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Electronic Musician

July 1996

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THIS AD CONTAINS 8 REA
YOUR FREE 1-HR. MACKIE

1 VLZ CIRCUITRY FOR ULTRA-LOW NOISE AND CROSSTALK. *Did we just make up a fancy name for the same old circuitry? Nope. VLZ (Very Low Impedance) is a Mackie innovation based on solid scientific principles. Through the careful deployment of high operating current and low resistor values at critical points in our consoles, we're able to dramatically reduce thermal noise & adjacent-channel crosstalk. Open up all the channels, subs & masters on a Mackie 8•Bus console and compare what you hear (or rather don't hear) with any Brand X console. Because Very Low Impedance circuitry needs loads of high current, we ship a humongous, 220-Watt Triple-Regulated power supply with every 8•Bus*

2 IT EXPANDS ALONG WITH YOUR NEEDS AND BUDGET. *You'd be surprised just how many 8•Bus console setups like the one below are currently in use. But you don't have to start out this way. Start out with a 24•8 or 32•8 and then grow your 8•Bus console 24 channels at a time with our 24•E add-on modules. 1, 2 or even 3 of 'em connect in minutes. They come with their own 220-watt power supply; optional meter bridges are available.*

3 IMPECCABLE MIC PREAMPS. *A console can have motorized dooflammers and an optional MIDI espresso attachment, but if the mic preamps aren't good, you don't have a fully-useful production board. Our discrete preamps with large-emitter-geometry transistors have won a critical acclaim for their exceptional headroom, low noise (–129.5dBm E.I.N.) & freedom from coloration. VLZ circuitry in the preamp section also reduces crosstalk.*

4 THIS CONSOLE JUST PLAIN SOUNDS GOOD. *Sure, you may be able to buy a Brand X console for less. But you end up with a console that sounds like...well...a Brand X console. Granted, we're getting into a pretty subjective area here...but we have tall mounds of 8•Bus warranty cards that rave about our consoles' "clarity," "sonic purity," "sweet sound," "transparency," "lack of coloration" and a lot of other superlatives we wish we'd thought of first.*

Above: 24•E 24-ch. expander with optional MB•E meter bridge and stand.

6 MAC® & WINDOWS® 95-BASED AUTOMATION THAT'S RELIABLE, PROVEN AND AFFORDABLE.

Along with affordable digital multitrack recorders, the Mackie 8•Bus has made it possible to do world-class productions on a modest budget. But until now, Big Studios have still had one remaining and unattainable creative "secret weapon"... computerized level automation. That's why we developed the UltraMix™ Universal Automation System. It gives you fully editable and recallable control of input, channel and master levels — plus features not found on even the most expensive proprietary Mega-Console automation systems. Equally important, it doesn't degrade sound quality, introduce zipper noise or cause audible "stepping." UltraMix is currently being used to mix network television music themes and on several major album projects – by seasoned engineers who grew up on Big Automation Systems. Their verdict is that UltraMix is a serious automation solution – stable, reliable and frankly easier to use than more expensive systems. The basic system controls 34 channels and can be expanded to as many as 128 channels. UltraMix Pro™ software, for 030/040 & Power PC Macintoshes and PCs (Windows® 95 required), includes a wealth of features like editable fader curves, built-in level display, unlimited subgroups, SMPTE time code display, event editor with pop-up faders, optional control of outboard effects devices and the ability to play Standard MIDI files from within the program.

UltraMix™ includes the Ultra-34 interface, UltraPilot Controller and software for $2797 suggested U.S.. retail. Macintosh® or Windows® 95-compatible PC not included.

[1] Mention in this ad denotes usage only, as reported to Mackie Designs, and is in no way intended to constitute official endorsement by the artists or groups listed.

*As compiled by a leading Independent Console Video Factoid Evaluation Laboratory. Your count of superior Mackie 8•Bus console features may vary.

SONS TO BUY OUR 8-BUS CONSOLE. VIDEO CONTAINS AT LEAST 71.5* MORE.

5 PROFESSIONALS REALLY USE THEM. *The members of Boyz II Men could have afforded any console they wanted for their studio's second room. They chose an 80-input 8•Bus with 102 channels of UltraMix™ automation. In the studios of artists as diverse as k.d. lang, Yes, Queensryche, Lee Roy Parnell, Aerosmith, Bryan Adams, Carlos Santana, Whitney Houston, Eric Clapton & U2, our consoles really are used to make great music.*

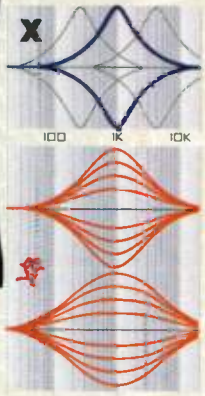
FREE VIDEO! *Choosing the right 8-bus console can be pretty confusing these days. That's why we've whomped up a free video that gives you some solid reasons to buy a Mackie 8•Bus. This eclectic compilation contains excerpts from our epic 8•Bus Video Owner's Manual, an introduction to UltraMix™ Automation System and an award-winning short subject, The 2nd Mackie Home Video. Watch all three parts before you part with bucks for any 8-bus console.*

FREE VIDEO FINE PRINT. *Visit your local Authorized Mackie Dealer for a real live 8•Bus demo, and then snag your free video. This handsome offer is good while supplies last, or until August 31, 1996, whichever occurs first. So, you snooze, you looze. Limit: one per customer. If you just can't seem to make it to a dealer, it's available from Mackie by phone or fax request – no reader response cards. Allow six weeks for delivery. You will also receive our 48-page 8•Bus and UltraMix™ Universal Automation System color tabloid. This video offer is available to respondents in the U.S. only. Canadian readers, call SF Marketing at the toll-free phone number below. In other countries, please consult your local Mackie Designs Authorized Distributor.*

Above: 24•E 24-ch. expander with optional MB•E meter bridge and stand. Above left: 32•8 with optional MB•32 meter bridge and stand.

Above: The SideCar, matching 8•Bus equipment rack.

7 WIDE MID RANGE EQ. *Whether you're tracking or mixing, equalization is one of your most important creative tools. We concentrated on important things like giving you Classic English Console EQ capabilities. By that, we mean extremely-wide-bandwidth peaking equalization that can be used to achieve effects that simply aren't possible with narrower EQ. Most Brand X midrange EQs have a fixed bandwidth of about 2 octaves (blue graph above right). You can sweep it up & down the frequency spectrum, but the "sharpness" of the EQ curve is always the same.*



This kind of EQ is good for some purposes...but if you've worked with it before, you know it's too drastic and localized for gentle changes in overall tonal coloration. The 8•Bus' true parametric Hi Mid lets you spread the bandwidth out to as much as 3 octaves (red curves at left). That extra octave of "width" gives you a whole new creative palette.

8 LEGENDARY RELIABILITY. *This is one of those factors you probably don't think much about – until your console goes down at in the middle of a critical session...at 2AM on a holiday weekend. Built with pride in Woodinville, WA, USA, 8•Bus consoles have an enviable 3-year track record for enduring continuous, round-the-clock use and abuse.*

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COMPOSE YOURSELF.

You never know when or where inspiration will strike. But with the PMA-5 palm-held Personal Music Assistant, at least you know where you can put it.

The PMA-5 is the most intuitive creative tool for anyone with a musical thought. Utilizing advanced pen computing technology, the PMA-5 is the ultimate portable music workstation. It's as simple as touching a pen to a screen. You can perform all operations and even play individual notes from the on-screen keyboard. You can access 600 backing patterns and 100 styles ranging from Monk to Funk and Sting to Swing. And, for on-the-spot improvisations, you can use the ad-lib function to play solos or melodies without knowing anything about music. Choose from over 300 Roland sounds and assign them to any of the 8 tracks in the built-in sequencer. Then add on-board effects including eight types of digital reverb and chorus. The PMA-5 can even function as a 16-part multitimbral GM/GS sound module.

Realtime faders give you control of volume, panning, reverb and chorus levels for all 8 tracks.

Intro, fills, verse, chorus, ending—the Style Track lets you lay out your song visually.

27 different chord types to choose from in any key with any bass note—even a different chord on every beat.

With step editing you can go deep. Change the velocity and duration of one note, move it a few clock pulses ahead, or insert individual events.

When you're ready to get back to less comfortable surroundings, the PMA-5 has a built-in computer interface. And, because it's MIDI compatible you can play or record into the PMA-5 from a MIDI controller. You can even exchange Standard MIDI File data with your computer for freedom you never had before.

When traveling with a band won't work, the PMA-5 will. Since the PMA-5 is battery powered, you can have a band at your side anytime or anywhere. Choose from up to 20 songs, select bass and drum parts, transpose to any key at will, choose a preset style or create your own. It even has a built-in start/stop jack.

Try the PMA-5 at your nearest Roland dealer. Or, better yet, try it someplace more inspiring.

