 octave. Fine adjustments (±50 cents), pan, level, and feedback gain are independently adjustable for left and right channels. These programs offer excellent tracking. Adding an upward 1-octave shift to a snare drum track made it a lot crisper, without incurring any noticeable delay between wet and dry signals. I was also able to correct a flat vocal track by sending it pre-fader to the stereo pitch-change program and

ProMix 01 Specifications

Frequency Response (+1/-3 dB)	Dynamic Range	THD (20 Hz-20 kHz)	Crosstalk (@ 1 kHz)	Dimensions (inches)	Weight (pounds)
20 Hz-20 kHz	105 dB	<0.1%	-70 dB	17.1 x 5 x 19.2	27.6

ADCs	DACs	DACs
20-bit linear, 64x	Stereo Out 20-bit linear, 8x	Monitor Out, Sends 3 and 4 18-bit linear, 8x

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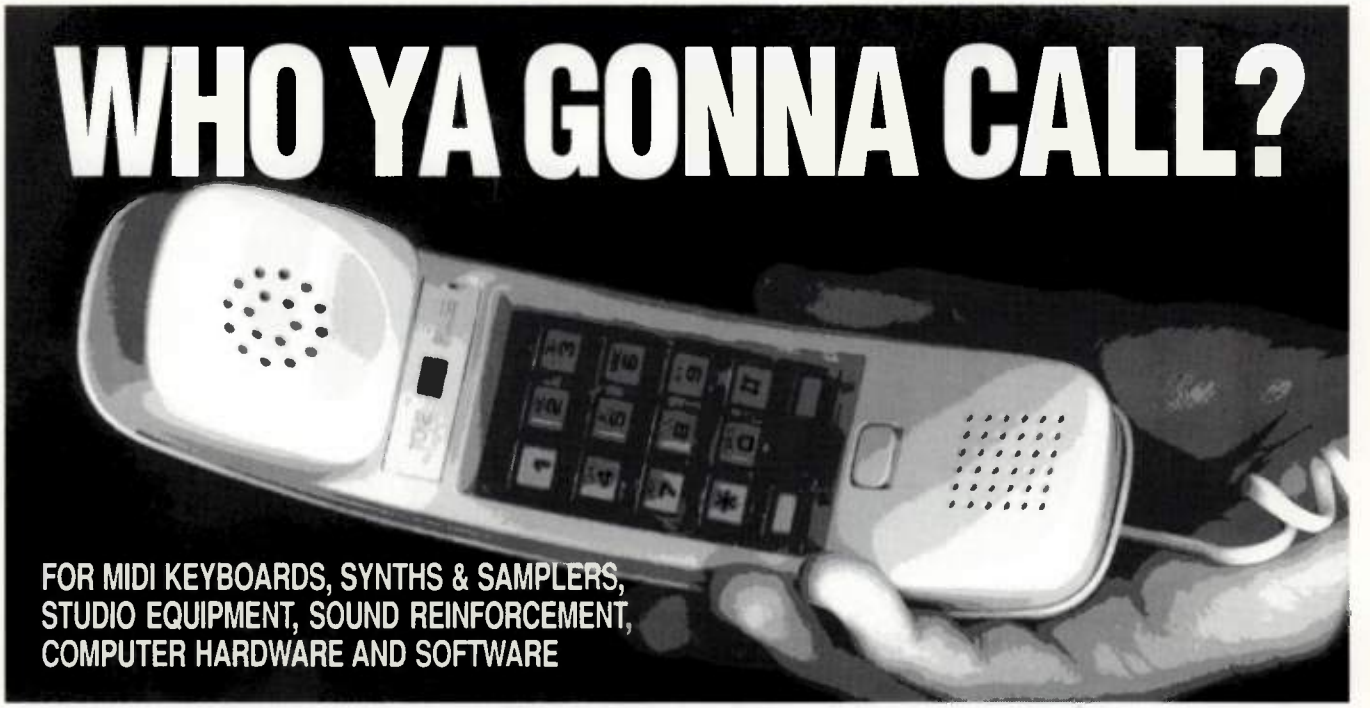

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shifting it up 13 cents. (By the way, pre-fader sends are *always* post-EQ.)

Although pitch stability is excellent, the pitch-shifted output suffered from "phasiness." Fortunately, the comb filtering is largely unnoticeable on background tracks. The stereo pitch-change program also produced *outstanding* detuning effects on arpeggiated guitars, making them fat, lush, and wide. And the Vocal Doubler program did a great job in fattening up both lead and background vocals.

DYNAMICS PROCESSORS

The ProMix 01 offers three internal, digital, stereo dynamics processors, each of which is capable of compression, limiting, gating, and ducking. Ten factory presets and ten slots for user programs are provided.

The processors can be patched into any input channel or stereo pair and are always post-EQ and pre-fader. They can also be patched into sends 3 and 4 and the stereo output, where you have a choice of pre-EQ/fader or post-EQ/fader. This lets you limit signals going to power amps, speakers, and stage monitors via those buses.

Although a stereo dynamics processor can be used on a single mono channel, it can't be used as two independent mono processors. You also can't patch any source to more than one dynamics processor at a time, which rules out simultaneously gating and compressing a vocal. However, because dynamics processor Patches (assignments) and settings are stored in Mix Scenes, you can instantly switch, say, from compressing a rack tom for sustain to gating it to reduce ride cymbal leakage. Thankfully, the three dynamics processors can be individually bypassed, and both gain reduction and output-signal levels are simultaneously, graphically displayed on the LCD.

All the compressors (and limiters, when ratios exceed 10:1) are based on the same algorithm and offer adjustable threshold, ratio, attack, release, and output gain (see **Fig. 4**). Gates and duckers offer adjustable threshold, attack, hold, decay, and range. While you get a generous number of controls, their parameter ranges and incremental resolution are not quite as useful as those in the digital multi-effects processors. For example, the unit's compression ratios jump from 1:1 to 2:1 to 4:1, but I often find it necessary to

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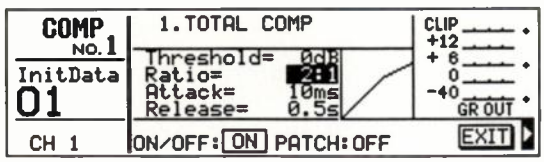

FIG. 4: The dynamics processor display shows the number and name of the program at the top. Note that you can toggle the processor on and off (bottom).

fine-tune compression ratios in the 1.5:1 to 3:1 range for vocals.

The compressor/limiters have a harsh, hard-knee sound. No matter how you set the attack and release controls, anything but extremely light compression results in a choked sound, and pumping is clearly evident, even at 2:1.

The gates work much better. I easily eliminated headphone leakage between phrases on a guitar track, and the attenuation rode down smoothly. However, the maximum hold time of 341 ms is too short to keep from attenuating sustained notes.

The duckers enabled me to automatically execute a smooth fade on a guitar track between vocal phrases. Ducking stereo program material behind a voiceover was also easy and effective.

A big strength is the dynamics processor's ability to key off a different channel than it is processing. This allows sidechain applications such as deessing and frequency-dependent gating. After splitting a vocal track to two inputs on the ProMix, I could equalize one input (cutting the low end and boosting the highs), slap its fader all the way down, and patch it (pre-fader, post-EQ) to the key input of a compressor. I patched the unequalized vocal to the audio input of the same compressor, and presto! The vocal was de-essed.

Well, almost. In reality, the compressor's minimum release time of 0.1 second is too long to avoid squashing the nonsibilant portion of the waveform. (It needs to be about twice as fast.) Pumping was all too evident. Furthermore, high amounts of gain reduction caused audible clicking on sustained input during the compressor's release phase at the minimum release time. Setting the compressor to the next longest release time, 0.5 seconds, solves this but limits the processor's applications.

Fortunately, ProMix handles frequency-dependent gating duties more effectively. I could gate out significant amounts of cymbal bleed from a snare track by setting up a similar patch to that used for the de-esser (i.e., split the snare and send the equalized version prefader to the gate's key input). The snare drum's transient attack was totally preserved, thanks to the gate's 0 ms attack time. The only drawback is that the gate's threshold control goes only as high as +10 dB, which did not allow me to gate out bleed from tom rolls and an occasional super-loud crash cymbal hit.

SNAPSHOT AUTOMATION

ProMix's automation and MIDI control features are among its strongest selling points. The analog controls—pad switches, gain pots, and so on—are reset manually. But the digital control settings can be automated.

A static "snapshot" of the digital parameters can be named and saved to any of ProMix's 50 Scene memories. These can be used as starting points for particular mixes, live setups for specific venues, or mix settings for scenes in a theatrical performance.

All Mix Scenes, the edit buffer (which contains work not yet saved to RAM), and ProMix's entire library of EQ, effects, and dynamics programs can be dumped to external SysEx storage or another ProMix. You can also selectively dump just a portion of a particular Scene's data to update a mix. A Bulk Dump request is also provided for downloading individual or groups of Mix Scenes, MIDI setup parameters (e.g., transmit and receive channels), and MIDI Program Change and Control Change assignments. Once reloaded into the ProMix, Scenes can be recalled one at a time, manually or via Program Changes. (Program Change mapping is provided.)

Whenever you recall a Mix Scene manually, a Program Change message is sent to the ProMix's MIDI Out, allowing real-time storage of mix snapshots for automation with a sequencer, among other applications. Recalling a Mix Scene with many parameter changes takes roughly one-third of a second.

The point at which you switch Mix Scenes must be strategically placed to avoid an audible click from being introduced into the audio. This seems to be a result of a rapid change in levels

within the program material. Wearing cranked headphones and with all faders up, I heard no clicks when changing Mix Scenes without audio running through the board. Furthermore, dynamic fades are smooth and click-free. Fading down a 1 kHz sine wave while blasting the headphones, I heard no zipper noise or distortion, even with quick fader moves.

CONTINUOUS CONTROL

ProMix's faders are motorized and actually move between 128 possible positions during playback of your sequencer data. (Although you can assign 128 positions via MIDI, the actual fader resolution is greater than this, as the ProMix interpolates to provide 4,096 actual fader positions.) Such a feature was previously relegated to extremely expensive mixing consoles, but a new day has dawned.

Whenever you adjust a digital control (such as fader level) or parameter (e.g., EQ boost or chorus depth), a MIDI Control Change message is sent. Therefore, any MIDI controller that can transmit Control Changes can control ProMix. For example, Control Changes and Program Changes can be recorded to a sequencer that is synched to a multitrack recorder for dynamic, real-time automation of all digital mixer parameters.

An impressive 530 mix parameters can be controlled by any of 96 Control Change messages (assigned in five banks, one bank per MIDI channel). Default Control Change/parameter assignments are provided, but you can easily edit them. You can set up ProMix so all Control Changes use the same MIDI channel (for economy's sake), or so a separate channel is used for each bank of Control Changes, which makes editing easier.

Dynamic automation is data-intensive. For optimal results, and to avoid MIDI traffic jams, you should dedicate a pair of MIDI interface ports to the ProMix. A MIDI sequencer that can chase controller data will allow you to start playback anywhere in a song and have ProMix's control settings adjust appropriately. Of course, you can manually override Control Change commands while a mix is in progress, until the next Control Change comes along and edits your move. To make permanent changes to the mix, just edit your sequencer's event list, or punch in "on the fly" while synched to multitrack. It's easy!

With Local Control off, ProMix becomes a generalized MIDI control surface. For instance, you can use the faders to control the parameters of a synth or external effects processor, and the Select buttons can send Program Change commands, all without affecting the ProMix's settings or edit buffer. In this mode, the LCD conveniently shows each fader's level in hexadecimal. The entire MIDI setup is retained in nonvolatile RAM.

ProMix transmits and receives on all sixteen MIDI channels and can operate in Omni mode. Transmission and reception can be independently disabled, and the LCD includes a MIDI indicator to show when data is being received. An Echo function can convert the MIDI Out to a Thru port.

UTILITIES AND OPTIONS

ProMix offers several utility functions. A handy safety feature is Memory Protect on/off, which keeps you from overwriting Mix Scenes. A battery checker tests the condition of the 5-year battery that backs up the user RAM.

In addition, an oscillator is provided for printing alignment tones, calibrating recorders and ancillary analog mixers, and troubleshooting loose connections. The oscillator produces 100 Hz, 1 kHz and 10 kHz sine waves, and pink noise. It can be routed to send 3, send 4, and/or the stereo output fader. A few options are offered, as well, including a rack-mount kit, a carrying case, an adjustable stand, and wooden side panels.

Product Summary

PRODUCT:
ProMix 01 mixer
PRICE:
$1,999
MANUFACTURER:
Yamaha Corporation
6600 Orangethorpe Ave.
Buena Park, CA 90620
tel. (714) 522-9011
fax (714) 739-2680
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FEATURES	● ● ● ●
EASE OF USE	● ● ● ●
AUDIO QUALITY	● ● ● ●
VALUE	● ● ● ● ●

CONCLUSION

The Yamaha ProMix 01 is the most exciting new product to come along in the last two years. Its main strengths are its mic preamps, digital signal path, S/PDIF output, flexible EQ, excellent modulation and delay-based effects, strong MIDI implementation, stellar user interface, motorized faders, and comprehensive automation capabilities. The two owner's manuals are excellent, which hopefully indicates a new trend for Yamaha. And all this comes at a rock-bottom price.

On the down side, ProMix's reverbs and compressor/limiters are mediocre. And the lack of direct outs, inserts, and multitrack buses greatly limit the mixer's usefulness for multitrack recording. The lack of dedicated knobs and a universal layout/interface for every function also make it an impractical tool for guest sound-reinforcement engineers at fixed installations.

That said, once you've climbed the somewhat steep learning curve, you'll fly around on this board with ease and joy. Sound-reinforcement engineers who mix predictable shows (e.g., the same band or theatrical performance) night after night will love the ProMix 01. The ProMix also excels as a submixer for virtual tracks, real drums, and layered keyboard parts.