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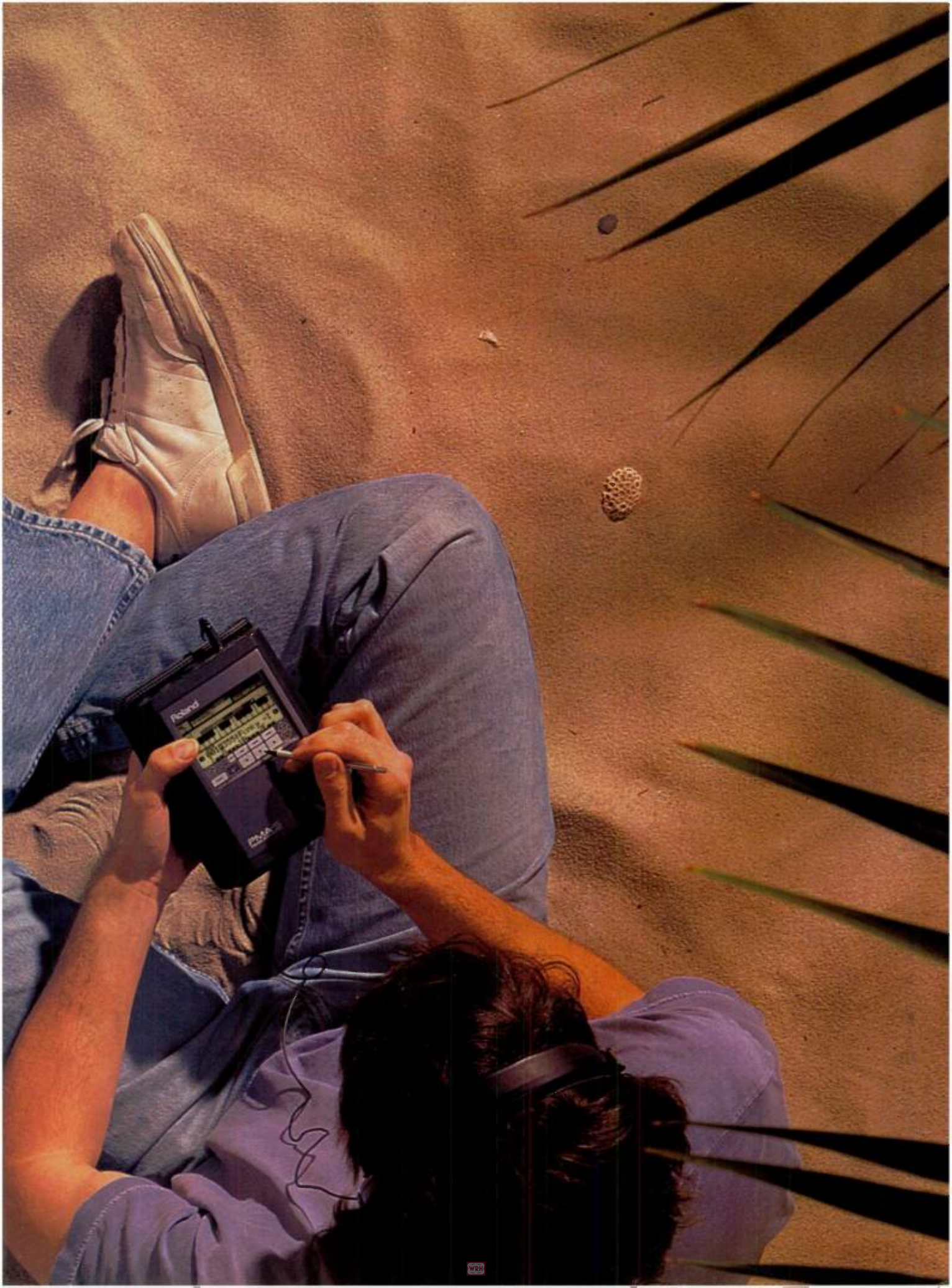
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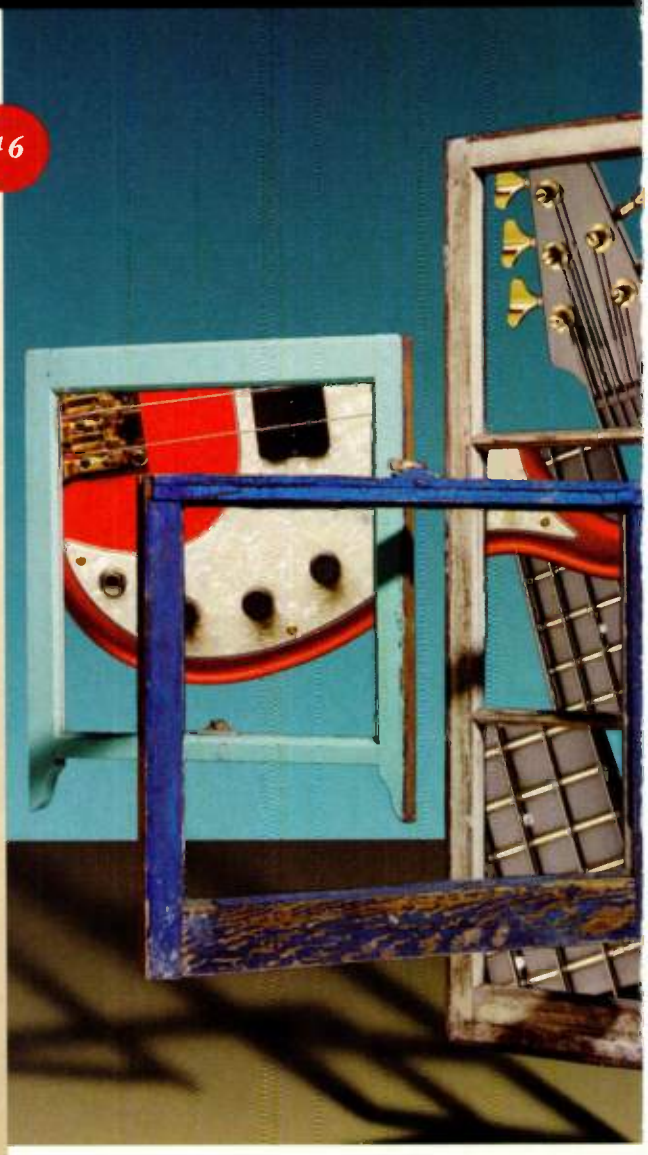
FEATURES



DEPARTMENTS

D E Electronic Musician®
ten!
JULY 1996 VOL. 12, NO. 7

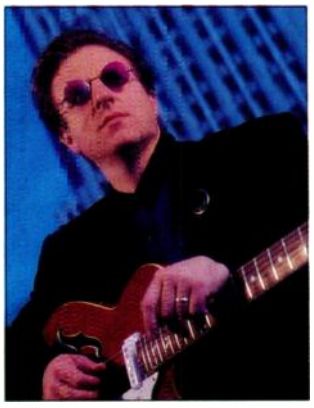
COLUMNS

REVIEWS

Cover: Photography by David Bishop.
Special thanks to Glenn Letsch.

The People-Go-Round

Get your scorecards out, kids, there've been a few lineup changes.



ROBERT PERRY

It's somewhat comforting to know that in this frightfully unpredictable universe of ours, constants *do* exist. The sun rises majestically every morning, gravity prevents us from floating into ceiling fans, and the eternally twinkling stars always lend their ears to earthbound wishes. We humanoid types, however, are denied the perpetual comfort zone of permanence. We change jobs, addresses, relationships, and even our opinions. And right now, change is a major force at **EM**.

If you read last month's guest "Front Page" by our former publisher, Peter Hirschfeld, you know that he has left to pursue a publishing venture on the World Wide Web. Peter was a zealous supporter of **EM**, and I'll sorely miss his energy and his counsel. (I'll even miss his deadly puns.) In addition, we've just hired Philip Semler as our new Circulation Manager, and we will have some new faces in our marketing department by next issue.

Of course, it was sad to see Peter and some other coworkers leave, but ambitious people move on—that's just a fact of life and business—and one of the cool things about **EM** is that it has always been a haven for gifted and industrious wackos. The staff's collective resolve and determination is astounding. These people just don't give up until a task is completed light years beyond expectations. This burning desire for excellence is what makes this magazine, in my admittedly biased opinion, a real treasure.

And this brings us to our new publisher, John Pledger. Talk about ambition! Throughout his previous gig at *Mix* magazine, John was a multitasking marvel. In addition to being an ace sales manager (a more-than-full-time job in itself), John supervised *Mix* Directories and was the mover and shaker behind the *Mix* Web site. He is also a fine jazzbo guitarist and an unrepentant gear head.

John's skills are a good fit for us, and I'm certain that his boundless energy will inspire the staff towards an even higher level of achievement. But I'm most excited about his perspective as a musician, which reinforces our commitment to real-world applications. As you loyal readers already know, most of the gear we review (of course, there are always a few exceptions) is tortured in demanding recording studio sessions and/or made to toil and sweat during actual live performances. We aren't bench-testers here! John's past and future turns under the spotlights are a major asset for a magazine that, every month, goes the distance trying to show its readers how to play better, record better, and make better sounds. Welcome to our little musical nuthouse, John!

And the life changes just keep on coming! Just before press time, Robin Boyce, our wonderfully twisted classifieds manager, announced her engagement to **EM** contributor and freelance author David (Rudy) Trubitt. The happy couple met during an AES show in New York, when they shared a cab ride from the airport to the Marriott Marquis Hotel. Robin and Rudy are totally beautiful people, and everyone on the staff wishes them a blissful future.

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How often have you had a great inspiration that somehow got lost on its way to the sequencer? Meet the MR-61 and MR-76, two new keyboards designed for the songwriter in all of us.

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complete with 8 variations and 8 fills. Load in new rhythms from disk, creatively exploring how the patterns can change by trying different drum kits.

Use the Drum Machine on your live gigs, or to jam with to find your next inspiration. When you use it together with the Idea Pad, all of your Drum Machine activity is captured as well!

Send your ideas on to the 16-track sequencer to develop them further.

Arrange it here.

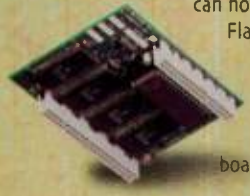
The Song Editor gives you a natural, easy-to-use interface for arranging your sequences into songs. Make a playlist by choosing the order of your sections. Trying a new arrangement is as easy as A, B, C, (or A, C, C, B, D, or A, D, C, B, E, ...).

Mix it here.

The FX / Mixdown strip gives you direct access to each of the effects sections – reverb, chorus, and any of the 40 insert effects. Plus control over panning, volume, solo, and muting – use it just like a mixing board.

Here are your expansion options.

The MR Series have 3 expansion slots, which can hold either wave expansion or Flash memory for loading samples. Expand your wave ROM with up to 24 MB per board, or add 4 MB of sample memory per board, in any combination you need.



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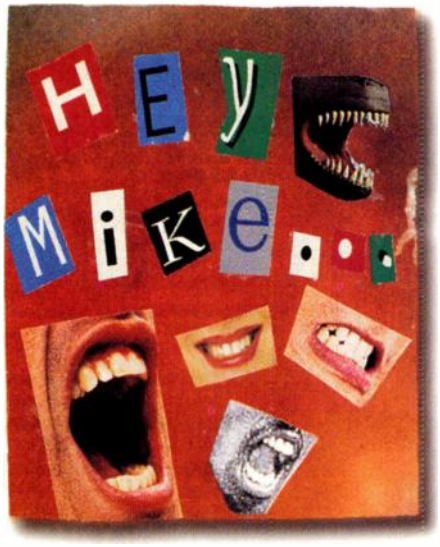

LIMBO LIMBO

As a devout Rush fan and home-studio hobbyist, I must commend you on your article, "Creative Space: Rush Limbo" (May 1996). The article was novice-friendly and a joy to read.

I could positively identify with Alex Lifeson regarding the recording of guitars within constrained ambient conditions. His manner of description (and your editorial style) was relatively easy for me to relate to my home-recording situation. I have read several articles on the same subject, and most have left me with little I could apply. The part about combining amplified and direct guitars was informative. And Lifeson's description of the dilution of stereo images as the result of room reflections (for miked acoustic guitars) has allowed me to greatly improve the quality of my recordings. I have struggled with this problem for a while but could not really put my finger on the cause.

Greg Pedersen, thank you for the insightful article. Also, thank you, Alex, for such professional advice. Perhaps someday I will enjoy my own music as much as I have enjoyed yours.

David M. Carter
dcarter@kittelson.com

LAY OFF OF THEM SHOES

I just read the "Static Cling" entry in April's "Letters" and thought I might be able to provide some help. I run a tracking and mastering room, and static is of great concern. The day I found fourteen spikes in a wave file that was just copied from DAT to hard disk was the day I went bonkers and finally discovered the cause of my problem. I found that no matter what I touched in the control room, my DAT meters would register. I also noticed that walking into the mastering/transfer room without grounding myself first would likely cause a loss of clock from that DAT machine and ruin a CD-R. Of course, I finally realized I was wearing shoes with soles that generated static electricity. After removing my shoes, all the problems disappeared. Since then I have started wearing "deck shoes."

William D. Gent
103264.1301@
compuserve.com

DO DAT DO DAT DO DAT DAT

The March cover story ("Everything You Wanted to Know about Releasing Your Own Album") said that cassette masters make lousy CDs. How about taking an 8-track tape produced on a cassette deck and mixing it to DAT? Would that produce a quality CD, or am I just dreaming?