For track-starved smaller studios, the board's automated mixing capabilities can breeze through mixing multiple, disparate instruments that are "stacked" on the same track. And as an adjunct submixer, the ProMix provides an inexpensive upgrade path for mid-sized studios looking to purchase more MDM tracks than their current mixer can accommodate.

Had Yamaha included direct outs, inserts, and multitrack bus outs on the ProMix 01, the required D/A converters, asynchronous sample-rate converters, and digital multichannel format converters it would have raised the price of the board substantially. Yamaha no doubt analyzed the extra expense and incompatibility issues and opted to keep things simple. But I can't help wondering what spin-off digital consoles the ProMix 01 will inevitably spawn for the commercial multitrack recording studio. I can hardly wait.

Michael Cooper *is the owner and chief recording engineer of Michael Cooper Recording in Eugene, Oregon.*

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FEBRUARY 1995

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Mark of the Unicorn FreeStyle (Mac)

By Dan Phillips

An affordable sequencer breaks new ground.

For years, electronic musicians have asked sequencing-software developers to provide tools for the diverse dmands of film scoring, pop songwriting, record production, digital audio, and classical composition in a single package. Most of the major software publishers have responded admirably, and now there is a good selection of high-end software from a number of companies, each capable of handling just about any job with extensive feature sets.

So now that they've given us what we asked for, everyone's happily making music, right?

Well, maybe not everyone. Some people don't need to worry about SMPTE 29.97 drop or nondrop; event selection via Boolean logic; or user-mappable, multichannel recording. For these people, the all-out, no-holds-barred professional programs are a bit much. Too many features and options usually result in a steep learning curve. Even professionals may wonder if they really need to get so involved in technical details when they're just sitting down to sketch out a song.

For these folks, companies such as Opcode, Passport, and Steinberg have long offered scaled-down, low-cost sequencer programs. Now Mark of the Unicorn is entering the fray with *FreeStyle*. This is an entirely new program that is not based on MOTU's flagship sequencer, *Performer*. Designed as an easy-to-use music tool, it offers some surprising twists on established sequencing techniques.

WHAT, NO CHANNELS?

The program's first challenge to the sequencing status quo is the concept of the Player. A Player represents a particular type of sound on a particular MIDI instrument, along with a few other instrument characteristics, such as default clef and orchestral transposition. Typically, Players are named after their sounds, such as Piano, Drums, Bass, Guitar, and so on.

FreeStyle comes out of the box with preprogrammed Players for General MIDI synths, and you can easily remap them for any of the over 70 common synthesizers the program supports. You can also create and name your own Players, and you can assign them to MIDI sound sources, Program Changes, and channels (see **Fig. 1**).

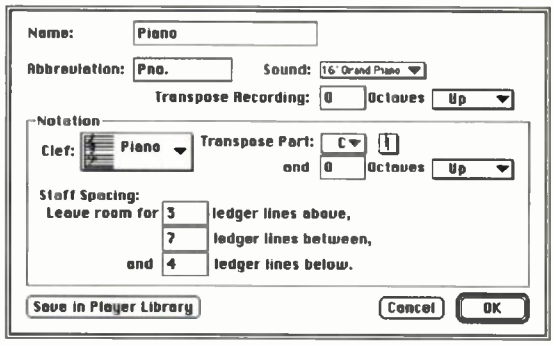


FIG. 1: Players are set up in a dialog box, complete with MIDI device, program name, clef, transposition, and staff spacing. Note that there's no sign of a MIDI channel.

Once your Players are set up, you can select sounds without regard to MIDI channels, devices, or Program Changes. Just choose Piano, and you'll be playing a piano sound. If you later want to hear that part on a french horn, you can easily select the french horn Player to play the part without worrying about Program Changes or MIDI channels. If you select several sounds in one multitimbral MIDI instrument, *FreeStyle* takes care of the channelizing for you. The program's automatic, dynamic rechannelization of parts can also coax better performance out of limited channel resources. (More on this later.)

Groups of Players can be stored in templates, called Ensembles, making it easy to set up for writing and recording in a particular style. *FreeStyle* comes with a list of standard Ensembles, including Rock Band, Piano/Vocal, String Quartet, and Latin Ensemble. You can add your own Players and save the result as a new Ensemble (see **Fig. 2**).

In addition to incorporating the concept of Players, *FreeStyle* eliminates the necessity of creating multiple tracks to hold alternate takes. The idea seems simple once you've worked with it for a few minutes. Each Player includes a list of Takes. If you want to try playing a part again, you simply select a new Take; the old Takes are retained until you explicitly delete them, and they can be easily accessed from a pop-up menu. This dramatically reduces track clutter and the necessity of continually adding new tracks and muting the old ones. I wish that every sequencer had this feature.

SECTIONS

As much as possible, *FreeStyle* tries not to distinguish between pattern-based and linear recording and editing. However, it does exhibit some pattern-oriented characteristics. A single pattern is called a Section. You can record into individual Sections one by one as a Song plays back. This means you can play a single part over the entire Song, and the data is placed within the component Sections, allowing easy editing after the fact.

Sections begin and end on barlines. However, each Section also includes a Pickup bar at the beginning and an Overhang bar at the end. The Pickup and Overhang bars are visible when editing and invisible when arranging Sections into a Song, which is as it should be. This means you don't have to worry if the bass starts walking up to the tonic before the downbeat or if a cymbal crash at the end of the break happens just a few ticks after the downbeat. Just place the Section where its first downbeat is supposed to fall, and *FreeStyle* deals with the rest.

Sections are arranged into Songs in the Arrangement window (see **Fig. 3**). The Sections are displayed as blocks; dragging and placing them end-to-end

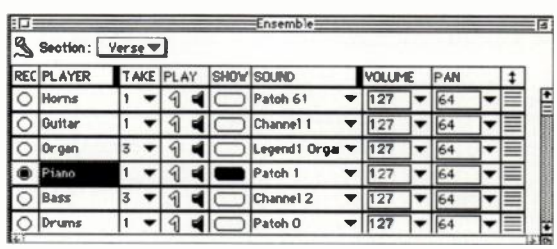


FIG. 2: A collection of Players becomes an Ensemble. Each Player can have an unlimited number of Takes, accessed from a pop-up menu. Clicking on a Player's Volume or Pan brings up a pop-up slider.

creates a Song. In a function reminiscent of *Cubase,* multiple Sections can be "glued" together to form longer patterns, or snipped apart to divide them into smaller phrases. Several Sections can be played simultaneously, but they must share the same tempo and time signature.

RECORDING

FreeStyle's remote controls let you activate most playback and record functions from your MIDI controller. The remote-control key assignments are only active when you are holding down a user-programmable group of keys on the MIDI keyboard called the Key Clump. You can use any group of keys you aren't likely to play; for example, I used low A through low C. You can also use a MIDI continuous controller (such as an otherwise unused pedal or wheel) to toggle the remote-control functions on and off.

On opening a new file, *FreeStyle* asks you to pick an Ensemble of Players. (You can add new Players later.) After you have selected your Ensemble, its associated Players appear in the Ensemble palette. Next, you select Players for recording and set basic parameters such as volume, pan, and solo/mute. You can also select a new MIDI device, bank, and program assignment for each of the Players, using pop-up menus.

Clicking on a Player's name record-enables it and selects it for editing. You can select multiple Players for simultaneous editing either by Shift-clicking, or by clicking on the Players' Record buttons.

FreeStyle is designed for loop recording, drum-machine style. It automatically establishes a record loop based on the length of the first part that you record, with the start and end points clearly shown in the ruler of the current editing window. The loop points are locked to measure boundaries, but *FreeStyle* offers a very cool Loop Smoothing feature that automatically includes pickup notes within the loop. The Smooth Record Loops function temporarily copies the pickup notes to the end of the loop, instead of leaving them before the beginning of the loop.

There is no such thing as destructive recording in *FreeStyle;* new notes are always added to the data already in the Player. Because it's always in overdub mode, there is no provision for punching in or out. (Of course, you can manually delete the part you wish to replace and record a new part.) A Paintbrush tool in the editing window allows step-time note entry.

In addition to the standard countoff click, a Riff Metronome feature lets you use drum grooves or any other single-instrument part as inspirational starting points.

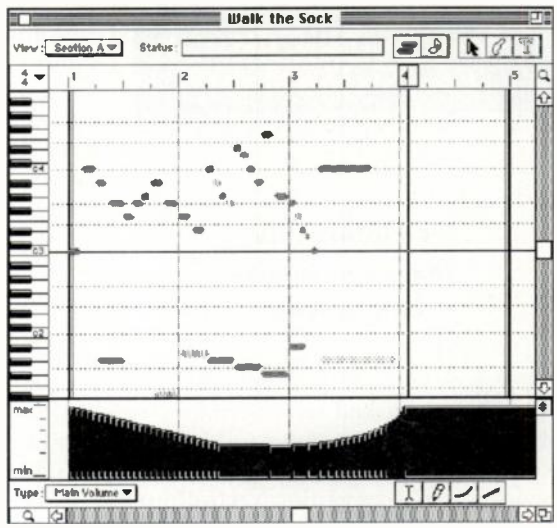


FIG. 4: The Graphic Editing View, with controllers turned on. Note the different fill patterns of the notes, which roughly indicate their Velocities.

NOTE EDITING

FreeStyle lets you edit the music in any combination of Players simultaneously. Colors or graphic fill patterns distinguish between Players. Fill patterns can also provide a rough indication of the notes' Velocities (see **Fig. 4**); the fill pattern becomes darker for higher Velocities. You can use a Graphic Editing View piano-roll display or standard musical notation, switching between the two views by clicking on buttons at the top of the editing window. There is only one editing window, so only one view can be used at a time.

In the program's Notation and Graphic Editing Views, you can see an individual Section or an entire Song, with the Section boundaries marked in the time ruler. These touches are sure to be welcomed by those who like to switch between the two working modes, as well as by novices who may not understand the distinction between them (and now might not need to).

FreeStyle's Zooming features are quite flexible and operate in real time, which makes it a snap to change perspective on the fly. You can Option-drag to zoom in on a couple of notes, Option-drag in the time ruler to zoom in on a specific time range, or use handy pop-up magnification sliders at the ends of the horizontal and vertical scroll bars.

Graphic editing is straightforward: You drag a note to change its start time or pitch. To change its duration, you drag the end of a note. The screen redraw is fast, and notes appear as they are played. You can also numerically edit a note's pitch, Velocity, start time, and duration in a dialog box that appears by double-clicking the note. It would be nice to be able to edit this data in the status display, as well.

The other note-editing commands are pretty basic: Quantize, Transpose, Cut, Copy, Paste, and Move. Quantization includes grid offset (for placing notes ahead of or behind the beat) and variable Swing amounts. A quantization-strength parameter would have been a plus.

CONTROLLER EDITING

Control Changes, Velocity, and Channel Pressure (Aftertouch) can be graphically displayed and edited in the bottom half of the Graphic Editing View. (The Notation View only shows notes.) Only one data type is shown at a time, but controllers for multiple Players can be shown together. *FreeStyle* supports all MIDI continuous controllers except Polyphonic Aftertouch. (It does not support System Exclusive, either.)

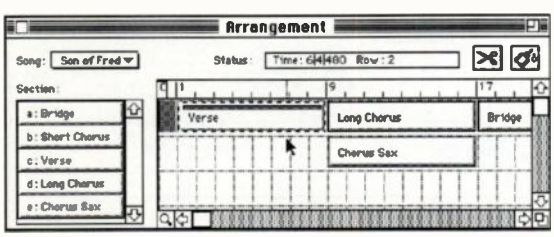


FIG. 3: In the Arrangement window, Sections are shown as blocks that can be dragged into place to create a Song. The Verse is selected in this example. Note the scissors and glue icons.

Controllers can be drawn freehand, or with curve and line tools, though existing data cannot be scaled. When cutting, copying, and pasting notes, a preference setting lets *FreeStyle* automatically bring the notes' associated controller data along, which is a nice touch.

NOTATION

FreeStyle's notation editing and printing features perfectly reflect the program's values: They're simple and straightforward, with no custom noteheads, no articulation markings, and no manual adjustment of spacing. The features it does offer, however, are elegantly executed and trouble-free, and printing with the included music font is of high quality.

Transcription from MIDI input is fast and accurate, including complex tuplets (see **Fig. 5**). Notes appear almost immediately after they are played, and their pitch, start time, and duration can be changed simply by clicking and dragging. Rests are inserted and deleted automatically.

FreeStyle also handles instrument transpositions intelligently. If multiple instruments are shown or printed in a score, they are all displayed in concert pitch; individual parts (such as trumpets in B♭) are displayed and printed in their transposed form. Piano parts are intelligently split between left- and right-hand parts and between treble and bass clefs, and you can override *FreeStyle*'s decisions where necessary.

To change the time signature, just click on the existing symbol in the staff, and a menu of standard time signatures pops up. If you need an odd time signature, you can enter it manually from a dialog box. Key signatures are just as easy: just click and select.

However, there are some pitfalls to this simplicity. Each file can have only one meter and key signature. In addition, keys are arranged by the number of flats and sharps only; there is no distinction between major and minor, so some note spellings may be incorrect. According to Mark of the Unicorn, these issues will be addressed in the next version.

Text can be placed anywhere on the page, with a user-defined font, style, and size. Unfortunately, lyrics are not directly supported, which would be a big plus in a songwriting tool such as

MOTU FREEMIDI

FreeStyle includes (and requires) *FreeMIDI*, Mark of the Unicorn's MIDI driver system. *FreeMIDI* is a system extension that is stored in the System folder and loaded into the Macintosh at startup. It provides a shared MIDI driver for all compatible programs; for example, this feature lets you run a *FreeStyle* sequence in the background while editing a patch in Mark of the Unicorn's *Unisyn* universal editor/librarian.

FreeMIDI is also intended to provide *MIDI Manager*-style interapplication communication, letting one program send data to another. Right now, *FreeMIDI*-compatible programs can sync to a common clock, but data-sharing is not yet implemented. However, the next version of *Unisyn* will be able to send SysEx data to *Performer*.

The system extension is accompanied by two applications, *FreeMIDI Setup* and *PatchList Manager*. *FreeMIDI Setup* provides the main control screen where you program which MIDI interfaces are connected to the computer and which MIDI devices are connected to the interface (see **Fig. A**). An Auto-Configure feature can be used to detect most popular interfaces and MIDI devices that support the Device Inquiry request. Devices not automatically detected can be added manually. It's important to note that if your devices are among the 70 supported by *FreeMIDI*, you don't have to touch either of these applications. The whole process is pretty much transparent.

For each device, *FreeMIDI* remembers a user-entered name, device manufacturer and type, interface port, transmit and receive channels, and System Exclusive device ID. It also records whether each device receives and transmits MTC and MIDI Clock, recognizes Bank Select, is compatible with MIDI Machine Control, and so on. This information is made available to all *FreeMIDI*-compatible applications, which can use it for pop-up device lists and general system setup, so that you don't have to reenter.

The *PatchList Manager* serves as a central storage area for program names. Its name lists automatically appear in any *FreeMIDI*-compatible programs instead of (or in addition to) Program Change numbers. Names for the factory programs of more than 70 synthesizers are included, which is a big plus.

PatchList Manager is aware of MIDI Bank Select and organizes the patches of multibank instruments into hierarchical menus in which you select the bank, then the program name. *FreeMIDI* sequencers (*Performer* and *FreeStyle*) treat Bank Select and Program Change as a single event, which eliminates various hassles and is extremely welcome.

With *FreeMIDI*, compatible programs can grab name lists from *FreeMIDI*-savvy editor/librarian programs, which currently means *Unisyn*. You can also get name dumps directly from a limited number of synthesizers. If all else fails, name lists can be typed in.

If some of this sounds familiar, you might be thinking of the *Opcode MIDI System* (*OMS*). *FreeMIDI* offers several levels of compatibility with *OMS*, which makes certain things easier for musicians using combinations of *OMS* and *FreeMIDI* software and hardware.

The simplest level is that of peaceful coexistence. *OMS* and *FreeMIDI* can run simultaneously, which works quite well. *FreeMIDI* can even generate a *FreeMIDI Setup* from an existing *OMS* setup file, so you don't have to reenter your device information. The downside of running both systems together is that you can't share MIDI drivers between applications. For instance, you can't run a sequencer in the background while working on a patch in an editor/librarian unless both programs are either *FreeMIDI*- or *OMS*-compatible.

FreeMIDI also includes an *OMS* emulator, a separate system extension intended to make *FreeMIDI* look like *OMS* to *OMS*-compatible applications. In theory, you can run *FreeMIDI*- and *OMS*-compatible applications together without using *OMS*. In practice, the emulation works to a certain extent. Opcode's *Galaxy* and *Vision* seemed to function, and it was possible to edit a patch in *Galaxy* while running a sequence in *Performer*. However, I experienced some minor strangeness, including a system crash that only occurred when I used the emulator. Hopefully, the emulation will become more robust in the future.

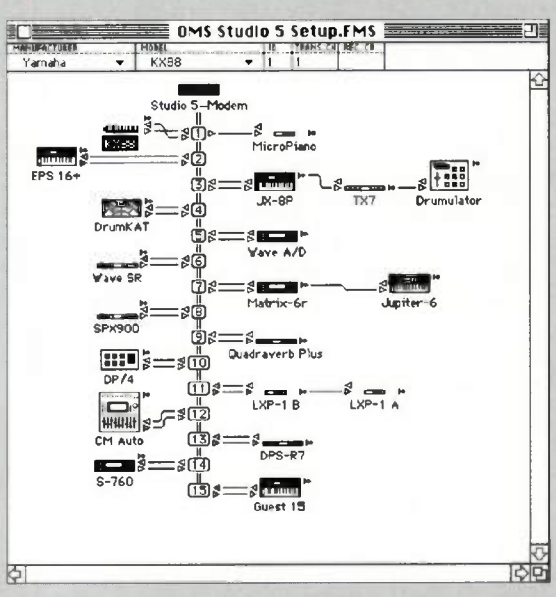


FIG. A: In *FreeMIDI Setup*, you program which MIDI interfaces are connected to the computer and which MIDI device is connected to each interface port. *FreeMIDI* is compatible with Opcode's *OMS* but does not support the advanced MIDI processing features of the Studio 4 and Studio 5.

OMS does not currently support patch-name sharing—*Vision* and *Galaxy* share names directly, outside of OMS—so lists from *PatchList Manager* don't show up in *OMS* applications. The upcoming *OMS* 2.0 is slated to add name-sharing; hopefully, this will also be added to *FreeMIDI*'s *OMS* emulation.

In addition, the *OMS* emulator does not currently support the MIDI-processing features of Opcode's Studio 4 and Studio 5 interfaces. Fortunately, Mark of the Unicorn is working to add this capability.

FreeStyle. You can enter lyrics as text, but the words aren't linked to their notes. (MOTU says this feature is on the way.) Part names, page numbers, and measure numbers can also be displayed.

THE CHANNEL SHUFFLE

The most innovative aspect of *FreeStyle*'s MIDI implementation is its dynamic channel reallocation. Players specify a MIDI instrument, but not a MIDI channel. Assuming that you're using a multitimbral sound module, you can call up an Ensemble that includes piano, bass, brass, and drums played on the same instrument. *FreeStyle* automatically assigns them to different MIDI channels. The tricky part comes when you assign more Players than available MIDI channels to the device. Even then, *FreeStyle* is usually able to make things work.

How does it do this? With a conventional sequencer, you would insert a bunch of Program Change commands at different points during the song,

▼

FreeStyle's notation editing and printing reflect the program's values. They're simple and straightforward.

along with whatever controllers (Volume, Pan, etc.) are necessary to make the programs sound right. *FreeStyle* does this for you, on the fly, sending all the MIDI setup data automatically over the course of the song as the Players change. As long as you don't exceed the moment-to-moment limitations of your MIDI sound module, everything will sound right. This isn't magic, but it's a clever idea, and Mark of the Unicorn's programmers should be commended for introducing it.

However, the rechannelization

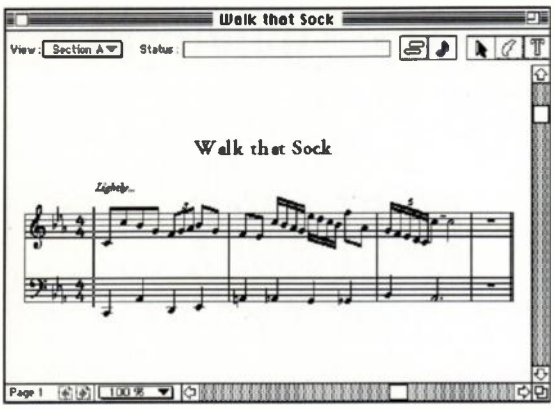


FIG. 5: The Notation View, revealing a short and senseless ditty. *FreeStyle* caught the quintuplets correctly on the first try.

feature makes certain assumptions about your MIDI devices that may or may not be accurate, especially regarding the MIDI channel assignments. Some instruments may have special settings for a particular MIDI channel (e.g., a special drum channel), such as effects routing, outputs, or note priorities, which may make some parts sound different depending on the channel they use. As long as you're using a supported synth, though, you should be okay.

In situations in which you really need to assign a sound to a particular MIDI channel, you can. To do so, however, you must give up being able to select sounds for that device from within *FreeStyle*. Instead, you have to do all your program selection from the front panel of the device. It would be nice to have some sort of middle ground, where Program Changes were available, but channels could also be assigned. Mark of the Unicorn says that this will be coming in a future version of the program.

IS FREESTYLE YOUR STYLE?

I really enjoy working with *FreeStyle*. It's refreshing to see a program take so many new approaches to old problems. It's also great to see software specifically designed to be easy to use, without worrying about impressing the market (and diluting the goal of simplicity) with buckets of features.

However, some musicians will be hampered by the programs's lack of tempo or key changes, or its lack of SMPTE/MTC sync. (It syncs to MIDI Clock only.) All of this is promised for an upcoming version, which is very good news indeed.

Other users may not work with a standard palette of sounds, which negates most of the usefulness of the *FreeStyle* Player concept. In addition, some folks may really prefer to have production tools, such as elaborate quantization options and Polyphonic Aftertouch, available from the beginning of the creative process.

But that's the point of optimizing a product for a particular use: Certain users are compromised, while others benefit. Besides, you can always use *FreeStyle* together with a pro sequencer (such as *Performer*) to get the best of both worlds.

With *FreeStyle*, those who value ease of use win big. The program is glorious when used with a compatible synth; first-time sequencer users could write hundreds of songs without ever being aware of MIDI channels or Program Changes, which is a real accomplishment. Anyone who doesn't need the complexities of a high-end sequencer should give *FreeStyle* a try.

Dan Phillips *is a partner with David Leon in Touch Productions, which provides composition, songwriting, and production for television, multimedia, and album projects.*

Product Summary

PRODUCT:
FreeStyle sequencer
PRICE:
$195
SYSTEM REQUIREMENTS:
Macintosh with 68020 or better processor; System 7.01 or higher; 4 MB of RAM; 6 MB of hard-disk space
MANUFACTURER:
Mark of the Unicorn
1280 Massachusetts Ave.
Cambridge, MA 02138
tel. (617) 576-2760
fax (617) 576-3609
CIRCLE #438 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ◖
EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ● ● ●
VALUE	● ● ● ●

Peavey Spectrum Analog Filter

By Charles R. Fischer

Peavey puts classic analog synth components under MIDI control.

Ask the average musician about the legendary Minimoog sound, and you'll probably hear about its fat, warm bass and lead sounds. But the Minimoog has other talents, including its impressive abilities as a signal processor. Any audio signal can be routed through a Minimoog filter and VCAs for effects quite unlike those from a digital multi-effects box. With a MIDI-to-CV (control voltage) converter, you can put that warm, analog circuitry under MIDI control, allowing you to filter, envelope, and resonate signals to your heart's content.

That's great if you have a Minimoog. But the multitude who don't own that classic synth can still get there from here. Peavey's 1U rack-mount Spectrum Analog Filter provides a remarkable re-creation of the Minimoog voltage-controlled filter (VCF) and voltage-controlled amplifiers (VCAs), and it lets you manipulate them in real time. The device operates under MIDI control, but it is nearly as powerful under its own steam.

THE INSIDE STORY

The Spectrum Analog Filter features a 4-pole, lowpass VCF based on Robert Moog's much-loved design. The VCF has knobs for cutoff frequency, resonance (from zero to oscillation), and the amounts of three modulation sources: keyboard tracking, Velocity, and a dedicated ADSR envelope (which can be replaced by the unit's internal envelope follower).

After the VCF is a VCA, which is used for gating and reshaping the amplitude envelope of an input signal. The VCA is controlled with a its own dedicated ADSR envelope generator or the internal envelope follower.

The unit's guts have little in common with a Minimoog. Most of the electronics are on one PC board, which holds the power supply, microprocessor, and MIDI and audio circuitry. The

electronics are neatly organized, with no rework or changes visible. The device requires an external, power supply.

THE OUTSIDE STORY

The Spectrum is easy to use, thanks to seventeen front-panel rotary pots, each dedicated to a specific VCF, VCA, or envelope parameter. Four buttons provide increment, decrement, compare, and bypass functions. The Select button steps through the parameters and lets you edit values, and the Execute button is equivalent to an Enter key.

A 2-character, alphanumeric LED display shows the program number, programming parameters, and values. In programming (Quick Setup) mode, the 2-digit LED alternates between a 2-letter code that represents the current parameter and a number that indicates its value. The 2-letter codes confused me at first, but there aren't many of them, and I got the idea soon enough.

Separate LEDs indicate input clipping, bypass status, and envelope-generator triggering. Another LED, labeled "Align," is particularly useful if you edit a parameter and then want to go back to the original setting. Just start turning the parameter knob until the Align LED lights up, and you're back where you started.

The unit offers three rear-panel, ¼-inch audio inputs, which are internally mixed with front-panel volume controls. A Level button sets input 1 for instrument or line level; the other two inputs are always line level. A mono, ¼-inch audio output and standard MIDI In, Out, and Thru jacks also grace the rear panel.

Best of all, the Spectrum includes a control-voltage input that lets you modulate the filter with any 0 to +5 VDC analog voltage source. The unit responded smoothly to a footpedal and external control voltage, without adding zipper or quantization noise.

With MIDI and analog voltage control, the Spectrum is compatible with the two most popular methods of interfacing synths. This dual control encourages experimentation. For example, hook up a footpedal and use the VCF as a programmable wah-wah pedal. I plugged in all sorts of exotic CV and MIDI sources just to see what would happen. Kudos to Peavey for giving the Spectrum the best of both worlds.

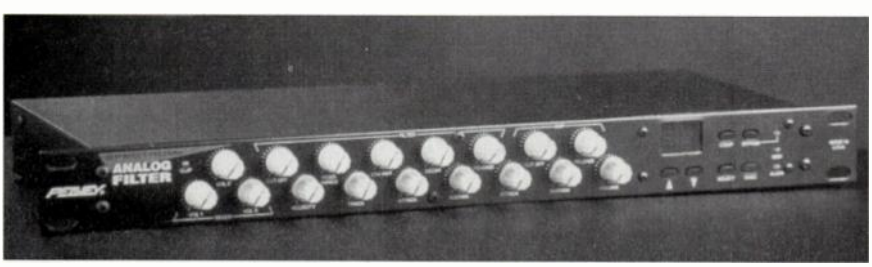
PROGRAMMING

Although the Spectrum contains a variety of factory presets, a bit of tweaking is required to get the most out of it. There are 99 program locations, and any Program Change higher than 99 forces the Spectrum into Bypass mode. Each program includes a Configuration Setup (which determines how the envelopes are triggered) and the control settings for the VCF, VCA, and envelope generators.