Jack Rodney
Redmond, WA

Jack—One of the scary little secrets in the record biz is the number of CDs that have been recorded on 8-track cassette decks. (I know because I've produced a few myself!) But don't expect a DAT machine to magically enhance the sound of your mix; all it can do is document the sonic quality that comes out of your cassette multitrack.

However, if you must use the 8-track cassette format to make your CD, then by all means mix to DAT or some other digital format. The limitations of a 2-track cassette master—narrow bandwidth, reduced dynamic range, tape hiss, format instability, etc.—are simply too great to waste your musical efforts on.

As for producing a "quality" CD, there are many more variables than just the recording format. With killer songs and excellent musicianship, a good ear, great outboard gear, and first-rate mastering, you can do good work with a high-quality multitrack cassette deck. But I promise you, it ain't no picnic.—Brian K.

BACK-UP BLUES

I'm using a Power Mac 7200 with *Deck II* (v. 2.5) software. I'd like to back up my digital audio files onto my Sony DTC-670 DAT machine, and I understand there is some software that will allow me to do just that. Can you give me any leads?

Pete Sprague
via e-mail

Pete—You can't back up to audio DAT because the stock Power Mac doesn't have a digital audio output. You would have to add a Digidesign Audiomedia III PCI card or an external Yamaha CBX-D5 or CBX-D3 digital audio processor for that. (Korg has announced a digital I/O PCI card for the Power Mac, but as of this writing it is not yet available.)

Fortunately, you don't need audio DAT backup. Just save your Deck II *files to disk, and back them up to a SCSI drive (such as a data DAT) just as you would back up any other Mac document.*

If you want to use data DAT for backup, check out Optima's DeskTape, *which lets you mount SCSI 2 devices (such as 4 mm data DAT and 8 mm tape drives) on the Macintosh desktop as 2 GB volumes. That way, you can use the DAT drive as if it were a removable-cartridge drive. For instance, you can copy files to and from DAT via click-and-drag and open them by double-clicking. (See the October 1993 "What's New" for details.)—Steve O.*

MA, CAN I HAVE A RAISE?

I'm only twelve, but I really enjoy reading *Electronic Musician.* It has taken me from the world of auto-accompaniment to the world of sampling. Many people with whom I've shared my rough sketches of songs think they have potential. I'd like to try to demo my song to the record companies, so this brings up my two questions.

First, I have a very limited budget

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(cutting grass, paid piano gigs, allowance), but I still want to put out a very professional product. What equipment will do this for me? I use a Roland XP-50, but I feel trapped to the sounds they chose to give me. In other words, how can I get most bang for my buck?

Second, I'd appreciate your input on a good resource book that tells me what I need to do to get the A&R executives to hear my stuff. How do I go about doing this and not make any foolish rookie mistakes?

mbwonder@aol.com

mb—If you haven't already done so, it's time to roll up your sleeves and start programming your own XP-50 sounds. Our March 1996 feature "Master Class: Programming the Roland Super JV" offers programming tips for the JV-1080 and XP-50, so go to your well-maintained collection of EM *back issues and dig in. (If someone stole your copy, you can buy another one via our back-issue line at tel. 800/839-5977 or 510/653-3307.)*

If you can part with some of those hard-earned bucks, you might want to check out Eye & I Productions' Voice Crystal programs for the XP-50 ($59.95; tel. 800/726-7664 or 510/625-7888; fax 510/625-7999; e-mail webmaster@voicecrystal.com; Web http://www.voicecrystal.com). There are probably other sources, so check around.

The Web is a good source for free patches as well as a good place to find commercial sounds. For example, as I was writing this reply, I fired up Netscape Navigator *on my computer and immediately found JV-1080/XP-50 patches at Nigel Spencer's Synth Zone site; http://www.rain.org/~nigelsp/roland.html.*

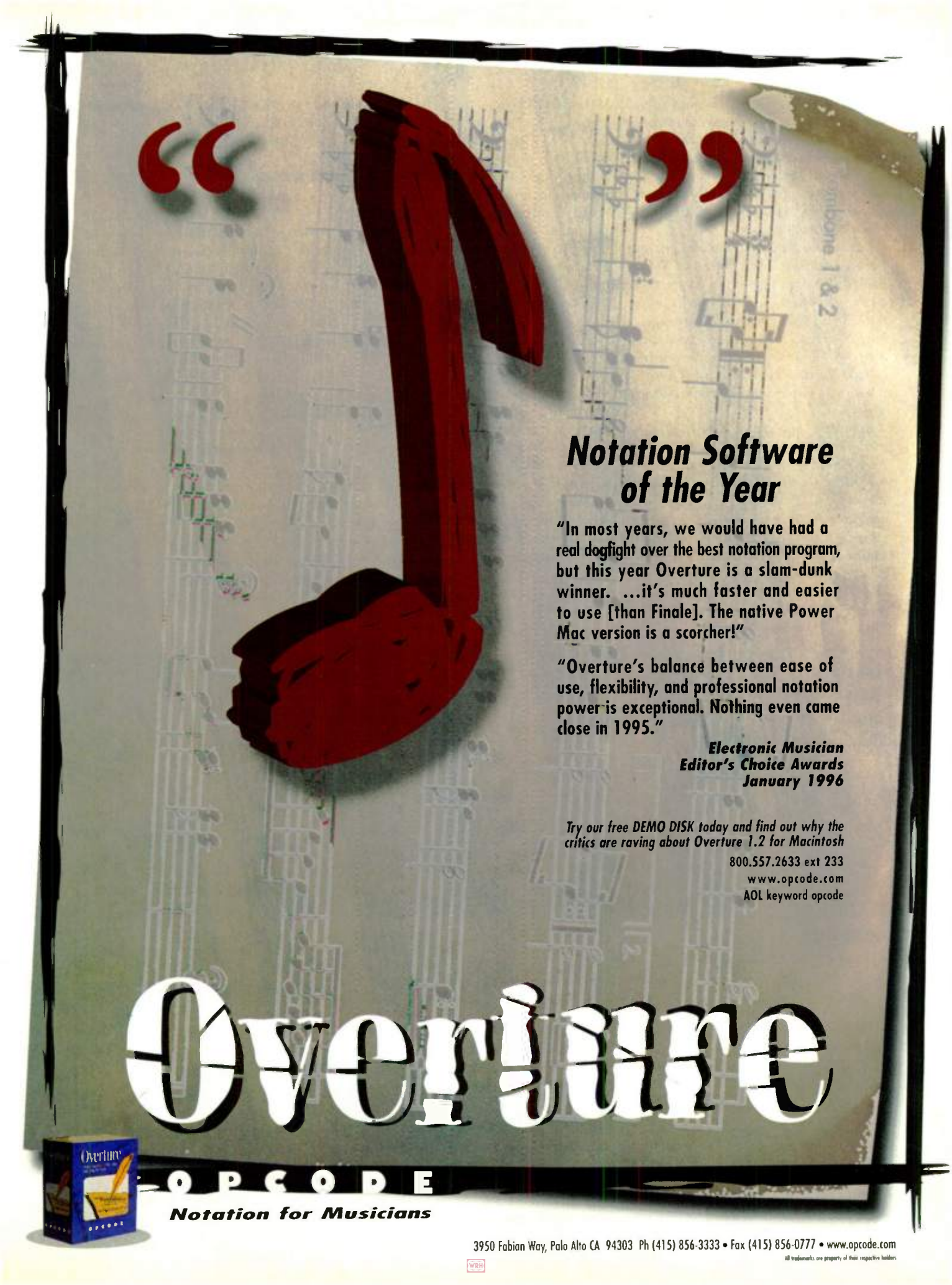
As for resource books, Bookshelf gurus Ken Stockwell and Don Washington recommend the following: The Music Business (Explained in Plain English) *by Naggar and Brandstetter ($12.95);* The Songwriter's Market Guide to Sound and Demo Submission Formats *by the editors of The Songwriter's Market ($19.95);* The Billboard Guide to Music Publicity *by Jim Pettigrew Jr. ($14.95); and* The A&R Registry *by Ritch Esra ($45). These books are available from Mix Bookshelf (tel. 800/233-9604 or 908/417-9575; fax 908/225-1562).*

Finally, keep in mind that even if you do your research, practice faithfully, sweat blood over a hot mixer, and try your best to do things in a professional manner, you'll probably still make some "rookie mistakes." Most rookies do, and so do a surprising number of veterans. Rookie mistakes—even occasional foolish ones—are okay at this point in your career as long as you learn from them and don't repeat them. You're not an aging musician making one last grab for the brass ring; if you blow it, you have plenty of time to try again. Good luck, and remember to have fun along the way.—Steve O.

RATING THE K2500

I want to take issue with Scott Wilkinson's K2500 review (May 1996). In the product summary under "Features," he gave the K2500 a 4 out of 5. Can you name an electronic keyboard on Earth that has more features than the K2500? And under "Ease of Use" the K2500 deserves at least a 4 out of 5, not a 3. The term "ease of use" is very relative in nature. I mean, it doesn't make any sense, for example, if you say that the Roland Sound Canvas is a lot easier to use than the K2500. Considering its complexity, I believe that the user interface of the K2500 is top-notch.

Hyeong Min Kim
hmk6@columbia.edu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Hyeong—Apparently, you misunderstand our rating system. A 3 is good, and a 4 is well above average (i.e., very good). A 5 in any category does not mean that the product is the best in the world in that respect but that it is as close to perfect as current technology allows. As a result, we very rarely give a 5 in any category.

I agree that the K2500 has a huge set of features, but that doesn't mean it can't be improved in this regard. For example, it has no hard-disk recording function like the Ensoniq ASR samplers, and the effects are badly in need of upgrading, which the company has been promising for a while. In fact, Kurzweil has a long list of features it wants to implement in future software updates.

Regarding ease of use, I agree that the user interface is good, and 3 is a perfectly respectable rating. However, this category encompasses more than the user interface per se. *As you know, the K2500 is* very *deep, and some features are not easy to grasp. (Have you ever tried to use the FUNs?) In addition, the display is smaller than those on other current offerings (e.g., Korg Trinity and Technics WSA1), which necessitates more cryptic abbreviations.—Scott W.*

UH, SORRY

I hate you guys. Our apartment used to bask in peaceful silence. But now that a roommate of mine has a subscription to your magazine, his mind has opened up to all these new possibilities for his synth. The apartment hasn't had a peaceful moment since. This magazine may have opened the mind of a musician, but you've wrecked a mellow apartment atmosphere.

Graham White
whiteg@elwha.evergreen.edu

Graham—If you want to return some peace to your abode, you and the other roommates might want to chip in and buy your synth nut a good set of headphones. Your generosity should (hopefully) inspire him to explore these "new possibilities" with headphones on, thus restoring serenity to the house. If that doesn't work, have each roommate (protecting themselves with earplugs, of course) walk around the apartment with a boom box blaring "Sugar, Sugar" by the Archies every time the selfish synthesist is trying to compose. Within a few days, he will be driven mad, and you can have the nice people in white coats come and move your "problem" elsewhere. Good luck.—Michael M.

A WISE MAN

I needed to supply phantom power to some MIDI controllers, so I went through my old issues of **EM** hoping to find the pinout of the MIDI connector. And what did I come upon? A full-blown description of how to supply phantom power to my MIDI controllers!!! Without reading that piece, I would have left off the diode. I mean, c'mon, c'mon, c'mon. Did I make the right decision in subscribing to your magazine all these years or what?

James Versyp
jversyp@ball.com

WE WELCOME YOUR FEEDBACK.
Address correspondence and e-mail to "Letters," Electronic Musician, *6400 Hollis St., Suite 12, Emeryville, CA 94608 or emeditorial@pan.com. Published letters may be edited for space and clarity.*

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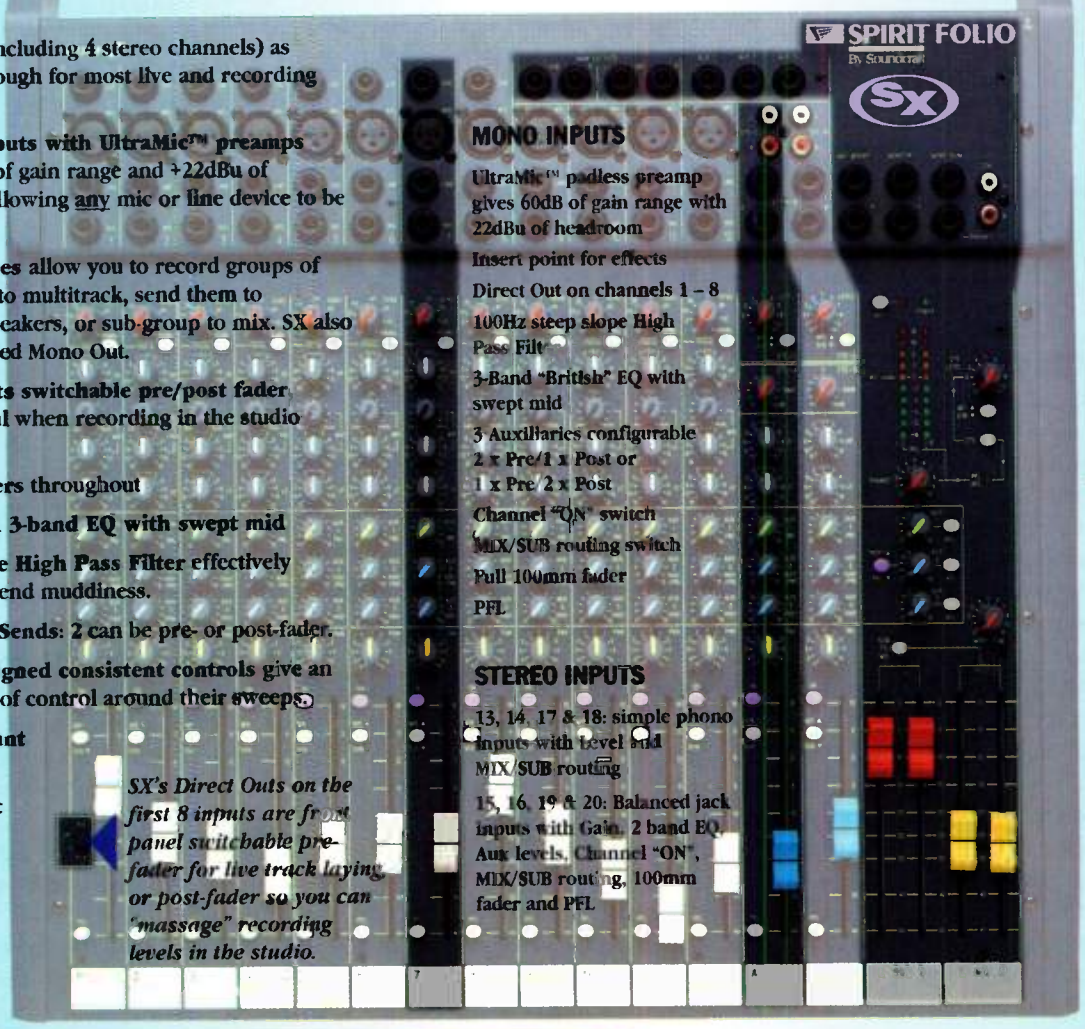

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- **Two sub-buses** allow you to record groups of instruments to multitrack, send them to additional speakers, or sub-group to mix. SX also has a dedicated Mono Out.
- **8 Direct Outs switchable pre/post fader** equally useful when recording in the studio or at a gig.
- **100mm faders throughout**
- **Real British 3-band EQ with swept mid**
- **18dB/Octave High Pass Filter effectively** reduces low end muddiness.
- **3 Auxiliary Sends: 2 can be pre- or post-fader.**
- **Custom-designed consistent controls give an** even spread of control around their sweeps.
- **Surface-mount technology**
- **Rack mount option**

SX's Direct Outs on the first 8 inputs are front panel switchable pre-fader for live track laying, or post-fader so you can "massage" recording levels in the studio.

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STUDIO RECORDING
Digital and analogue multitrack (4 & 8 track), small or home studios, pre-production, video post production

SUBMIXING

LOCATION SOUND

TYPICAL SPECIFICATIONS

Mic EIN	-129dBu
Crosstalk (1kHz):	
Channel Mute	<95dB
Fader Cutoff	<90dB
Frequency Response (20Hz to 30kHz)	<1dB
THD	<0.006%

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SEE US AT NAMM BOOTH #1521

WHAT'S NEW

By Steve Oppenheimer

SENNHEISER ME65

When miking live vocals, it's always important to maximize gain before feedback. Sennheiser gave its ME65 vocal mic ($295, $580 with power module) a frequency-independent, supercardioid polar pattern because a supercardioid mic minimizes feedback by rejecting sound entering from approximately 150° to the rear. The ME65 handles up to 144 dB SPL without distortion, which makes it a possible choice for nonvocal, high-decibel miking applications, as well.

The condenser mic is intended to be handheld, so it has an elastic suspension system for reducing handling noise. An integrated mesh windscreen protects against popping sounds from plosives (consonants such as *p*, *t*, and *d*). A bass rolloff switch helps compensate for the proximity effect when close-miking.

The ME65 can be powered with either AA batteries or phantom power using Sennheiser's K6 power module. Sennheiser; tel. (860) 434-9190; fax (860) 434-1759; e-mail miclit@sennheiserusa.com; Web http://www.sennheiserusa.com.

Circle #401 on Reader Service Card

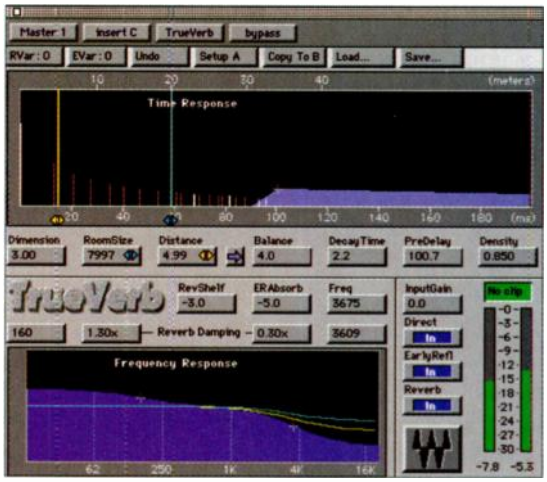
WAVES TRUEVERB

One big advantage to computer-based digital audio production is the ability to apply an assortment of effects-processing plug-ins to the source signal while remaining in the digital domain. The most powerful environment for such plug-ins is Digidesign's Pro Tools/TDM system for the Macintosh, and Israeli software developer Waves makes some of the hottest TDM plug-ins.

Waves' latest TDM plug-in is *TrueVerb* ($800), a 24-bit reverb processor that lets you apply reverb or ambience processing to single or multiple tracks with extensive control over frequency and time characteristics. You can define the room size and the frequency response. An unusual Distance control uses psychoacoustic rules to give the listener a sense of distance from the sound source.

The room simulator and reverb sections can be used together or separately. If you link these sections, the signal's perceived level is kept constant, maintaining your mix balance. Stereo compatibility is maintained throughout so the source's stereo image does not shift.

When Waves' *TrueVerb* is used in Thru mode, the entire source signal is routed through the reverb, as if the plug-in were an in-line processor. When not in Thru mode, the source is routed to and from *TrueVerb* via a virtual aux bus, as with most plug-ins. Waves; tel. (423) 689-5395; fax (423) 688-4260; e-mail waves@waves.com; Web http://www.waves.com.



Circle #402 on Reader Service Card

PRESONUS ACP-8

Following up on the success of its **EM** Editor's Choice Award–winning DCP-8 8-channel, digitally controlled compressor, PreSonus has released the ACP-8 ($799.95). The new unit offers eight independent compressor/limiters and eight noise gates in a modular frame. Each module can be individually bypassed or linked. The link feature uses a special power-summing bus that lets you set up multiple combinations of master/slave links.

The 2U rack-mount ACP-8 is a more conventional device than the DCP-8, as it is controlled by analog, front-panel knobs. Each compressor offers control of threshold (-60 to +20 dB), ratio (1:1 to 20:1), attack, release, and makeup gain (±20 dB), with selectable soft or hard knee. You can set attack and release curves manually or just use a preprogrammed curve. A sidechain is provided on each channel. An 8-LED ladder indicates gain reduction. The gate has a key input on each channel, a fast (<50 µs) attack time, and variable threshold, release time, and attenuation range.

The ACP-8's frequency response is rated at an impressive 10 Hz to 50 kHz (±0.5 dB). Its S/N ratio is rated at >92 dB and THD at <0.02%. PreSonus; tel. (800) 750-0323 or (504) 344-7887; fax (504) 344-8881; e-mail presonus@presonus.com; Web http://www.presonus.com.