The first step is to set the envelopes so signals can pass through the VCF and VCA. To do this, its important to understand Configuration (CF) Setups.

The first two CF Setups trigger the envelopes from incoming MIDI Note On messages. CF Setup 01 puts the EGs in single-trigger mode, i.e., when the unit receives a Note On, the EGs trigger the attack-decay portion once and sustain as long as you do, ignoring additional Note On messages. The envelopes won't retrigger unless no notes are sustained. CF 02 uses multiple triggering; the envelopes are retriggered every time the unit receives the Note On, whether you sustain or not.

The other two Configuration Setups (03 and 04) do not use MIDI; instead, the envelopes are activated whenever the signal level of the audio input exceeds a preset threshold. With CF 03, the unit triggers the EGs whenever the input signal exceeds a user-selectable threshold. Configuration 04 replaces the EGs with a single envelope follower, which is great for re-creating many of



Peavey's Spectrum Analog Filter includes a Minimoog-style VCF and VCA, complete with envelope generators and an envelope follower.

the Mu-tron III effects used by Stevie Wonder, Bootsy Collins, and others during the 1970s.

At the global level, you can choose the MIDI channel, dump and load settings via SysEx, and have the unit respond to or ignore Program Change messages. One continuous controller (selectable from Control Changes 00 to 99) can be assigned to control the VCF. MIDI Pitch Bend messages can be used to change the filter cutoff. (Pitch Bend depth can be set to 0 [off], 2, 8, 12, or 24 semitones per program.) And of course, you can set the trigger threshold for Configuration 03.

One nice feature lets the unit send a MIDI Note On message to the MIDI Out port whenever the envelopes are triggered. This is useful when you want to simultaneously trigger a MIDI sound source (such as a drum sound) and the Spectrum's envelopes.

THE WISH LIST

The Spectrum Analog Filter's MIDI implementation is pedestrian, but it delivers the essentials. On the down side, however, the Spectrum does not respond to Pressure (Aftertouch) messages, which seems an unnecessary limitation. According to Peavey's representative, this feature wasn't considered essential because the company's MIDI controllers already let you remap Pressure data to be sent as other controllers. Fortunately, Peavey is reconsidering support for Pressure messages to help the many people whose MIDI controllers lack remapping features.

I also wish the VCA responded to Velocity data, as the VCF does. Among other things, this would give you expressive keyboard control over levels for non-MIDI sound sources and early MIDI devices that don't support Volume and Velocity.

My last concern is the unimpressive, preliminary users guide. Among other things, it doesn't bother to explain how the front-panel controls can be used together to create various sounds. I can't imagine how this would seem to a user with no prior analog synthesis experience. Hopefully, the final manual will be much better.

UP AGAINST A LEGEND

Before receiving the review unit, I was skeptical about Peavey's claim to have reproduced the Moog filter sound. I immediately put the Spectrum up against my Minimoog for a critical comparison, programming both units to identical settings. I conducted several listening tests for each device, using a variety of input signals.

I quickly discovered differences between the two. One surprising difference is that the Spectrum's VCF can be swept over a far greater range than the Moog filter. For example, the Spectrum's Frequency knob is capable of sweeping the filter beyond the range of human hearing (above 20 kHz). On a Minimoog, the initial frequency knob only covers about 10 Hz to 12 kHz; to go further, you have to use an envelope generator or other control voltage in parallel. Of course, once you're aware of the increased range, it's easy to avoid impractical settings.

Another difference is that the Spectrum has less odd-order distortion than the Moog. While the difference isn't extreme, it was detected by everyone present. Fortunately, I was able to emulate the Minimoog's distortion by using a tube distortion box before the Spectrum's input.

I was pleased to discover that the Spectrum is quieter than my Minimoog, which is reasonably noise-free (for a dinosaur, anyway). In this aspect, at least, I prefer the modern filter to the legendary synth.

Otherwise, the filter and VCA sections of the two devices sound close enough to make me happy. Although some listeners might disagree, I'm convinced that the majority wouldn't find the subtle differences objectionable. After all, with early synths such as the Minimoog, each instrument had its own sonic personality, thanks to slight variations in the electronic components. If we accept this variation between two synthesizers of the same model, the minor sonic differences between a Minimoog audio path and the Spectrum Analog Filter are insignificant.

EXPLORING THE SPECTRUM

It didn't take long to find interesting uses for the Spectrum. One of my favorites was adding real-time filtering to sample-based sound modules that lack this powerful feature, such as the Alesis D4 drum module and E-mu Proteus. Using MIDI Velocity to vary the timbre of their sounds gave them a whole new life.

Both the D4 and Proteus sounded great through the Spectrum VCF and VCA. By using the filter to remove the highest frequencies at lower Velocities, the drums sounded far more natural and realistic than they did by themselves. This worked especially well with kick, hi-hat, and snare samples.

The Spectrum Analog Filter is equivalent to about 60% of a MIDIfied, programmable, analog synth, so why not use it as the centerpiece of a do-it-yourself synth? If you add offboard voltage-controlled oscillators and a few other circuits (such as an EG for the oscillator and an LFO), you could have a serious analog synth with MIDI programmability and room for your personality. The cost and labor involved would be minimal, as much of the circuitry is in the Spectrum.

CONCLUSION

I'm impressed with the Spectrum's performance. It re-creates the analog sounds of Moog synths accurately and gives you far more control over those sounds than any other product I've seen. Peavey should be congratulated for creating a device that mixes the best of the old and new technologies and making it available at a price almost anyone can afford.

My faithful Minimoog has managed to avoid being replaced—this time. But the Spectrum sounded good enough to fool me a few times, which is the ultimate testimony.

Charles R. Fischer *has been playing, building, programming, designing, teaching, and writing about electronic musical instruments for a long time.*

Product Summary

PRODUCT:
Spectrum Analog Filter
PRICE:
$449.99
MANUFACTURER:
Peavey Electronics
711 A St.
Meridian, MS 39301
tel. (601) 483-5365
fax (601) 486-1278
CIRCLE #439 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ◖
AUDIO QUALITY	● ● ● ● ◖
VALUE	● ● ● ● ◖

Michael Pinder Presents Mellotron

By Geary Yelton

A collection of classic sounds from a moody instrument.

From the mid-1960s to the mid-1970s—long before the age of the digital sampler—progressive rock groups such as the Moody Blues, King Crimson, Genesis, and Yes were performing and recording with sample loops of acoustic instruments. The keyboard instruments that helped these bands establish their signature sounds were the Mellotron and the Chamberlin.

In fact, the Mellotron was the world's first sampler. But instead of playing back digital recordings, as modern samplers do, the Mellotron and the Chamberlin played back sounds recorded on analog tape.

The Mellotron was the British offspring of an American instrument originally called the Mellotron and later called the Chamberlin. The Mellotron is the better-known of the two instruments, because they were mass-produced and Chamberlins were made-to-order, and the Mellotron was a British instrument made popular by British bands.

TAKE ME DOWN

Ever since I learned that a Mellotron was the source of those oddly mechanical flute sounds in the Beatles' "Strawberry Fields Forever," I've admired its unique character. For years I'd hoped to stumble across one, so I could sample it. Finding one in good repair has proved all but impossible, mostly due to the instrument's infamous mechanical unreliability.

Fortunately, InVision's David Kean and Justin Mayer acquired the master tapes of all the original sounds and sampled them from the best-maintained Mellotrons and Chamberlins they could find, including those belonging to Michael Pinder of the Moody Blues. Pinder also provided quality control and production assistance on this ambitious project.

These samples have recently been

released as *Michael Pinder Presents Mellotron,* a CD-ROM for Akai S-series samplers, E-mu Emulator IIIx, and the Kurzweil K2000S. The samples are grouped into Mellotron and Chamberlin sound banks. A third group of samples consists of rhythm accompaniments and instrumental fills from the Mellotron Mark II (more on this later). The disc's three sample groups are further subdivided into 34 sample sets. Most of the sample sets are around 12 megabytes.

The Mellotron keyboard has a range of 35 notes, just under three octaves. On the CD-ROM, every pitch is sampled independently, just as it is on the Mellotron. Whenever you press a Mellotron key, it plays a length of tape seven seconds long. The Pinder disc is so faithful to the original instrument, that it provides 7-second samples, with no looping.

Because the recording quality of the Mellotron is of decidedly low fidelity, all samples have been recorded at a 22.05 kHz sampling rate. This conserves sampler memory without sacrificing high-frequency content, which was never there to begin with. Many of the Mellotron's sound banks were recorded with some notes slightly out of tune, so on the CD-ROM, some sample sets include programs with both the original tuning and corrected tuning.

The first sample set on the disc contains the most popular of the Mellotron's sounds: the violins from the Mark II, circa 1964. In addition to the original, the sample disc includes a retuned version and a version that has been equalized to reduce its harshness.

As with most sounds on this disc, the attacks and releases are fast. It would be nice if slower envelopes were provided, as most Mellotron players made liberal use of a volume pedal and lots of reverb. As it is, you'll have to create your own programs if you want more gradual envelope times.

There are several other string sample sets, such as the Model 300 Strings, 16 Violins, 'Tron Cello, and 'Tron Viola. However, none of them have the charm of the Mark II Violins.

InVision's *Michael Pinder Presents Mellotron* CD-ROM contains all the original sounds from the Mellotron and Chamberlin keyboard instruments.

THE CRIMSON KING

The Mark II Brass samples will sound familiar to fans of early King Crimson. Of course, it doesn't sound as much like real brass as it sounds like a Mellotron. My personal favorite sound, however, is the 'Tron Flute. To re-create the intro to "Strawberry Fields Forever," be sure to bend the pitch down a fifth, as Paul McCartney did.

The Mellotron 8 Voice Choir, introduced in 1970, was made popular by both Genesis and Rick Wakeman. It doesn't hold up well when compared to modern choir samples, but it has the characteristic Mellotron sound. The Electric Guitar sounds like no guitar I've heard; it more closely resembles a strangely filtered Wurlitzer piano.

The Mark II Organ is a Hammond B3 made weirdly Mellotron-ish. It was used by Felix Pappalardi on Cream's "Badge" and "White Room" and is said to have been the only organ sound on the five albums released by the group Mountain.

Apparently, the Mellotron was at first marketed in England as a home keyboard for the musically impaired. The Mark II had two keyboards, one of which was used to play rhythm accompaniments and pre-recorded instrumental fills. And I bet you thought sampling grooves was a new idea. Wrong!

Five of these combinations are featured on this disc, including Bossa Nova with Cello and Violin Chords, Cha Cha with Swinging Flutes, and Fox Trot with Sax Phrases.

The Swinging Flutes, by the way, were played backward at the end of "Strawberry Fields Forever." You'll also find the "Bungalo Bill" guitar-run sample that the Beatles used to open their song of the same name. These rhythms and fills are certainly of historical interest, but it's not likely that you'll use them on *your* next hit record.

AH-ONE, AND AH-TWO...

InVision also provides a bank of eleven sounds from the Chamberlin. In large part, these are of better sonic quality than the Mellotron samples. Most of the Chamberlin samples were recorded from instruments played by Lawrence Welk's musicians.

Some, like the Flute and Tenor Sax, are so well sampled that if not for the less-than-stellar recording quality (remember, we're talking 22.05 kHz sampling rates here) and limited frequency range, they would be useful whenever you needed some flute or tenor sax samples.

To sampler-wielding fans of progressive British rock, this disc obviously has a very high "coolness factor." It's well produced and includes more Mellotron sounds than I ever knew existed.

For the basic Mellotron strings, flutes, brass, and choir, $195 is just about the right price, and you get all the other sounds as a bonus. If you're looking for the real thing, this disc is your one best source. ●

Product Summary

PRODUCT:
Michael Pinder Presents Mellotron sample CD-ROM
PRICE:
$195
SYSTEM REQUIREMENTS:
Akai S-series, E-mu E-IIIx, or Kurzweil K2000S sampler
MANUFACTURER:
InVision Interactive
2445 Faber Place, Suite 102
Palo Alto, CA 94303
tel. (415) 812-7380
fax (415) 812-7386
CIRCLE #439 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
SOUND QUALITY	● ● ● ●
VALUE	● ● ● ●

TB Systems SoftMC (Windows)

By Allan Metts

Fader control without hardware faders.

I love it when my old gear learns new tricks. A few years ago, I converted a Commodore 64 computer into a dedicated, full-screen editor for one of my synths. More recently, I got my keyboard controller to tell my sample player which sounds I want to load from its hard disk.

TB Systems' *SoftMC* performs a similar trick, transforming your *Windows* computer into a powerful transmit-only MIDI fader box. It also lets your computer serve as an editor/librarian for a Lexicon LXP-1, LXP-5, LXP-15, or PCM70 effects processor. This combination of features is sure to find a good use in almost any studio.

FIRST GLANCE

Even though *SoftMC* is a *Windows* program, it acts just like a hardware fader box. In fact, *SoftMC* is cleverly programmed to *look* like a hardware box. Instead of a menu bar, the program's features are accessed via nine onscreen buttons with little LEDs.

When I installed *SoftMC,* I appreciated the ability to specify my own subdirectory and *Windows* group. A "Partial Install" routine is available in case you need to replace a corrupted file. The program ran without glitches under both *Windows* and OS/2.

SoftMC is remarkably easy to learn and use. When you run the program, you see the nine toolbar buttons across the top of the screen, eight faders, and eight buttons down the right side (see **Fig. 1**). The faders and programmable buttons include indicators to display their function and current value. Because only eight faders fit on the screen at once, a Page button allows you to move between six pages of faders. An identical control allows you to move between two sets of eight buttons.

A button appears under each fader, as well. These buttons aren't programmable; they send a MIDI message based on the function and position of the fader. For instance, if you program a fader to send Note On messages, its button would come in handy for triggering sound effects. If you map a different sound effect to each note, you can find your favorite noise with the fader and trigger it with the button.