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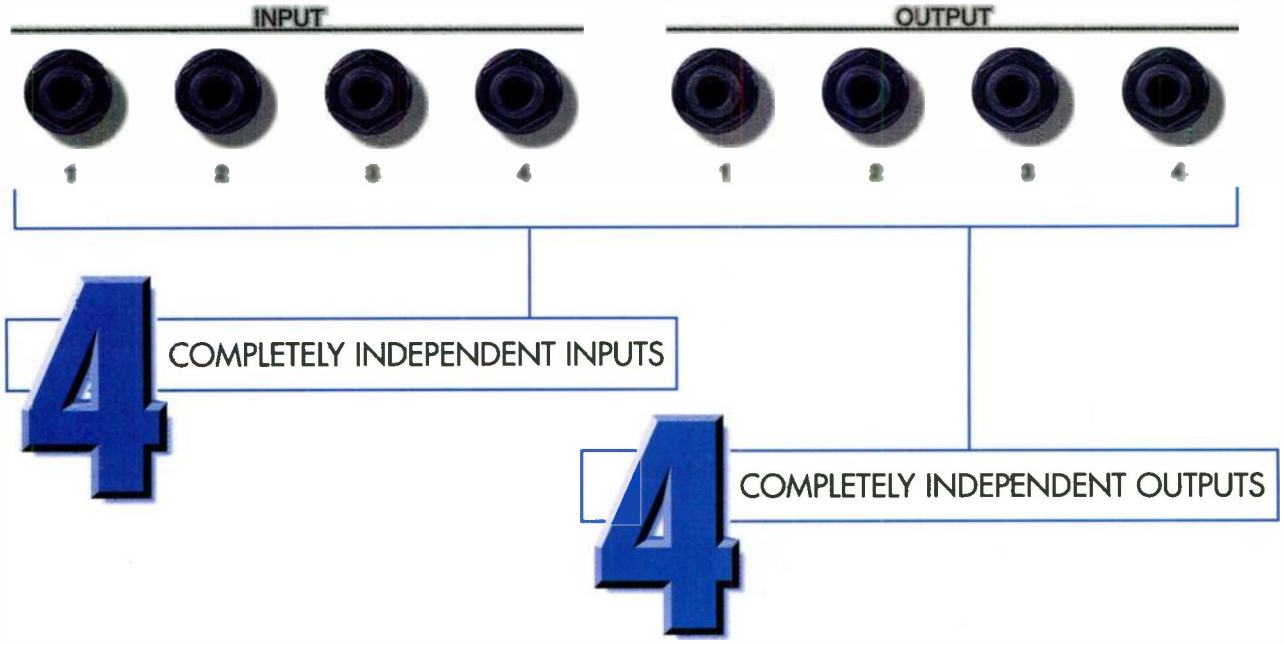

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JUICE GOOSE RACK POWER 320

Ground loops usually cause hum in your audio system, which can really ruin your day. Juice Goose's Rack Power 320 AC ground-loop control system ($329) helps eliminate this problem by supplying a front-panel ground-lift switch for each of its ten rear-panel AC outlets. The switch disconnects the third pin that carries the AC ground for that circuit, eliminating loops caused by having two paths to ground. A ground-fault interrupt circuit terminates all current to the unit if it detects unsafe levels of ungrounded power.

The 1U rack-mount unit also provides current-overload protection, 3-way spike protection (but not line regulation), a connector for a front-panel lamp, and a multistage AC line filter to eliminate RF and electromagnetic interference. Juice Goose; tel. (713) 772-1404; fax (713) 772-7360.

Circle #404 on Reader Service Card

DIGITECH VTP-1

Acknowledging the ascendancy of digital recording, DigiTech released the VTP-1 ($999.95), which combines a tube mic preamp, tube line preamp, 4-band EQ, and 18-bit A/D converter in a 2U rack-mount package. When used with line-level signals, it acts as a tube DI box so you can warm up the sound of your instrument and route it direct to a multitrack recorder, bypassing the mixer.

The dual-channel tube preamp uses a high-voltage, 12AX7 tube-based input circuit with front-panel gain and trim controls. Each side has its own phase-reverse switch, 20 dB pad, defeatable 48V phantom power, and mic/line input switch. A large, illuminated, analog VU meter indicates levels, and a red clip LED warns of transient peaks.

The EQ has fixed high (15 kHz) and low (80 Hz) shelving bands and two sweepable mid bands. The low-mid band has a 6-octave range, from 50 Hz to 3.2 kHz. The high-mid band ranges over five octaves, from 500 Hz to 18 kHz. You also get a defeatable, 75 Hz, 12 dB/octave low-cut filter to eliminate mic-handling noise and rumble. The entire EQ can be bypassed independently for each side.

The VTP-1 has both XLR and ¼-inch analog inputs and outputs. An optional transformer-balancing circuit (price tba) that replaces the electronic balancing stages is also available.

But what really sets this box apart is that, along with its many useful analog features, it has onboard 18-bit analog-to-digital converters and simultaneously available AES/EBU and S/PDIF digital outputs (on XLR and RCA connectors, respectively). The unit's sampling rate is selectable between 44.1 and 48 kHz. A balanced ¼-inch, post-EQ send/return loop is provided for inserting external effects processors.

DigiTech rates the unit's frequency response at a spectacular 15 Hz to 300 kHz (+0/-1 dB), signal-to-noise ratio at <100 dB (A-weighted), and THD at 0.02%. DigiTech; tel. (801) 566-8800; fax (801) 566-7005; Web http://www.digitech.com.

Circle #405 on Reader Service Card

ELECTRO-VOICE RE1000

If you want to record pro-quality audio, you can't beat a condenser microphone, and Electro-Voice makes some of the best. One of E-V's latest prizes is the RE1000 ($995), an externally biased, high-voltage, true condenser (not electret condenser) microphone. The microphone offers a supercardioid polar pattern and features transformerless circuitry designed to minimize low-frequency distortion and susceptibility to induced hum.

The mic can operate at full efficiency on phantom-power levels between 12 and 48 VDC. A defeatable, 12 dB/octave filter rolls off frequencies below 130 Hz.

The diaphragm is made of an ultrathin, low-mass, gold laminate and is midsized so as to combine the high output of a large-diaphragm mic with the superior transient response and pattern control of a small-diaphragm mic. According to E-V, matched pairs are unnecessary because the RE1000's ceramic backplate and assembly design minimize unit-to-unit variability.

The RE1000 can handle levels up to 130 dB SPL. E-V rates the mic's frequency response at 70 Hz to 18 kHz (±3 dB). A swivel-mount stand adapter is included. The mic accepts E-V's model 325 shock mount (optional, price tba) and Wind Tech's model 20/421 external windscreen (available separately from Wind Tech). Electro-Voice; tel. (800) 234-6831 or (616) 695-6831; fax (616) 695-1304.

Circle #406 on Reader Service Card

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Sweetness... you can taste it with the increased 'air', detail, warmth and presence of the award-winning, patented Tubessence® true vacuum tube circuit. Naturally sweet tube sound without any false additives or bitter aftertaste to cloud your music. Packaged with unique, fully parametric equalization, you can use the Model 109 as either 2 channels of 2 band EQ to 'warm up' tracks or to sweeten the entire mix. Or use as 1 channel of 4 band EQ to fix problems that your mixer or graphic EQ can't solve. And when you realize how little you paid for all this power...well, that's the sweetest thing of all. The Model 109 - go ahead, take a bite!

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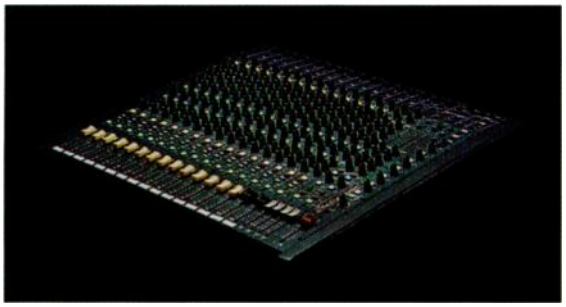
▼ STUDIOMASTER TRILOGY TR206

One of the many great advances in the last few years has been the ever-dropping price and increasing quality of small and midsized mixers. Studiomaster has furthered this cause with its new Trilogy 4-bus boards, including the 12 × 4 × 2 × 1, rack-mountable TR166 ($1,195) and the 16 × 4 × 2 × 1 TR206 tabletop model ($1,395).

Studiomaster calls the last two channels Mon:Ster channels. These channels have simultaneously available mono mic and stereo line inputs, hence their name. The two inputs have separate trim controls but share a channel fader. The Mon:Ster channels' EQ can be assigned to either input.



The Trilogy can be expanded with the TR140EX ($795), which offers eight full-featured channels with mic/line inputs and two Mon:Ster channels. It is designed primarily for sound-reinforcement applications. Alternatively, you can add the 32-input TR302EX (price tba), which is designed for recording. Either rack-mountable expander attaches via the manufacturer's proprietary TriLink system, which uses a 25-pin D-sub connector.

Balanced XLR mic inputs with phantom power and ¼-inch line inputs are provided on all channels. Channel, group, and master L/R bus levels are controlled via 60 mm faders. Each channel has a direct out, PFL/in-place solo, 100 Hz highpass filters, and peak and overload LEDs. Insert points are provided on all channels, the subgroups, and the main stereo bus. A pair of 12-segment, 3-color LED ladders display the levels.

The 3-band channel EQ features sweepable mids (350 Hz to 6 kHz, ±15 dB). The high shelving band's threshold is set at 12 kHz and the low shelving band is set at 60 Hz.

There are six balanced channel aux sends (each switchable pre/post-fader). A Stage Mode switching feature lets you route auxes 1 to 4 to the four subgroups so you can use the Trilogy as a stage monitor mixer. In this mode, auxes 5 and 6 are still available as regular sends, and you can use the L/R main outputs for side fills, in-ear monitors, etc.

The main, subgroup, and aux outs are on balanced ¼-inch connectors. The main L/R and mono (sum) outputs are also provided on XLRs. You also get control-room outputs, headphone outs, four stereo aux returns (three are balanced and two feature 2-band EQ), and 2-track inputs and outputs. Two aux returns are assignable to aux sends 5 and 6.

Studiomaster rates the Trilogy's frequency response at 20 Hz to 20 kHz (+0/-0.3 dB). Total harmonic distortion is 0.008% (@1 kHz), and mic equivalent input noise is -129 dB. Studiomaster; tel. (714) 524-2227; fax (714) 524-5096; Web http://www.studiomaster.com.

Circle #407 on Reader Service Card

▶ TASCAM M1600

TASCAM's new M1600 Series mixing consoles have been designed specifically for users of modular digital multitrack recorders such as the company's popular DA-88. The 8-bus boards are available in 16-channel and 24-channel configurations ($1,699 and $2,199, respectively).

The M1600 includes balanced ¼-inch TRS line inputs on all channels. Balanced XLR inputs with mic preamps and phantom power are provided on channels 1 to 8, and the optional MA-8 ($450) adds eight more mic preamps with XLR inputs in 8-channel blocks. Every channel has an insert point, in-place solo, PFL monitoring, and mute as well as a signal-present/overload LED.

The 3-band channel EQ includes sweepable mids (100 Hz to 10 kHz, ±16 dB). The high shelving band's threshold is set at 12 kHz and the low shelving band is set at 80 Hz. You get 100 mm faders for the channels, subgroups, and main stereo bus.

There are four mono aux sends, one stereo aux send, and four assignable, stereo aux returns. With the M1600's Selectable Monitor feature, you can enable aux sends 1 and 2 to act as the monitor controls for the tape returns during tracking. At mixdown, when the tape returns are controlled by the faders, Selectable Monitor enables aux sends 1 and 2 to act as a pre/post-fader (switchable) stereo effects send. In addition, you can use these auxes to control live inputs.

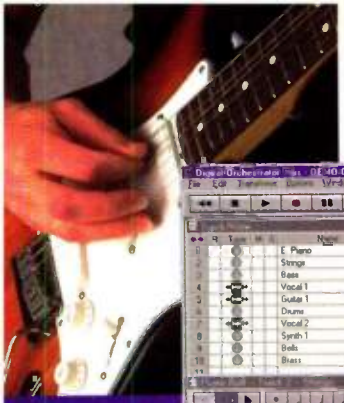
All unbalanced and balanced tape returns are on 25-pin D-sub connectors, which are switchable in 8-channel blocks. DB-25 connectors are also provided for the group/direct outs.

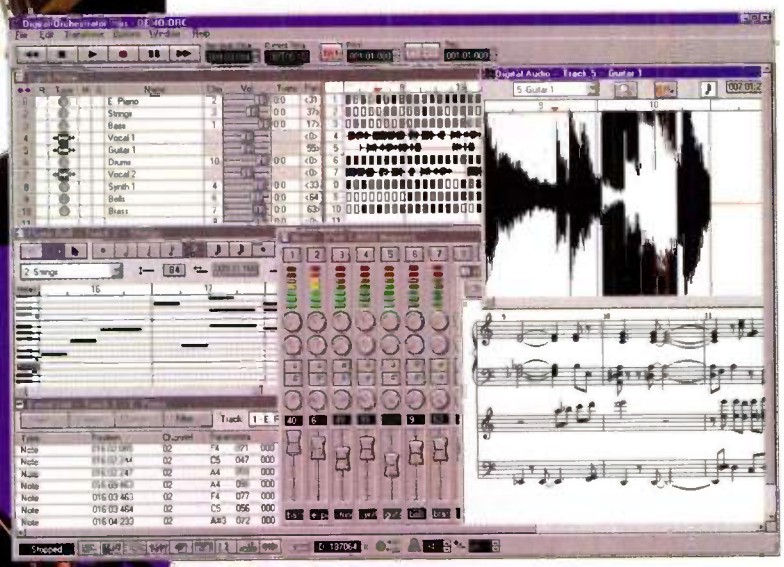
You can switch between monitoring the L/R stereo bus, aux 1/2, and the 2-track input. A Mono switch lets you check for phase problems and mono compatibility. The board includes LED level meters for the channels/groups and master L/R bus. However, you can get even better metering with the optional meter bridge (16-ch. $500, 24-ch. $650).

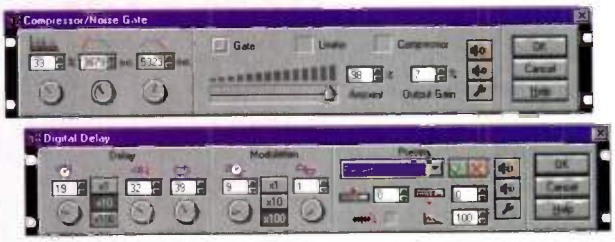
TASCAM rates the M1600's frequency response at 20 Hz to 25 kHz (+0.5/-1.5 dB) and crosstalk at >90 dB. THD is <0.006%. TASCAM; tel. (213) 726-0303; fax (213) 727-7656; faxback (800) 827 2268.

Circle #408 on Reader Service Card

Awesome Features!







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▼ GOLDSTAR PROCYON PRO

The heart of most MIDI studios is the sequencer, so when shopping for a new one, you should take your time and choose carefully. One of the newest candidates for Windows users is Goldstar's *Procyon Pro* ($389), which supports up to 100 tracks and multiple MIDI ports. The software is bundled with MIDI Art's GS-1000R General MIDI/GS-compatible sound module.

Procyon Pro can sync as master or slave using MIDI Clock or SMPTE/MTC. The program features pattern-based recording with a resolution of 720 ppqn. Data can be recorded in real time (including SysEx) or entered in step time, and the program lets you filter incoming MIDI messages. It has tape deck–style transport controls and piano-roll and event-list editing. You can view your music in standard notation and edit it via click-and-drag in the Score Editor window. Tempo and key changes are edited in the Conductor window. A 16-track Mixer window allows you to control Volume, Pan, solo, and mute, along with two selectable Control Change messages.

In addition to the usual cut, copy, paste, undo, and redo editing, the program lets you transpose notes and tracks, reverse notes, extract and merge patterns, and edit Velocity, Aftertouch, and Control Change values. A Timing Changes feature alters the duration of selected notes or an entire track. The product provides quantization by percentage, but not Groove Quantize. It allows you to print parts but not entire scores.

Procyon Pro has a dedicated Drum Editor window with a grid layout reminiscent of the grid display in some drum machines. Drum-hit Velocity can be edited, and color codes indicate Velocity ranges. The Drum Editor is preprogrammed with the mappings of all eight GM kits. Speaking of General MIDI, *Procyon Pro* lets you select GM patches by name.

The program runs on a 16 MHz 80386 or better PC with 2 MB of RAM (4 MB recommended) and Windows 3.1 or later.

The 24-voice GS-1000R sound module has 128 GM sounds, 128 additional sounds, and eight drum kits. Its effects processor offers four reverbs, two delays, rotary-speaker emulation (fast and slow), chorus, flanger, and distortion. The sounds cannot be edited, but the effects can.

In addition to its MIDI ports, the GS-1000R has a serial interface that supports both Macintosh and PC computers. A stereo pair of RCA inputs lets you mix the module's sound with audio from an external source. The audio outputs include a ⅛-inch headphone jack and a pair of line-level RCA outputs. Power is via a 12 VDC external supply. Music Industries Corp. (distributor); tel. (800) 431-6699 or (516) 352-4110; fax (516) 352-0754; e-mail fatar@aol.com; Web http://www.musicindustries.com.

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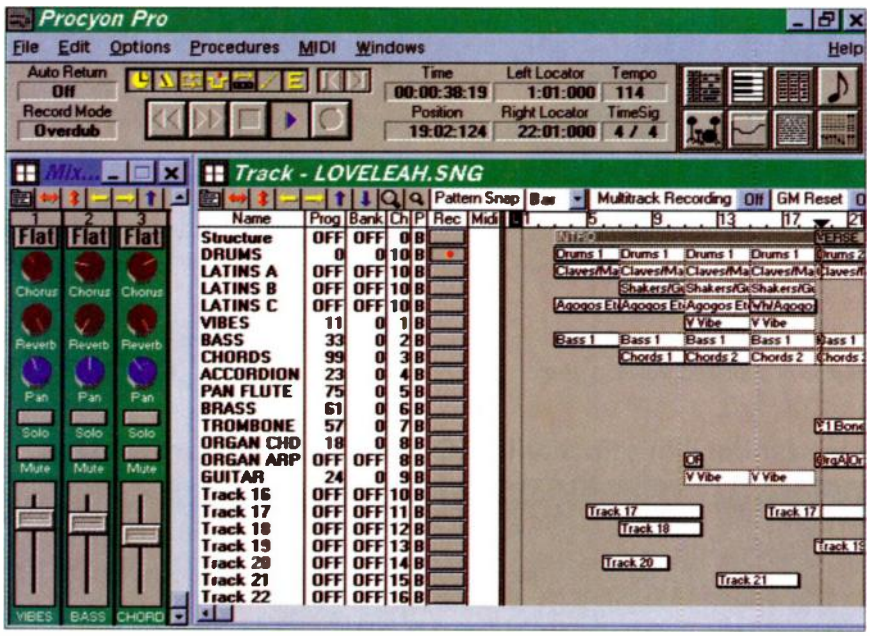

▲ MICROTECH GEFELL MD 100

Known for its high-quality condenser mics, Microtech Gefell announced its first moving-coil dynamic mic, the MD 100 ($375). The cardioid mic was codeveloped with fellow German manufacturer Microphone Technique Leipzig, an established manufacturer of dynamic microphoness.

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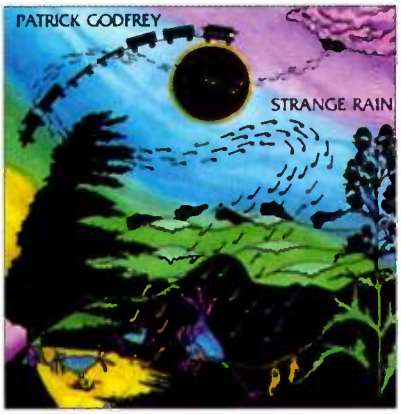

PRO FILE

Tunesmith

Patrick Godfrey forges an ambient new world.

By Diane Lowery

Patrick Godfrey has gone from creating pieces using a grand piano, a double-manual harpsichord, and a marimba to working with a pile of black boxes, computer equipment, and cables. Although he admits all this gear drives him crazy, it lets him combine improvisation, composition, and musical notation so that everything is at hand and in his control. For Godfrey, the boxes have become his instruments, allowing him to integrate the composing and recording processes.

Godfrey has composed scores for television, film, and animation, including the 1995 Academy Award–winning short, *Bob's Birthday*. With his new CD, *Strange Rain*, Godfrey strove to combine melodic, ambient, trance-like instrumentals and lively, humorous, cartoonish pieces to demonstrate a wide range of musical styles.

"I sometimes use pieces that I created several years ago, such as with the song 'Black Moon,'" Godfrey says. "I had created a shifting, irregular rhythm pattern, and I waited until I found the right bell sounds to use with it. I added an electric-bass part that gently shifts across the rhythm. Then I improvised a solo with a trombone sound and a more lyrical melody with an English-horn sound. I filled in the background with some wet, splashy electronic cymbals. I wanted to keep the trance quality of the original pattern intact while adding long, winding melodies that create a deep, constantly changing background. It was a process of adding and subtracting until the whole seemed in balance."

Godfrey creates most of his work on a Macintosh IIci and sequences with MOTU's *Digital Performer*. His sound modules include a Roland JV-1080 and JD-990 and a Kurzweil K2000R, but he still uses an old Yamaha KX88 controller for sketching out ideas.

"I use *Digital Performer* to build up lots of raw material," he says. "I can revisit sequences, find a part I like, then chop it out, and extend it to create a pattern. Any part of any piece can become the seed for a complete composition. For example, 'Spinning' started with an exploration of very fast, repeated note patterns."

However, Godfrey found that the insistent quality of the repeated notes did not give him the feel he wanted. So he cut out the "performed" notes that repeated and used a delay to re-create the pattern with a softer, spacier feeling. "This small segment became the basis for a bed to which I added melodies," he explains. "After that, I went back to the bed, and I added and took out guitars, bass, and other sounds and instruments to help propel the song in its new, softer direction."

For many musicians, making the switch from acoustic instruments to electronic gear can be tough, but the drastic change can open up a wealth of creative possibilities. "Just as it took a great deal of study and practice to become capable of real spontaneity at the piano," says Godfrey, "it took serious labor to organize my MIDI studio to the point that I feel the same sense of connection between playing and composing. Music is the thought behind the sound. Art isn't about tools and technique but about ideas."

For more information contact Apparition Music, 10885 Madrona Dr., RR1, Sidney, BC V8L 5N9, Canada; tel. (604) 656-8879; e-mail appmusic@islandnet.com; Web http://www.islandnet.com/~appmusic.

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Illustration by Erika Luikart

By Michael Molenda

SQUEEZE BOXES

Three tube compressors—and one WACKY solid-state model—**flex** their muscles to deliver a vintage PUNCH.

If I were a wrestler, I'd want to be called "The Crusher." This appellation has nothing at all to do with my laughable physique, pitiful strength, or nonviolent nature; it's just something I like to do to audio signals. You see, I'm a compression addict.

I squash guitars until the sound rips the hair from your eyebrows at ten paces, and I pulverize basses until the low end rattles your rib cage. I work vocals until whispers seem to dance seductively in your ears and screams slap you in the face. Nothing escapes me. Drums are compressed until they wallop, saxes until they wail, and upright pianos until they, well, *rock*. This compression obsession is a real sickness, but thanks to the multitude of excellent compressors on the market, I can at least rest easy knowing that my tracks never sound flat and boring.