MACHINE DRIVEN

SoftMC stores its configurations in Machine files on your hard disk. There are six types of Machine files, five of which are mostly preprogrammed for the Lexicon devices that the program supports (discussed shortly). The sixth type, Generic, is where most of the fader programming occurs. A Generic Machine file holds 128 Setups. Each setup holds the assignments for 48 faders, four master faders, and sixteen buttons. If you're starting to get the impression that you have a lot of programming power here, you're right.

SoftMC is always running in either Normal or Program mode. In Normal mode, the faders and buttons send MIDI data. You tell the faders and buttons what messages to transmit in Program mode. As with a hardware box, you toggle between the two modes with (you guessed it) a button.

Programming *SoftMC* is easy. Just enter Program mode and click on the item you want to configure (faders are programmed by clicking on the button beneath the fader). A dialog box lets you specify the type of message sent by the button or fader and how it is sent (see **Fig. 2**).

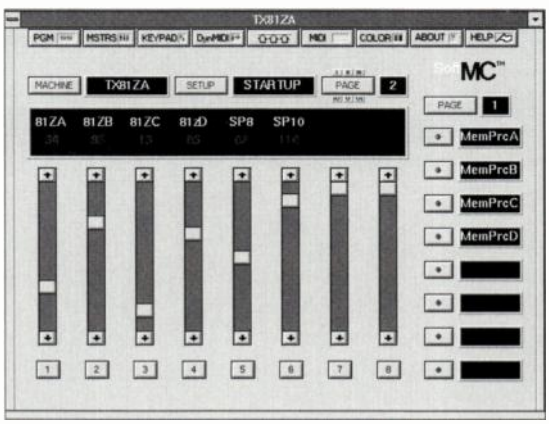


FIG. 1: *SoftMC* looks like a hardware fader box. The buttons below the faders and to the right are fully assignable.

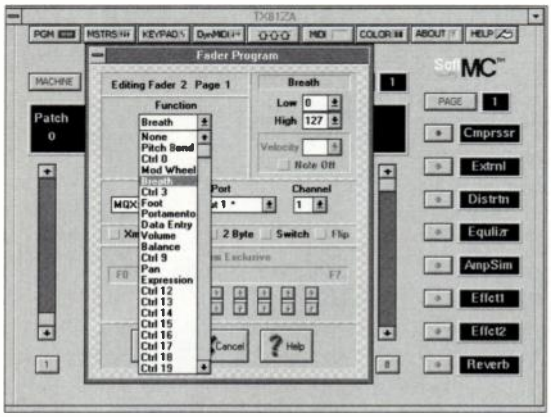


FIG. 2: Programming each fader and button in *SoftMC* is easy.

The faders can send Pitch Bend, Control Changes 0 to 120, Note Ons, Program Changes, SysEx, or Song Select. Each fader can transmit on its own MIDI port and channel, which let me tweak several synths and an effects box without leaving the screen. You can specify minimum and maximum values for the fader, reverse its polarity, or make it act like a switch. (It sends either the minimum or maximum value, but no intermediate values.)

For the most part, this works quite well. However, I have some complaints about *SoftMC*'s implementation of System Exclusive. SysEx messages can be only ten bytes long, which is enough to change any parameter on my Yamaha TX81Z, but not enough to do anything useful with my Peavey SP. You specify each byte in the message using the up/down buttons, but you can't type them in. Consequently, entering a value of 7F takes 129 clicks of the mouse. (On the plus side, it takes under ten seconds to scroll through all the values if you hold down the mouse button.) You specify which bytes are to be varied with the fader by setting their values to "VV."

The programmable buttons can send the same messages that are available to faders, plus Start, Stop, Continue, and Panic (which sends individual Note Off messages on all channels). Programming these buttons is virtually identical to programming the faders, with an additional feature: Each button can operate as a momentary or toggle switch. In both cases, pressing the button sends the programmed maximum value. In Momentary mode, the minimum value is sent when the button is released; in toggle mode, the minimum value is sent by the next press.

A programmable button's SysEx message is limited to 10 bytes, but the "VV" variable byte isn't available, which disappointed me even further. If it were present, I could have configured a button to toggle a synth parameter between two commonly used values (e.g., Poly/Mono, Program Change enable/disable, and effects on/off).

Any of the 48 faders can be connected to one of four master faders, which appear when you click on the Masters button at the top of the screen. Programming the masters couldn't be easier. Put *SoftMC* in Program mode, click on the button beneath a master fader, and click on any of the 48 check boxes that correspond to the individual faders. Type in a label, and you're done.

CHANGING THE WORLD

I did some really interesting things with *SoftMC*. My Zoom 9030 effects processor has a decent MIDI implementation, so I mapped a *SoftMC* button to each of the 9030's nine effect on/off controls. Then I programmed several faders to control some of the unit's other parameters. The 9030 didn't let me control every parameter via MIDI, but I ended up with a front end that let me do all sorts of sonic manipulation.

I also set up some basic controls for my Yamaha TX81Zs. I could switch off their memory protection, change their master tunings, and alter their system parameters to my heart's content. I liked the ability to control different instruments on different MIDI channels from the same page of faders.

After I had programmed faders and buttons to do almost everything I could think of, I realized I was barely using two of the 128 Setups in my Machine file I wondered if *SoftMC* is meant for big MIDI rigs, but then I discovered another use for all these Setups. This aspect of *SoftMC* was designed with live performance in mind. Each Setup can automatically configure a rack of gear for a different tune in the set.

After programming the faders and buttons, you save them in your Machine file by giving them a Setup name and choosing one of the 128 Setup locations. *SoftMC* saves the *positions* of the faders along with the fader and button assignments. The program really shines when you save multiple versions of the same Setup that vary only in the position of the faders. These versions can represent anything: a synth configuration, a perfect mix, or a certain combination of lights for a MIDI lighting controller.

You can tell each fader and button to Transmit on Load, which lets you reconfigure your whole studio each time you recall a Setup. I only wish you could rearrange the position of the faders and buttons without reprogramming them. I realized too late that some of my MIDI messages needed to go out before others. A fader/button copy feature would be nice, too, especially with the labor-intensive SysEx programming.

Although the ability to save snapshots of your fader positions is quite useful, *SoftMC* needs full fader automation. Most *Windows* sequencers have the ability to record fader movements and sync them to MIDI Time Code, and I was disappointed this feature was missing from *SoftMC*.

SOFTWARE SCHIZOPHRENIA

So far, I've only covered Generic Machines. *SoftMC* takes on a whole new identity when you load up one of its Lexicon Machine file types. All of a sudden, this programmable fader program becomes a full-blown editor/librarian for Lexicon effects processors. Lexicon Machine files come in five flavors: LXP-1, LXP-5, LXP-15, and

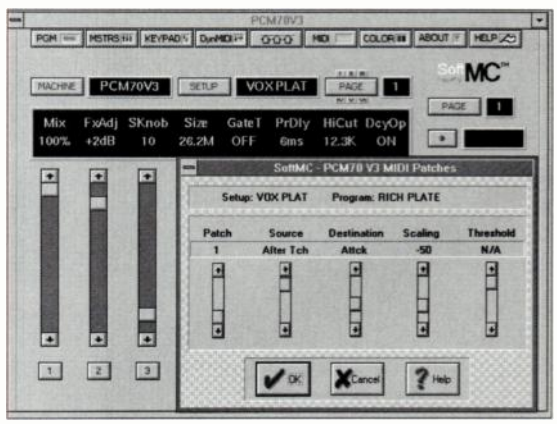


FIG. 3: *SoftMC* includes full support for Lexicon's Dynamic MIDI patches.

PCM70 firmware versions 2.0 and 3.0.

When using Lexicon Machine files, you lose some features and gain some new ones. Faders are no longer programmable; they are preprogrammed for the parameters in the appropriate effects box. Buttons and master faders are still programmable. The fader positions correspond to the values of the effects parameters. This lets you edit your LXP-1's reverb decay time by moving a fader.

When loading or saving Setups, Generic Machines can only use *SoftMC* Machine files on your hard disk. But Lexicon Machines can use either your hard disk or the effects unit itself. For example, that reverb decay time you just edited can be stored in a LXP-1 Machine file or in a user RAM location on the LXP-1. Buttons and master-fader configurations must be saved on your computer, as Lexicon boxes don't know what to do with them.

To try all this out, I borrowed a PCM70 and put *SoftMC* to work. To create a new Machine file, I put *SoftMC* in Program mode and hit the Machine button. I chose PCM70 V2 as my Machine type, selected a MIDI port and channel, and named the file. At this point, I could load the file with the user-programmable registers in the PCM70 or the factory presets built into *SoftMC*. Because my PCM70 registers were empty, I chose the latter option.

SoftMC transformed before my eyes. The faders were labeled with PCM70 parameters, and the position indicators that used to show simple numbers, such as 1 to 128, now displayed parameter-specific information, such as "20db," "OFF," and "60ms." The locations of specific faders within the *SoftMC* pages didn't correspond to the parameter pages in the PCM70, but they were logically arranged and ordered. With the exception of some system parameters (such as MIDI receive channel), I had complete control over every parameter in the PCM70.

I could access the PCM70's Dynamic MIDI patches by pressing the "Dyn-MIDI" button at the top of the screen (see **Fig. 3**). Using the five associated sliders, I could map all sorts of MIDI messages to the PCM70's effect parameters for each of the ten Dynamic MIDI patches. I had control of each patch's scaling and threshold values, and nothing stopped me from using *SoftMC*'s buttons to send MIDI messages that

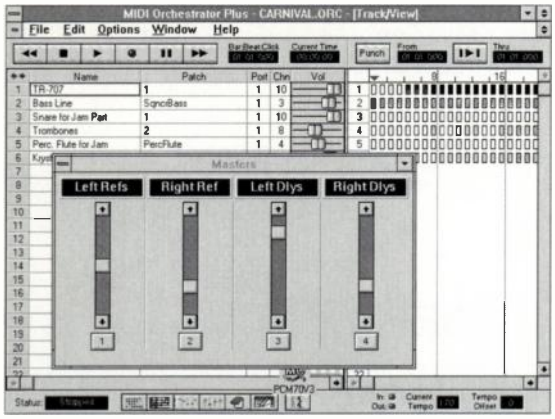


FIG. 4: *SoftMC*'s design allows integrated operation with a sequencer.

were mapped to the PCM70's parameters via Dynamic MIDI. In fact, *SoftMC*'s manual shows how to set up a nifty mute button using this technique.

MORE FOR THE MONEY

SoftMC has a few other goodies up its sleeve. A Program Change window provides a quick way to change patches anywhere in your system. "On Top" mode keeps *SoftMC* on top of all other windows, even when it's reduced to an icon. In addition, the program's colors are user-programmable.

I noticed that *Windows* treats the master faders and Program Change keypad as separate applications. Because they are separate programs, they had a tendency to disappear behind the main window on my dinky 12-inch monitor. However, by playing with these accessory windows and *SoftMC*'s On Top mode, I began to appreciate one of the program's design philosophies.

TB Systems realized that most users would probably run this program as an accessory to a sequencer or hard-disk recorder, so they designed it to be easily accessible without getting in the way. As a result, I could activate On Top mode, minimize the main window, and have the handy Program Change keypad or master faders available with my sequencer (see **Fig. 4**). *SoftMC* cooperated with my other *Windows* MIDI programs without a single glitch.

I like *SoftMC*. I like having hundreds of faders only a few mouse clicks away. *SoftMC*'s "hardware" look and feel makes it very fast and easy to program. It is quite stable and professionally implemented. The online help is extensive, with a how-to section and all sorts of hypertext links. Even the manual is quite thorough.

I also feel that *SoftMC*'s faders and buttons should be fully automated. This feature is found in most *Windows* sequencers, so *SoftMC* is a bit behind the times in this regard. (TB Systems' representative notes that automation is in the works for a future release.)

If you don't need the Lexicon front-end features, $100 might be too much to spend for programmable faders that don't move by themselves. But if you have Lexicon effects, *SoftMC* definitely earns its keep. I wish it included similar support for other brands of gear, and I'd like the ability to design my own Machine templates. (Synth programming, anyone?) Overall, though, *SoftMC* is a handy utility that found many uses in my MIDI studio.

(Thanks to Atlanta Discount Music.)

Product Summary

PRODUCT:
SoftMC 2.0a
PRICE:
$99.95
SYSTEM REQUIREMENTS:
PC-compatible with 2 MB RAM; *Windows* 3.1 or greater; *Windows*-compatible MIDI interface; VGA monitor; *Windows*-compatible mouse
MANUFACTURER:
TB Systems
2205 Boston Rd.
Bldg. O-144
Wilbraham, MA 01095
tel. (413) 596-8380
fax (413) 596-9846
CIRCLE #440 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ●
EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ● ● ●
VALUE	● ● ● ◖

Allan Metts *is an Atlanta-based MIDI consultant, musician, and systems designer. He recently caught himself worrying about the weeds in his front yard and he wondered if that meant he was getting old.*

Korg G4 Rotary Speaker Simulator

By Alan Gary Campbell

Take your instrument for a spin.

The Leslie has long been the king of effects processors for keyboard players and has won the hearts of many guitarists, as well. No processor has stimulated more love and devotion than this beautiful behemoth, and none has caused more back strain. Over the years, several equipment manufacturers have produced rack-mount and tabletop devices that emulate the venerable rotating-speaker box, and almost every synthesizer has an organ-with-Leslie patch. But the real thing has a lot of subtleties and quirks, and few simulations are really convincing.

Despite the useful results obtained by rotary speaker simulators based on delay technology, none has provided the ultimate simulation. But the latest pretender to the throne, Korg's G4, utilizes digital signal processing to advance the state of the art. Korg is not the first to use DSP for rotary speaker simulation, but the other attempts were limited algorithms in a generalized multi-effects processor. Korg deserves high marks for applying this sophisticated technology to a dedicated device.