Alas, it seems that a cure for this little disorder will be a long time coming because more and more manufacturers are producing tube compressors to exploit the retro-audio craze. I have no beef with that, but do these tubular dynamics processors *really* deliver warm, fuzzy, vintage-sounding compression?

For a reality check, we did a comparison test of three current models—Aphex's 661 Expressor, Bellari's RP282 Dual Tube Compressor/Limiter, and TL Audio's C-2021 Valve Compressor—that fell within a project-studio budget ($600 to $1,395). And just to make things interesting, we also tossed in the Fletcher ElectroAcoustics Joe Meek SC-2, an expensive ($1,999) solid-state ringer that carries a fine pedigree for vintage crunch. Our main objectives were to evaluate the pros and cons of each of these signal crushers and to determine whether tubes actually enhance sonic performance.

COSTUME CAPERS

As far as fashion concerns go, the field was split into two distinct camps. The Bellari RP282 and the Joe Meek SC-2 keep up a vintage appearance, and the Aphex 661 and the TL Audio C-2021 present modern, streamlined profiles.

Of the bunch, the Joe Meek SC-2 is definitely the stunner. A rich, lustrous green exterior that wouldn't offend a Rolls Royce is accessorized with huge black knobs and a large VU meter, creating a sophisticated yet funky look. The Bellari RP282 maintains an understated, classy air, with its brushed-aluminum faceplate and symmetrical arrangement of black knobs, silver buttons, and dual VU meters. Both units are sturdy and well built—even the knobs and buttons feel tight—although the RP282's VU meters are a tad flighty. The needles tended to bounce around indiscriminately, regardless of the level of input signal or whether Output or Gain Reduction metering was selected.

The Joe Meek is kind of an operational iconoclast, so its parameter controls are not labeled as one might expect. You don't get markings for decibels, ratios, or milliseconds, you get numbers. (And, yes, some of them go up to 11!) The RP282 displays conventional parameters, but finding a specific range can be tricky. For example, the Ratio knob shows only four settings—2:1, 4:1, 5:1, and ∞:1—and these values are spaced *equal* distances apart. If you asked me to dial in a 10:1 compression ratio, I could only hazard a guess at where I should set the knob.

On the Aphex and TL Audio mod squad, the TL Audio C-2021 is definitely the ace face. A striking, indigo blue front panel offers up a sleek, uncluttered layout of control knobs, buttons, and LED meters for each of the C-2021's two channels. Unfortunately, like the RP282, some parameter values are not clearly marked. The C-2021's Ratio controls are simply identified as "Min" and "Max," and the only Threshold ranges shown are the extremes: -20 dB and +20 dB.

The Aphex 661, on the other hand, has extremely helpful, detailed parameter markings. For example, the 661's Ratio knob is stepped off in the following increments: 1.0, 1.3, 2, 2.5, 3, 4, 5, 6, 7, 10, and 30. No problem finding a 10:1 ratio here.

Appearance-wise, the 661 is no slouch, either. The unit wears the blue-gray colors of the company's Tubessence family, and its many control knobs and buttons are sensibly arranged into parameter sections. A way cool feature is the 661's dual LED metering that lets you monitor audio level (input or output) and gain reduction simultaneously.

All of the compressors offer XLR and ¼-inch inputs and outputs and, excepting the Joe Meek SC-2, every model has a sidechain dedicated to each channel. (For more specifications, see the chart "Squeeze Plays" on p. 40.) Something else that all the compressors shared was an annoying pop or crackle that occured whenever the bypass (or compression in/out) switch was toggled to compare processed and unprocessed signals.

The Joe Meek SC-2 by Fletcher ElectroAcoustics is simple, quirky, and absolutely brilliant.

IN THE RING

Thanks to the kindness of the manufacturers, I was able to live with all four compressors for approximately two months. This luxurious timeline allowed me (and my cohorts at Tiki Town studios) to record and mix four album projects, a multimedia score, and various song demos. In addition, we did full tests on both the balanced XLR and unbalanced ¼-inch I/O on every machine.

The studio tests were instructive because engineers started to select certain models for a particular sound or application, and overall allegiances to one unit or another were formed. Obviously, all opinions were culled for this face-off. In addition, I booked four sessions so I could work intimately with each compressor individually. Here's how these signal wrestlers performed against a variety of opponents.

TL Audio's C-2021 Valve Compressor is silky smooth, even at brutal threshold and ratio settings.

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APHEX 661

The 661 packs enough artillery to deal with just about any signal you throw at it. In addition to conventional compression controls, you get a Spectral Phase Refractor that phase-aligns bass frequencies (up to 150 Hz), a handy Auto switch for when you want the 661 to decide how to process signals, a soft-knee switch to activate a gradual onset of compression (at the selected threshold), a low cut for the sidechain input, and a high-frequency expander that puts back the shimmer often lost at high compression settings. This near-ultimate level of audio control made the 661 the box of choice when a sonic challenge (such as a lifeless snare track invaded by tons of hi-hat and kick-drum bleed) jumped into the fray.

Vocals. The 661 delivers such pristine, detailed compression that the ambience of the space where the vocals were recorded always became a prominent element of the source sound. Such dimensional articulation and transparency made the 661 a "given" for producing clear, shimmering vocals. In addition, the high-frequency expander allowed me to crush vocals at a 15:1 ratio and a -20 dB threshold without surrendering intelligibility. The 661 may be one of the hippest balms for the human voice since tea and honey.

Electric bass. The Spectral Phase Refractor (SPR) earned my respect after it erased the muddy lows from a sloppily finger-picked performance. Otherwise, the 661 treated basses with a smooth, tight compression that added "whomp" without losing snap.

Guitars. The 661 produced a clear, tight sound on both electrics and acoustics, but the timbre was a little too polite for my taste. Here's an embarrassing admission: when processing guitars, the 661's Auto function always produced a cleaner, sharper tone than my manual tweaking.

Mono drum submix. When mixing, I often fade a monaural drum submix under the level of the main channel mix to add more of a slammin' impact to the tracks. For this application, the 661 was brilliant, producing a crystal-clear sonic picture with snap and bite. The marvelous SPR clarified kick-drum and tom resonances until they roared. My only complaint was that cymbal crashes leapt uncomfortably out of the mix.

BELLARI RP282

The RP282 is a meat-and-potatoes type of processor that will not bind you to a learning curve or interfere with rapid adjustments. It is what it is, as my former production partner, Neal Brighton, would say.

Vocals. Remember those old Otis Redding records on which he'd let loose and you'd hear the compression trying valiantly to rein him in? That's the sound of the RP282 when it's processing vocals. The insistent pumping and breathing mar an otherwise warm and harmonically rich timbre.

Electric bass. What a boom! The RP282 delivers a warm, swooping low end that was pretty darn close to Paul McCartney's bass tone on *Rubber Soul*. Midrange frequencies were somewhat muted, and some pumping remained audible on hard plucks, but I gladly accepted these compromises in the face of the RP282's big ol' bottom.

Guitars. Although the pumping and breathing were still audible on electric- and acoustic-guitar tracks, the RP282 produced, once again, a nice 1965 Beatles timbre. The mids were appropriately sharp and cranky, which made the RP282 a good choice for "vintage" guitar sounds.

Mono drum submix. This was not a graceful encounter. No matter where the compression parameters were set, the sound flapped, splattered, and popped. As a result, much of the drum kit's articulation was lost. The RP282 may work for intentionally trashy drums—such as the ugly percussion favored by producers T-Bone Burnett and Brian Eno—but for more organic applications, it's a washout.

JOE MEEK SC-2

Due to its lack of conventional controls, the Joe Meek defies you to get tweaky. For example, there are no Ratio or Threshold parameters, only Slope, Compression, and a series of numerical values. Huh? The cheeky instructional

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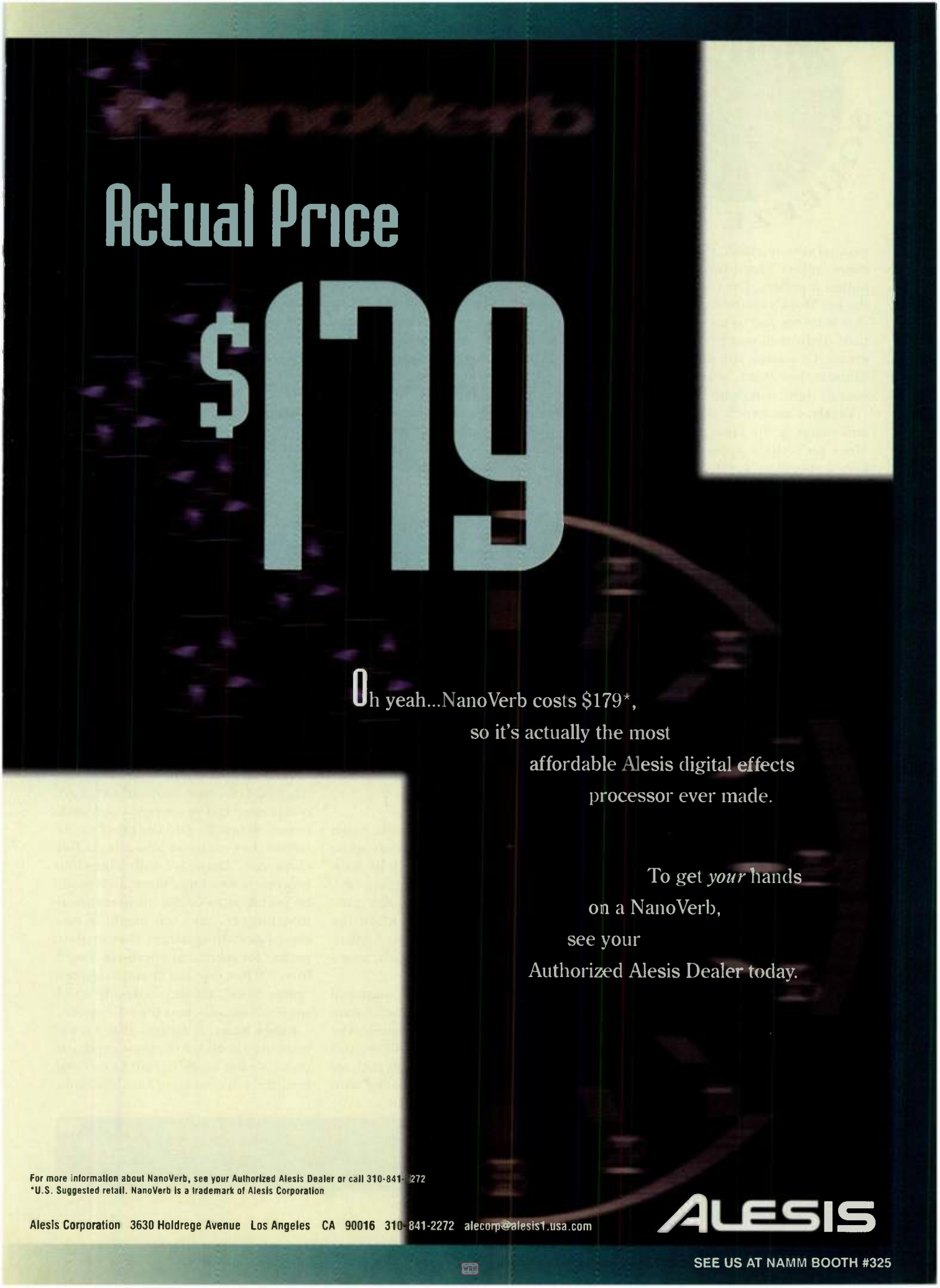
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manual says, in effect, that if you want more "effect," turn the knobs to the higher numbers. The cool thing about the Joe Meek's unabashed simplicity is that it forces you to mess around and twist dials until you get a happening sound. Of course, the tortured genius himself, Joe Meek, often said, "If it sounds right, it *is* right." I agree.