TOTAL CONTROL

The G4's controls are enough to make any rotating-speaker enthusiast drool. You can adjust the simulation parameters for rotation speed, acceleration, rotor/horn balance, and the distance and spread of stereo "microphones." These adjustments really work, and they interact subtly within the simulation to avoid effects that don't gel. The unit has an LED that lights up to indicate the default value (position) of the current parameter.

The G4 can make even truly lame organ patches convincing. The acceleration and deceleration curves are impressively close approximations, and the Drive parameter is capable of cherry-red tube distortion. Interestingly,

Korg's G4 rotary speaker simulator provides an amazingly close approximation of the famous Leslie sound. Its main drawbacks are its single program memory and lack of MIDI features.

the cabinet formants can be removed from the simulation algorithm by holding down Bypass and pressing Speed, to allow a flat response for use with external EQ (e.g., to simulate a hornless, portable unit).

You can set up some fascinating "experiments" without touching a real microphone. Setting the Drive at about twelve o'clock, increasing Distance and Spread slightly, and tweaking Balance to favor the rotor gave a close approximation of the classic 1970s guitar sound. Emulating a close-miked unit with a wide spread between the "microphones" created an awesome, antiphonal effect.

Onboard footswitches control the Bypass, Drive, Stop, and Speed functions. Speed can also be controlled by an external footswitch, or you can use a continuous pedal to produce intermediate speeds, which is a cool, if inauthentic, effect.

One oddity is that using only the left output, as the manual suggests for mono operation, doesn't actually provide a mono mix. In fact, it provides merely the left half of the stereo signal. I found that externally mixing the left and right outputs gave a more satisfactory effect, even though you lose most of the amplitude modulation due to phase cancellation.The best solution is to run in stereo.

ONE PROGRAM FITS ALL

The G4 is programmable in the sense that you can edit the panel values and store them. But unfortunately, you have just one program. You can set up an edit in the edit buffer for one sound and recall the unedited program for another, but recalling takes several seconds. A dozen programs might be sufficient, but having just one program is akin to getting a single french fry with your burger!

Moreover, no MIDI functions are provided, so controlling the G4 during a MIDI-controlled mixdown is a genuine pain. Korg reports that all the G4's processor capability is needed for the simulation, and adding more programs and MIDI would have significantly increased the cost. Still, I hope someday the company will design a MIDI version.

MAKING CONNECTIONS

The G4's left and right, line-level inputs and outputs are on unbalanced, ¼-inch jacks. The input circuits offer enough gain to handle a guitar directly, which simplifies live applications for string-benders.

Korg included a ⅛-inch headphone jack, which lets the G4 double as the most Doppler-shifted practice amp around. Korg's marketing research indicates that most users like the mini jack, but I would have preferred a standard, ¼-inch headphone jack.

The manual explains the controls at length, but some passages are poorly translated, and some explanations are just plain confusing. Fortunately, the controls are intuitive, so the manual's shortcomings shouldn't cause you grief.

Product Summary

PRODUCT:
G4 Rotary Speaker Simulator
PRICE:
$450
MANUFACTURER:
Korg USA, Inc.
89 Frost St.
Westbury, NY 11590
tel. (516) 333-9100
fax (516) 333-9108
CIRCLE #441 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	●●◖
EASE OF USE	●●●●
AUDIO QUALITY	●●●●◖
VALUE	●●●

CONCLUSIONS

The G4 is an odd mix of dream features and frustrating omissions. It sounds great; I really got off on it. Korg obviously put a lot of work into the simulation. My main objections are the lack of multiple program memories and MIDI. (Yes, I know these features would raise the price, but I still want them.)

Korg's literature suggests that the G4 is designed for organ and guitar, but the overgrown stomp-box design is clearly guitar-oriented. What keyboardist would want to do calisthenics to reach the controls on the floor? A rack-mount, fully MIDI programmable version for keyboards would be unbeatable, especially if it were offered at a reasonable price.

Playing with the G4 is addictive, and hopefully it is a hint of things to come. I was almost tempted to retire that 5-foot, whirring end table that glows in the dark. Almost. ❁

Wildcat Canyon Autoscore 1.0 (Mac)

By Scott Wilkinson

Pursuing the dream of viable pitch-to-MIDI conversion.

It's a dream of every musician: Simply sing or play any acoustic instrument into a microphone and watch a computer transcribe it into standard notation. With such a system, you could also record parts into a software sequencer without having to play a keyboard or other MIDI controller.

Over the years, several companies have tried to produce pitch-to-MIDI converters, but for practical purposes, this has remained an impossible dream. Still, Wildcat Canyon Software hopes to turn the dream into reality. The company's *Autoscore* for the Macintosh provides an alternative method of input to MIDI sequencers and notation programs. *Autoscore* accepts melodic input from a microphone, determines the pitches, translates them into MIDI data, and passes this data to a notation or sequencer program via Apple's *MIDI Manager*.

The software does not perform real-time pitch-to-MIDI conversion; there is a definite delay between the moment a note is played or sung and the moment a corresponding MIDI message is generated. However, *Autoscore* is not intended for real-time applications, and the delay helps the program generate clean data.

Autoscore is not a stand-alone program; it operates in conjunction with a host program. The list of compatible host programs is fairly comprehensive, however, including Ars Nova *Practica Musica* 3.0 or later, Ars Nova *Songworks* 1.5 or later, Coda *Finale* and *Finale Allegro*, Jump! Software *ConcertWare* 1.5 (and the previous version from Great Wave Software, *ConcertWare Pro*), Opcode *Musicshop*, Opcode *Vision* 1.4 or earlier, OSC *Metro*, and Temporal Acuity Products *Nightingale*. *Vision* 2.0 is not yet compatible—and may never be—because *Autoscore* time-stamps incoming data, which *Vision* 2.0 does not support. Just in case you don't have any of the compatible software, *Autoscore* is bundled with its own little stand-alone sequencer called *Autofile*, which can export Standard MIDI Files for other programs.

Of course, *Autoscore* also requires a microphone. All current Mac models include a mic input, and most include a microphone, as well. Older Macs can use Macromedia's MacRecorder or a Digidesign audio card for input. Wildcat Canyon recommends a relatively inexpensive microphone, such as an electret condenser, which costs about $20 or $30.

INSTALLATION

I tested *Autoscore* on two computers: a Mac IIci running System 7.0.1 and a PowerBook 180 running System 7.1. I used a MacRecorder for input into both computers. The host programs included *Vision* 1.4 and 1.3, *ConcertWare Pro* 1.0.3, *Musicshop* 1.0, *Metro* 2.5, and *Nightingale* 1.3.

Installation is relatively straightforward: Simply launch the installer on the program disk, which installs *Autoscore* and *MIDI Manager*. You must also drag a folder of drivers to the System Folder. A system-analyzer program looks at your system and generates a report of available resources. However, the list is quite dense and technical, making it less useful for neophytes.

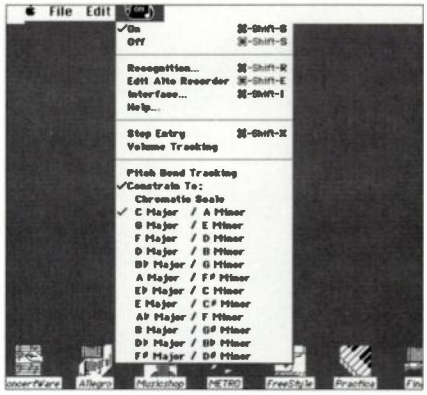


FIG. 1: *Autoscore*'s pull-down menu provides the entire user interface to the program.

After installation, you must reboot the computer, after which the *Autoscore* icon appears in the menu bar. This pull-down menu (see **Fig. 1**) provides the entire user interface for the software. If you run a program that requires *OMS*, it automatically switches to *MIDI Manager* mode. *OMS* and *MIDI Manager* can potentially fight over the serial ports, but I didn't experience this problem.

After installing *Autoscore* for the first time on the IIci, all host programs ran very slowly. (It took many seconds to draw a dialog box.) I also got a lot of "Data Overflow" messages. After much gnashing of teeth and consultation with the manufacturer, the problem turned out to be my *OMS* setup, not *Autoscore*. I routinely use both serial ports for MIDI applications, one for normal music data and the other for synchronization. However, I had connected the MacRecorder to the sync (printer) port for this review, and the computer continued to read data from the microphone. The MacRecorder churns out massive amounts of data, which bogged the system down big time. After I disabled the printer port in *OMS*, the system ran normally.

SETUP

Once you get the system up and running on your Mac, pull down the *Autoscore* menu to set it up for your particular requirements. You can turn the program on and off by clicking on the menu icon, selecting the appropriate menu item, or sending a user-specified MIDI message. In fact, there are several ways to perform most tasks in *Autoscore*.

In the Recognition dialog box, you select the appropriate filter for the type

of instrument you intend to use. This feature helps optimize the software's ability to recognize pitches from your instrument of choice. The program has several preset instrument filters, such as low, medium, and high wind; male and female voice; guitar; bass guitar; violin; and cello.

You can also create your own instrument filter in the Instrument Settings dialog box (see **Fig. 2**), which includes parameters such as pitch range, volume threshold, expected note length, and "base class" (i.e., Voice, Guitar, Wind/Brass, String, and Rhythm). I created a custom setup to use with an alto recorder. It's easy to set the pitch range: select the high or low note parameter and play the corresponding note on the instrument.

Also in the Recognition dialog box are several music-tracking options. For example, you can constrain *Autoscore* to generate notes in the chromatic scale or any major scale and its relative minor scale (e.g., C major/A minor). If you constrain to a major/minor scale, two onscreen buttons play major and minor arpeggiated triads as guide notes.

You can also elect to track pitch bending (which causes *Autoscore* to send Pitch Bend messages to the host program) and/or volume (which sends different Velocity values, not Volume messages). Finally, you can enter music in step time and test the microphone to make sure it's sending acceptable data to *Autoscore*.

The other setup dialog box offers several Interface Options. This lets you specify the conditions under which the *Autoscore* menu is visible, enable keyboard shortcuts (e.g., Command-Shift-R to open the Recognition dialog box), specify the MIDI messages that turn *Autoscore* on and off, and set up the MIDI click options. In addition, you can tell the program to play the reference tones through the Mac's internal speaker, or over a particular MIDI channel. The primary MIDI output from the program can be sent on any channel, as well.

Context-sensitive help screens are available throughout the program. The appropriate section of the Help file is displayed according to where you are when you ask for help, although the entire Help file is always available. The online help is fairly useful, though not exceptional.

OPERATION

I used *Autoscore* in several different configurations. On the IIci, I started with the MacRecorder's internal microphone, but I got much better results with a Sony ECM-220T electret condenser mic connected to the MacRecorder's mic input. I also tried the PowerBook's internal mic, but it was inferior to the Sony mic through the MacRecorder. Keep in mind that the ECM-220T is not a studio-quality microphone by any means, but the manufacturer recommends just such a microphone for this software, because a cheap mic is less likely to pick up ambient noise.

The Sony mic helped reduce the two primary problems I encountered with *Autoscore:* missing notes and repeated notes where one long note should be. These problems were also affected by the distance from the mic to the sound source: Greater distances increased the problems. I found that a reasonable seating distance of about two feet from the mic produced inaccurate results. I had to be a few inches from the mic to get consistently good input.

I got the best results playing the alto recorder. I was able to enter complex melodic lines with fairly high accuracy, as long as I was close to the mic and played with careful precision. The timbre of a single note—low B♭—often prevented *Autoscore* from recognizing it, but this problem was minimized with the Sony mic.

Unfortunately, singing produced comparatively poor results (see **Fig. 3**). I'm not a trained vocalist, so I enlisted the help of a professional singer. We had to be *extremely* accurate and use no vibrato to record anything close to what we intended. But no matter how accurate we were, there were still a few missing and repeated notes, not to mention semitone jumps from the inevitable scooping that all singers do. Vibrato increases the number of repeated notes and jumps. If the music permits, constraining to a particular key helps quite a bit. Adjusting the note-length control in the Instrument Edit window to recognize mostly long notes also helps somewhat, but if you sing a few short notes, the number of missing and repeated notes increases.

You can greatly reduce unintended jumps by tracking audio pitch bend, but this presents its own problems. Tracking pitch bends crashed the IIci regularly. Even when it didn't crash, major pitch bends actually slowed the metronome down! I suspect this generates so much data that the software becomes overloaded. (This didn't occur on the PowerBook, although *Autoscore* was mysteriously disabled after a bunch of vocal pitch bending.) As a result, I normally constrained *Autoscore* to chromatic notes or a specific key. However, selecting chromatic or key constraints sometimes froze the mouse for about four seconds, which was disconcerting.

In addition, if *Autoscore* was turned on before launching *Vision* on the IIci, the system rebooted instead of running the program. This did not happen on the PowerBook, and I was unable to discover why. (I disabled all System Extensions and Control Panels except those essential to *Autoscore* and *Vision*, but this made no difference.)

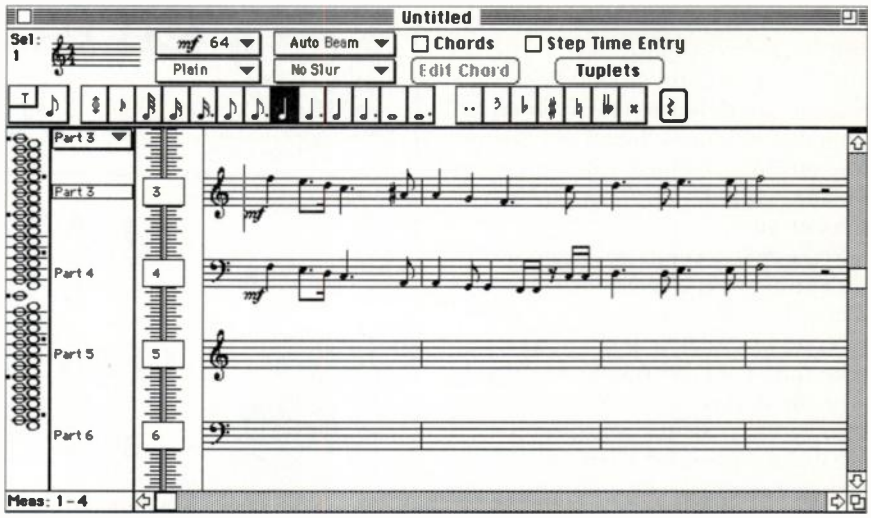


FIG. 3: I recorded the first part of "Joy to the World" into *ConcertWare Pro* by playing the alto recorder (upper line) and singing (lower line), which were then transcribed without any tweaking. The recorder line was entered and transcribed perfectly on the first try, but the sung line is the best I could do after many tries. Notice the repeated notes and incorrect pitches and rhythms in the lower line.

CONCLUSION

Autoscore is a valiant attempt to give musicians something they've dreamt

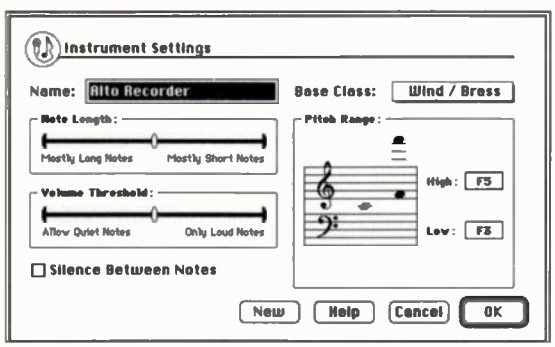


FIG. 2: You can create your own instrument filter to optimize *Autoscore*'s recognition. The Pitch Range box responds to microphone input in real time.

Product Summary

PRODUCT:
Autoscore 1.0
PRICE:
$150
SYSTEM REQUIREMENTS:
68020 Macintosh or better running System 6.07 or later; 2 MB of RAM for System 6 or 4 MB for System 7; microphone input; microphone
MANUFACTURER:
Wildcat Canyon Software
1563 Solano Ave., #264
Berkeley, CA 94707
tel. (510) 527-5155
fax (510) 527-8425
CIRCLE #442 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ●
EASE OF USE	● ● ● ◖
DOCUMENTATION	● ● ◖
VALUE	● ● ◖

of for a long time. Under certain circumstances, it works pretty well. I would use it to enter data into a sequencer or notation program with a discrete-pitch instrument, such as a recorder, but not by singing. On the other hand, singers could use it to enter notes in step time with fewer problems. In addition, the program might make an excellent educational tool to demonstrate how inaccurate student singers can be.

On the PowerBook, *Autoscore* worked well, and there were only a couple of crashes in several hours of use. However, it seemed more flaky on the IIci. (I had to reboot the IIci *many* times during this review.) I was never able to establish exactly why the IIci had problems, but its configuration is not particularly unusual; in fact, it's rather plain by today's standards.

Despite these problems, I love the idea, and I hope the developers continue to refine the program. Perhaps version 2 will be a dream come true.

Rolls RP220 Dual Tube Mic Preamp

By Eric Hawkins

These vacuum tubes will soothe your digital bites.

Do you ever wish your solid-state microphone had a switch marked "tube sound"? Do you dream of using a vintage tube mic to warm up your vocal sessions? If you answered "yes" to these questions, you need to get your hands on a vacuum-tube preamp. Until recently, you also needed a major loan to finance it. Luckily, Rolls Music's RP220 Dual Tube Mic Preamp is an affordable way to satisfy your sonic needs without going into debt.

The RP220 brings the smooth, warm, sound of tubes into the crispy, crunchy world of today's digital recording studio. Its two 12AX7A vacuum tubes (one per channel) lend a sweet, round sound to incoming signals due to the natural distortion and compression that occurs as a signal passes through them. This audio coloration is a perfect counterpoint to the pristine, harsh sound of digital recording.

BASIC FEATURES

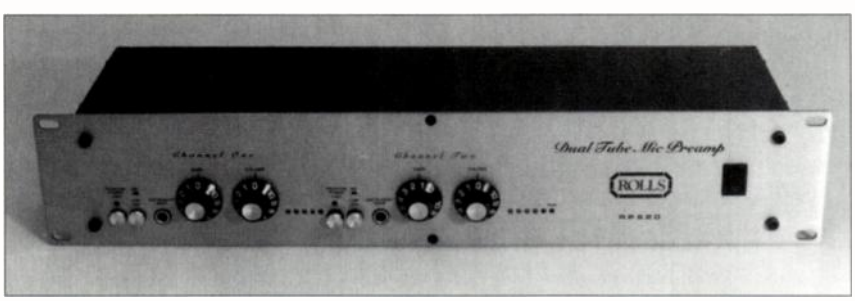
The RP220's design is simple and straightforward, making the unit very easy to use. Dressed in silver and black, with big gain and volume knobs reminiscent of an old guitar amp head, the RP220 looks vintage. Each channel has phantom power and a 5-stage, easy-to-read, output LED. That's pretty much it for the RP220's controls, other than a power-indicator LED and front-panel power switch. The unit's power cord is permanently attached, which is fine with me.

The unit has balanced XLR inputs and both balanced XLR and unbalanced ¼-inch line outputs. A ¼-inch instrument input on the RP220's face, when connected, overrides the XLR on its rear. A second ¼-inch output on the rear lets the unit act as an active signal splitter.

The XLR inputs and outputs are switchable between mic and line levels. As you would expect, the ¼-inch jacks are line-level only. The inclusion of ¼-inch outputs makes the RP220 a good choice as a tube front-end for an MDM, DAT, or hard-disk recorder.

TESTING 1, 2, 3

After a quick look at the 4-page owner's manual, I plugged in an AKG C414



Rolls RP220 Dual Tube Mic Preamp offers surprising sound quality in an affordable package.

Rolls RP220 Specifications

Frequency Response (mic/line)	Frequency Response (instrument)	THD	S/N Ratio
40 Hz-40 kHz (±3 dB)	5 Hz-40 kHz (±3 dB)	0.1%	107 dB

solid-state condenser mic and started working. The C414 is sometimes criticized for its harshness—it is extremely sensitive and picks up even the slightest sibilance—so it seemed a good candidate for tube processing.

After recording a few tracks with a male singer who has a particularly edgy voice, I compared the results from the RP220 to tracks recorded with the C414 running through a solid-state preamp. The tracks recorded with the RP220 were fatter at the low mid frequencies and caused an overall warming up of the singer's voice, which effectively took the unwanted edge off his voice.

The RP220 didn't turn the C414 into a high-end, vintage tube microphone, but it effectively turned it into a pseudo-tube mic with a pleasing sound. As anticipated, the two make excellent partners.

I found plenty of other good applications for the RP220. For example, I ran a sampled grand piano through the RP220 while mixing a modern rock tune. This made the piano sound darker and more realistic. I also ran a drum machine's kick drum into it, slightly overloading the input, which created a punchier, more transient kick. I even patched a digital effects processor with a spring reverb patch through the RP220 and tuned in a more authentic spring sound.

Of course, some experiments were less successful. For example, I tried recording a Gibson hollow-body jazz guitar through the RP220, but found the resulting timbre a bit too clean for my taste. (I prefer a dirtier, more colored tube sound for guitar.) Oh well, it is a *mic* pre after all.

IN MY OPINION

Although the Rolls RP220 doesn't do anything groundbreaking, its *price* is groundbreaking. The unit doesn't have a lot of bells and whistles, but for the price what do you expect? Consider its higher-priced competition, and you will really appreciate the RP220's value.

However, I did not like the sound quality of the tubes that shipped with the unit. Fortunately, the RP220 accepts virtually any 12AX7 tubes, so you can pick whatever brand you like. When I substituted a pair of Groove Tubes for the originals, the sound improved dramatically. According to Rolls, the RP220 now ships with better quality tubes.

Other criticisms? Okay, the power LED is a bit close to channel 2's output peak LED, and they can easily be confused. Who cares? What matters is that given good tubes, the RP220 sounds great. With its many potential applications, it makes a valuable addition to any studio.

Erik Hawkins *is a producer and musician in the San Francisco Bay Area. He is the owner of Sound Proof Productions and an associate of Infinite Studios.*

Product Summary

PRODUCT:
RP220 Dual Tube Mic Preamp
PRICE:
$499.99
MANUFACTURER:
Rolls Corporation
5143 South Main
Salt Lake City, UT 84107
tel.(801) 263-9053
fax (801) 263-9068
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EASE OF USE	●●●●◖
AUDIO QUALITY	●●●◖
VALUE	●●●●

Ilio Synclavier Sample Library

By Geary Yelton

The sounds that made the Synclavier famous.

In the beginning was the Synclavier, and it was good. Very good. But it was also expensive. Very expensive. One feature that made the Synclavier so in-demand for studio recording was its large library of high-quality samples. Recorded with 16-bit resolution at a 48 or 50 kHz sampling rate, the quality of those samples was unparalleled and is still considered state-of-the-art.

The Synclavier (now manufactured by The Synclavier Company) is still priced out of sight, and MIDI technology has caught up with most of its capabilities, but widespread hunger for high-quality instrument samples is more alive than ever. It's about time someone made the Synclavier library of samples available for today's popular samplers.

Ilio Entertainments has released several CD-ROM volumes of these sounds for the Digidesign SampleCell, Kurzweil K2000, Akai S-series, and Roland 700-series samplers. I checked out three volumes for SampleCell: *Strings Percussion+ Disc One, Essential Percussion,* and *Percussion+ Disc Two: World & Orchestral.*

ZING WENT THE STRINGS

New England Digital's fine-sounding library of string samples for the Synclavier greatly contributed to its popularity with composers and producers. Ilio's *Strings* CD-ROM contains just under 240 MB of samples, instruments, and banks. In addition to the impressive variety of violins, violas, cellos, double basses, and assorted combinations, there are harps and vocal ensembles.

The strings are played legato, staccato, pizzicato, vibrato, and at various dynamic levels. There are as many as three versions of each bank and instrument to accommodate the amount of memory in your sampler. Many require a full 32 MB of RAM, but there are also scaled-back banks that have

shorter samples or, more often, have fewer multisamples. In the maximum-memory versions of each solo violin and cello sample, every "white key" note is included, which means that no single sample is transposed more than a semitone.

When you open a file from within *SampleCell Editor,* comments in the Open File dialog box specify the controller routings and RAM requirements. Knowing in advance how much RAM is necessary saves you from getting a bank or an instrument partially loaded, only to have SampleCell delete all its samples when it realizes there isn't enough memory.

Instruments are usually arranged as multisamples with the same dynamic and articulation (forte, pizzicato, etc.). Some instruments were sampled with vibrato, others without. Unless you change the modulation routings yourself, you can't add vibrato with pressure or modulation. That's just as well, because vibrato from a low-frequency oscillator would certainly detract from the naturalness of these strings.

Everything was recorded through the Synclavier's analog-to-digital converters. Ilio has relooped each of the original samples using Jupiter Systems' *Infinity* software. As a result, the loops are nearly perfect. According to the "Read Me" file that accompanies the disc, noise reduction was applied sparingly to noisier samples.

COULD'VE FOOLED ME

Among the banks are seven string ensembles in both mono and stereo versions. Ensemble Mix 1 and 2, which combine multisamples of all four stringed instruments, require 31 MB and 12.5 MB of RAM, respectively. Ensemble Mix Complete, at 28 MB, combines sustained forte and staccato cellos, violas, and violins with sustained piano, pizzicato, and tremolo violins.

To my ears, all sampled strings sound somewhat synthetic, especially in the context of symphonic music. But I'm sure the Synclavier strings would fool the average guy on the street.

Each of the sustained sounds has a fairly fast attack and an even sustain. MIDI Footpedal and Modulation Wheel messages control the amount of staccato violin and cello in the mix, giving the attacks more punch.

Ensemble Strings 1 and 2 spread cello, viola, and violin sections across the keyboard. These samples have no vibrato, and volume can be changed either by the modulation wheel or keyboard pressure. Ensemble Strings w/Staccato is identical to Ensemble Strings 1, with the addition of staccato cellos and violins. Modulation Wheel controls their volume in the mix.

As you might expect, the stereo and mono violins and violin sections take up more disc space than anything else. The sustained violins have a moderate attack, which may be too slow for some applications. Each of the sustained violins is forte—perhaps too forte—with fairly obvious splits.

The tremolo violins are a bit intense, but still quite good. The pizzicatos are excellent. Solo violins are provided in sustained, staccato, and pizzicato variations. There are occasionally two versions of the same note, but I wish more dynamic levels were available. The sound of the solo violins is consistently good, but not great.

Though there aren't many variations, the violas are generally better. The sustained forte violas may be the most realistic string samples I've ever heard. Velocity affects the attack time and loudness, and again, Modulation and Pressure also affect loudness.

The sustained cellos are also good, with enough splits to keep the slight vibrato at a consistent rate. In the cello ensemble, solo cello is layered in for a fuller sound. Although the timbre of the cellos ranges from very rich to rather thin, often depending on the amount of memory used, they're all pretty effective.

In fact, almost all of the library's Synclavier strings are usable. For the most part, vibrato is pretty consistent from one multisample to another. Some of the crossfades and Velocity switches could be better. One obvious problem is that the Modulation Wheel works in a nonlinear fashion, making it difficult to manually control mix and volume without abrupt changes. You'll probably want to reprogram the mod parameters.

DON'T HARP ON IT

I suppose harps have their place on a strings disc, and there are plenty of harp samples here. The sustained harps are okay, but they're nothing to write home about. I've heard equally good sampled harps from a synthesizer. More interesting are the marvelous little harp arpeggios, which are best played at their original pitch. Most of them are alternately ascending and descending. Surprisingly, there's at least one with two flubbed notes in the middle. Now that's realism!

There are three kinds of vocal samples: Jones Vocal, Boys Choir, and Vocal FX. The Jones Vocals are a small male ensemble singing the syllables "baah" and "dooh." There are also instruments that truncate the beginning of each to form the syllables "aah" and "ooh." The Boys Choir offers six pitches, with the lowest one deeper than you'd expect from a real boys choir. The effects are five percussive syllables, such as a breathy "uh" and a fricative "tch." Both mono and stereo versions are available. Here again, the loops are excellent, but the split points are pretty obvious.

None of the vocal samples sound natural, but they're still pretty cool. They can be used anywhere you need a vocal synth pad. The Jones Vocal "dooh" has a particularly nice synthy quality, sort of like pan pipes in the upper range.

BEYOND THE ESSENTIALS

The first of two percussion discs, *Percussion+ Disc One: Essential Percussion,* focuses on the sounds of a drum kit, with electric bass. Trap percussion includes snares, kicks, toms, hi-hats, and cymbals. Latin percussion, steel drums, synth hits, and assorted sound effects are thrown in for good measure. Banks are arranged into eight drum kits, three of which are low-memory or mono versions of the others.

Ilio Entertainments' *Synclavier Sampler Library* includes several CD-ROM volumes of sounds for Digidesign SampleCell, Kurzweil K2000, Akai S-series, and Roland 700-series samplers. The library's quality is generally good, but *Percussion+ Disc Two: World & Orchestral* is downright awesome.

I wasn't enthusiastic about the drum kits, but I used them as a basis for creating my own kits. Each kit is on MIDI channel 1; none uses the entire keyboard. Many of the toms and cymbals are exceptional, but all the snare samples are too short. You can remedy this, of course, with a little reverb. The 5 MB of hi-hats is especially nice and features assorted degrees of being open or closed.

Drum sounds range from naturally acoustic to heavily processed. The bank called Drum Machine is a fairly standard drum kit, with some good sound effects, but no drum-machine samples. The Rhythm Section bank is a 9 MB kit with bongos, shakers, tambourine, and cymbal roll, with picked electric bass on MIDI channel 3.

The instruments grouped as Percussion are mostly of the latin variety. The diversity of bongo drums is particularly outstanding. These include patterns played at various tempos, several rolls and riffs, and bongos played with hands, brushes, sticks, and mallets. Lots of tambourines, maracas, shakers, congas, cowbells, timbales, and all the others you'd expect are found here.

In addition, there are miscellaneous pitched sounds, such as plucks and mutes on an electric guitar, a carillon-like wine glass, and a sound I can only describe as a bowed vibraphone. The eleven Bizarro sounds aren't especially bizarre, encompassing various sound effects from synthesizers, prepared piano, car doors, and the like. There are also six short Tone Hits created by layering synthesizers.

The electric bass is a good, basic bass guitar played with both pick and fingers. Notes are sustained, and the large (nearly 20 MB) version has a crossfade between soft and hard playing. E Bass Picked 1 is less than 1 MB and very even across its pitch range, but it's munchkinized if you play higher than E above middle C. E Bass Picked 2 is identical, but playing harder opens up a lowpass filter. E Bass Plk/Pik VS abruptly velocity-switches between fingered and picked bass.

Bass effects include mutes, pulls, slaps, and glisses in different zones on the keyboard. The popped basses are almost perfect, but I wish there were more than six multisamples.

WORLDLY SOUNDS

The second percussion volume, *Percussion+ Disc Two: World & Orchestral,* is absolutely great. It features almost 500 MB of instruments from around the world, from abacus to xylophone. Many instruments offer single hits, rolls, and rhythmic loops with annotated tempos.

Orchestral sounds include timpani, celesta, gong, ratchet, triangle, woodblock, and so on. Of course, there are also snares, bass drums, and cymbals. The nearly 170 MB of timpani are especially impressive. I never realized that kettledrums had such a large musical vocabulary. If it can be played on

timpani, it's probably on this disc. The celesta is beautiful and very realistic. There are also some very good bells and chimes, as well as other pitched percussion such as vibes and marimba.

For the most part, I prefer the snares on this disc to those on Volume 1. They have a lot of life, and if you want them processed, you can do it yourself. Many of the snare patterns are familiar military marches.

As far as I can tell, each of the bass drum samples is from the same drum. Fortunately, it's the perfect orchestral bass drum. Unfortunately, it's much too legato for nonorchestral music. At least three cymbals are rolled and struck at various levels, with plenty of sample time for the fades. This is good stuff.

World percussion includes instruments from Africa, Asia, South America, and more. Some of these, such as kalimba and rainstick, can be found in almost any world percussion sampler library. Others, such as caxixi, anklung, and totosan, may be hard to find.

I'm a big fan of Indian tabla, and there are ten excellent tabla sounds here, as many as I've found anywhere. There's also a huge selection of shakers and rattles made of everything from pigs feet and bean pods to dry bones and pantyhose packaging. In addition to lots of whistles and guiros, latin instruments include castanets, claves, clickers, and clackers. There isn't a clunker in the entire collection.

Each family of instruments is mapped to the keyboard in a specific key range. South American drums are an octave higher than shakers and rattles, with Far Eastern percussion in the next octave. This arrangement makes it possible to load different instruments into a bank without so much concern for overlapping key ranges. Of course, pitched instruments, such as kalimba and waterphone, are spread across the keyboard to reflect their actual ranges.

For those who purchase both *Percussion+* discs, there are banks that combine their sounds into a single bank. This is cool, but loading a double-disc bank from CD-ROM was a tedious, time-consuming headache. The computer had to read the first disc every time it needed to know what to ask for on the second. Then it prompted me for permission to find each instrument. After it found the instrument, it prompted me to click the Open button. Loading one bank took more than two dozen disc swaps. Fortunately, disc swaps and prompts can be minimized by copying the Bank file to hard disk.

RECOMMENDATIONS

I love the *World & Orchestral* percussion disc, and I recommend it wholeheartedly. The variety is impressive, and the sounds are well done. You probably have never heard many of these instruments, and the ones you've heard a million times are top notch.

Most of the sounds on *Essential Percussion,* though, can be easily found elsewhere. There's not much on this disc to make it superior to similar CD-ROMs. If you're short on drum kit sounds, however, it's worth a look. And to be fair, the variety and quality of the cymbals is exceptional.

The collection of samples on *Strings* is quite good, but certainly not the finest. Its sounds are an excellent addition to anyone's sampler library, but they're not the last strings you'll ever need to buy. There are no solo violas and no bass section. But as long as you don't expect perfection, you won't be disappointed.

Geary Yelton *is confused and pursuing the path of the solitary heart in Atlanta, Georgia.*

Product Summary

PRODUCT:
Synclavier Sampler Library
PRICE:
Strings $249
Percussion+ Disc One: Essential Percussion $187
Percussion+ Disc Two: World & Orchestral Percussion $187
SYSTEM REQUIREMENTS:
Akai S-series, Digidesign SampleCell, Kurzweil K2000, or Roland 700-series sampler
MANUFACTURER:
Ilio Entertainments
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tel. (800) 747-4546
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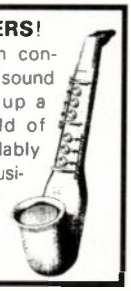

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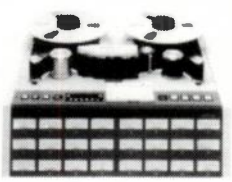

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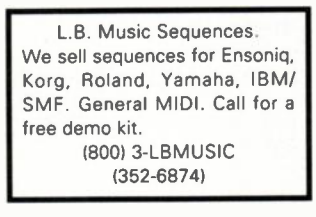

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TECH PAGE

FAR Out

Oberheim's new sound technology is a real trip.

By Scott Wilkinson

At the recent AES show in San Francisco, Oberheim Digital (a division of the venerable synth company, now owned by Gibson) demonstrated an amazing new technology called Fourier Analysis Resynthesis (F•A•R). This technology is based on the fact that any periodic waveform can be distilled into a set of sine waves with different frequencies, amplitudes, and phase relationships. The sine waves can then be recombined to synthesize the original sound. However, this technique has remained impractical until now because it requires many oscillators that are highly controllable in real time.

F•A•R solves this problem by creating hundreds of controllable digital oscillators, which requires some heavy-duty number crunching. The prototype system crunches numbers on a Silicon Graphics Indigo computer, while the user interface is implemented on a Mac. Commercial products are likely to appear in the form of rack-mount boxes with an SGI MIPS chip, controlled from Mac-based, front-end software.

The process begins by analyzing any digital audio file (see **Fig. 1**). First, the file is divided into short *Spectral Frames,* each lasting a few milliseconds. These Frames overlap by 50% to ensure smooth transitions between them during playback. Each Frame is subjected to a Fast Fourier Transform (FFT), which determines the frequency, amplitude, and phase of each partial in the Frame's waveform. The partial information from all Frames in the sound file is then assembled into a single Partials File.

Next, the Partials File is resynthesized into a digital audio file and subtracted from the original sound file. The remaining data represents the noise and other nonperiodic material in the original file (e.g., breath noise, key clicks, etc.), which is analyzed separately and stored in a Noise File. The Partials and Noise Files are then combined into a F•A•R Data Set.

Once a Data Set is assembled, it can be played back and processed in real time. The Partials and Noise Files are resynthesized and combined to play a F•A•R Sound. Of course, you can choose not to play one of these files. For example, this lets you remove the noise from a poor recording by deleting the Noise File from the Data Set. (During the AES demo, I heard the system remove the pops and clicks from an old 78 record.)

Many problematic sample manipulations are much more effective with F•A•R, because the elements of pitch and time are completely separated from each other. For example, time compression and expansion are easily accomplished without worrying about pitch shifting; simply play the Frames back at a different rate. Pitch shifting without affecting duration is equally easy; just bias the frequencies in the Partials File. You can even create maps of pitch and/or time shifts over the duration of a sound file, which can be used to automate the process of fitting dialog to picture or fixing a singer's intonation problems.

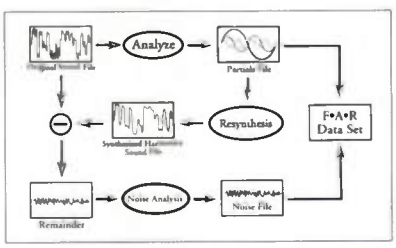

FIG. 1: F•A•R separates and analyzes the partials and noise in a sound file. These elements are then combined into a Data Set that represents the entire sound.

Each Frame includes all the information necessary to produce a complete waveform, unlike individual sample points. This means you can audition single Frames and perform pitch-stable scrubbing. In addition, Frames can be played forward or backward in any order to create dynamic, varying sustains that are much more lifelike than static sample loops.

One of the most interesting capabilities of F•A•R is true sonic morphing. Unlike most systems, in which two or more sounds are "morphed" by crossfading between them, F•A•R Sounds are morphed by interpolating the data in their Partials and Noise Files. Don't forget that this, and all other processing, is performed in real time under manual or automated control.

F•A•R represents a major development in electronic sound generation and manipulation. Potential applications include music and speech synthesis, sound design, and audio post-production. In fact, F•A•R is likely to have a huge impact on virtually every aspect of the audio world, so get ready for the next sonic revolution. ●

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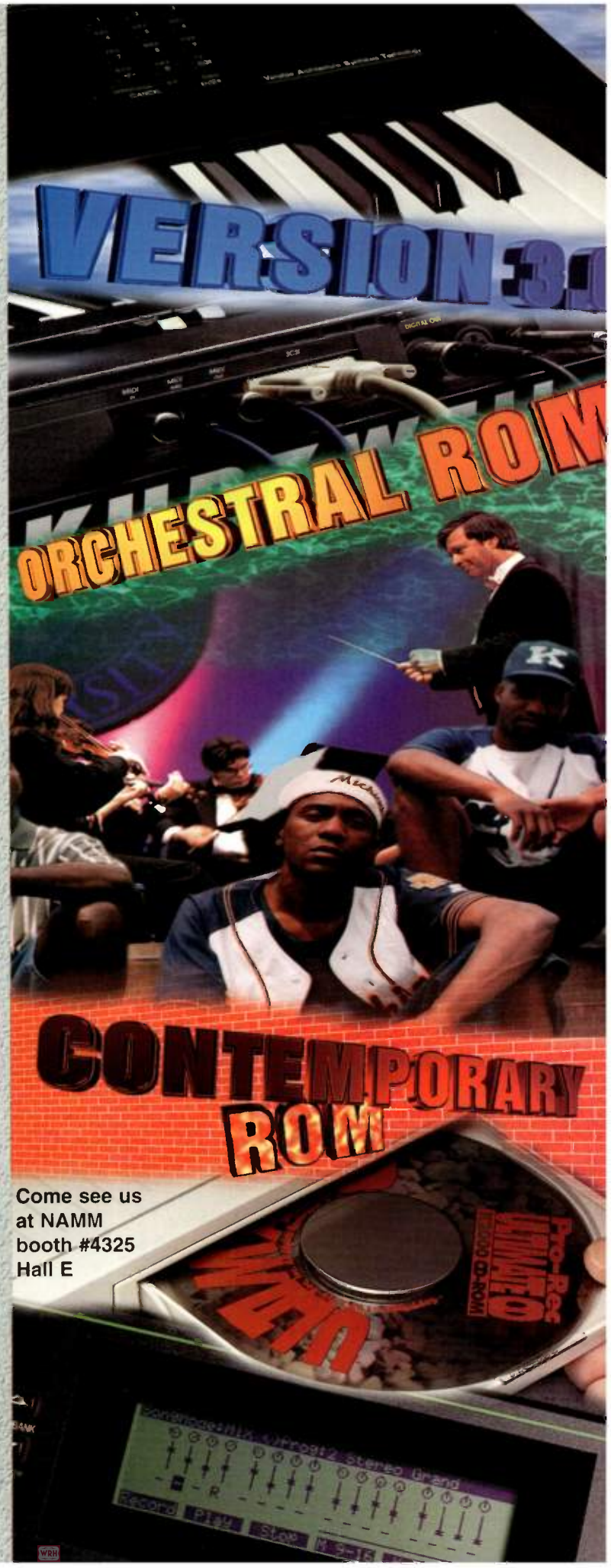

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