Vocals. Can a vocal tone be sensual and savage at the same time? The Joe Meek pulls these apparent opposites into a stunning aural collaboration. Vocals sounded warm and smooth while also smashing against the soundstage with awesome ferocity. I loved it.

Electric bass. We're talking about a mammoth vintage pump here, with outstanding midrange articulation and a fat, chunky low end. Eighth-note pedals had a chugging, relentless quality, and single-note runs were crystal clear.

Guitars. *Heaven.* The Joe Meek forged *the* guitar sounds for every project I've produced since it arrived for review. The box delivers kick-butt impact, aggression, and detail. And the sparkle it brought to acoustic-guitar tracks left me breathless.

Mono drum submix. The Joe Meek reproduced drum tones with remarkable clarity and punch. In addition, all of the tonal relationships were dead even: crash cymbals did not pop out of the mix, and the hi-hats did not overwhelm the snare.

TL AUDIO C-2021

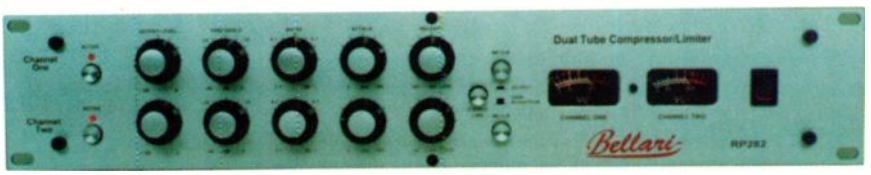
Like the RP282, the C-2021 invites you to get right to work. There's nothing out of the ordinary to suss out, and you even get a convenient perk: a front-panel, ¼-inch instrument input.

Vocals. For the most part, the C-2021 embraced vocals with a smooth and sensual-sounding compression. However, if the performer belted Ethel Merman–style, some honking in the low mids would appear, along with a little high-end grit.

Electric bass. The rear panel, ¼-inch inputs on the review model did not like bass. The signal was so edgy and distorted that it was rendered unusable. When the XLR I/O was employed, the distortion disappeared and the bass sound was warm and robust—becoming especially rich in the 250 Hz range.

Guitars. I had a hard time dialing in suitably tough compression settings without accentuating low-level buzzes and other dirty doggies. Light compression settings added a sexy sheen to acoustic guitars, but the C-2021 wasn't the box for nasty electric tones.

Mono drum submix. The C-2021 served up a clear, organic picture of the drum set. Although the snap of the snare was more pronounced, the processed sound wasn't much different from the unprocessed track. Heavier compression settings brought up the low-frequency content somewhat, but the overall tonal spectrum remained balanced and transparent.



Bellari's RP282 Dual Tube Compressor/Limiter emulates a vintage crunch.

TRICK MOVE

Now, does a tube compressor actually sound warmer—or exhibit more sonic personality—than a quality solid-state model? During this comparison test, finding a definitive answer to that question was tough, especially when the solid-state Joe Meek sounded more blissfully colored than its tubular counterparts. What's the deal?

To gain more insight, I compared the tube machines to some solid-state models in my processing arsenal: the dbx 166A, the PreSonus DCP-8, and the Focusrite Red 3. Although each individual compressor was loaded with personality, I couldn't say that the tube models sounded any warmer, tougher, or funkier than the tubeless processors. In an extremely subjective evaluation, I rated each compressor on its ability to infuse signals with warm, aggressive, "vintage" coloration. Here's the pecking order: Joe Meek, 166A, RP282, C-2021 and DCP-8 (tie), 661, and Red 3.

The RP282, in all its overkill glory, was the only tube compressor that evoked the fat, musically fuzzy sound of authentic tape coloration. Even so, I could dial in the same vintage punch with more clarity and impact using the Joe Meek or the 166A. I'm not slamming the tube compressor tribe here, I'm just stating that you shouldn't purchase one of these devices with the express goal of "heating up" signals. If you want a conspicuous burn factor on your tracks, record everything with a high-caliber tube mic preamp or lay your sounds down on analog tape.

CHAMPIONSHIP BELTS

This face-off proved to be of monumental, Ben Hur–type proportions. Each compressor had its strengths and weaknesses, depending on the job it was assigned, but each was also a bona fide champion. These are truly marvelous processors, and I dug them all. It would be pointless to crown an overall winner, however, as each machine possessed certain qualities that made it perfect for specific applications. Therefore, I'll just rate the champs on their "game faces" and let you decide which sonic personality best fits your needs.

Kubla Khan. It figures that I'd fall head over heels for the most expensive unit (bye-bye budget!), but I can't stop myself from obsessing over the sonic

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1995 NOMINEE

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punch of the Fletcher ElectroAcoustics Joe Meek SC-2. It simply made everything sound gosh darn amazing. The Joe Meek enhanced the crystalline harmonic structures of electric and acoustic guitars while making them sound loud and proud. I was totally blissed out. In addition, processed vocals were clear and present, drums walloped and raged, and basses thumped with aggressive conviction.

Of course, the Joe Meek is best employed when you want to use compression as an effect, because it definitely colors the source sound. In a strange twist, given its distinctive coloration, the Joe Meek delivered the cleanest audio of the models tested. Audible hiss was practically nonexistent.

Obviously, at $1,999, the Joe Meek SC-2 will appeal to only the most capitalized, serious recordists amongst the **EM** readership. But if you can afford the unit's extremely stiff price tag, the sonic rewards are tremendous. This is a wonder box. Bless you, Joe Meek, wherever you are.

Doc Octopus. The Aphex 661 Expressor is loaded with so many features that it should be filed under "Compressors: The Next Generation." But the 661 is not just a box o' many goodies, it also happens to sound spectacular.

This is an extremely transparent compressor that delivers almost clinical audio quality. Processed signals were very clear and present, regardless of how hard the 661 crunched them. Such precision was beneficial when compressing vocals and drums because minute ambient details were audible enough to add dimension to the source sounds. The downside to this clarity is that poorly recorded tracks (or instruments tracked in less-than-ideal acoustic environments) may sound worse when every sonic element is brought front and center. Some audible hiss was apparent when the 661 was doing its thing, but the noise wasn't objectionable.

The 661 is a single-channel unit, so you'll need two to do stereo processing. Although twin 661s will cost approximately $1,500, that's certainly a fair price for a stereo compressor transparent enough for home-mastering use. After all, now that affordable CD-Rs provide desktop studiophiles the option of making their own CDs (see "Burn, Baby, Burn!" in the June 1996 **EM**), it makes sense to have some critical mastering tools available. The 661 definitely has the sonic chops to add crystalline punch to a stereo master *and* smash some ferocious sense into a lone guitar track.

The Peacemaker. TL Audio's C-2021 Valve Compressor caresses signals in a velvety embrace. Compression remains lush and smooth from a light hug (a 2:1 ratio at a 0 dB threshold) to a spine-cruncher (a 20:1 ratio at a -15 dB threshold). This doesn't mean that the C-2021 sounds like a marshmallow, just that it produces a refined coloration that is less aggressive than the other models.

The mellow mood was only broken during ripping guitar passages and dynamic vocal crescendoes. In these instances, the C-2021 was prone to exhibit a slight grittiness. I usually considered

Squeeze Plays

	Aphex 661	Bellari RP282	Fletcher ElectroAcoustics Joe Meek SC-2	TL Audio C-2021
Threshold	-30 dB to +20 dB	-40 dB to 0 dB	nonspecific	-20 dB to +20 dB
Ratio	1:1 to 30:1	2:1 to ∞:1	4.5:1 to 7:1	1:1.5 to 30:1
Attack Times	.05 ms to 100 ms	.5 ms to 100 ms	1.5 ms to 10 ms	0.5 ms or 20 ms
Release Times	.04 sec to 4 sec	100 ms to 500 ms	nonspecific (fast to slow)	40 ms or 2 sec
Gain Control	input and output	output	input	input and output
Channels	1	2	2	2
Meters	LED (input or output level and gain reduction)	VU (output or gain reduction)	VU (gain reduction)	LED (output level or gain reduction)
Main I/O	XLR and ¼" (balanced or unbalanced)	XLR (balanced) and ¼" (unbalanced)	XLR and ¼" (balanced)	XLR (balanced or unbalanced) and ¼" (unbalanced)
Sidechain I/O	¼" send and return (unbalanced)	¼" send and return (unbalanced)	n/a	¼" TRS insert (unbalanced)
Tube Type	12AT7 dual triode (1)	Rolls 7025 (2)	n/a	ECC83/12AX7 (2)
Rack Profile	1U	2U	2U	1U
Cool Extras	Spectral Phase Refractor, auto or manual operation, soft-knee switch, sidechain low cut, high-frequency expander	no frills	no frills	¼" instrument input on front panel with high/low gain switch
Price	$749	$600	$1,999	$1,395

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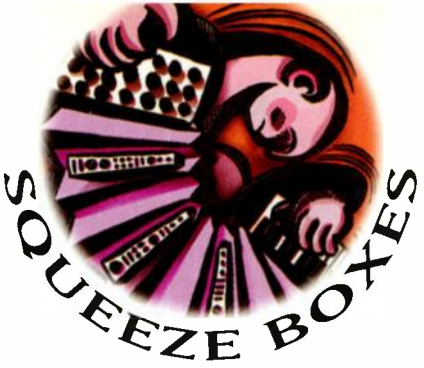

the C-2021's increased sizzle a "gift," as it fattened up the harmonic content of the source sound (although the buzz proved too obtrusive for subtle applications). Audible hiss was pretty subdued, but the noise floor increased with higher ratio and threshold settings.

Speaking of parameters, specific settings can be difficult to pinpoint because the C-2021's controls do not mark off incremental values. The only other operational bummer was that the -10 dBu, unbalanced I/O on the rear panel produced an ugly, splatting distortion on bass-intensive signals. When the +4 dBu I/O was employed, the distortion magically disappeared.

These quibbles aside, the C-2021 is a sensuous compressor that cradles, rather than pummels, signals. A cappella vocals, solo flute, and other delicate performances were particularly well suited to the C-2021's charms. The C-2021 isn't all peace, love, and understanding, but the other three combatants produced more aggressive tones when processing "impact" instruments such as electric guitars and drums.

The Ruffian. The Bellari RP282 Dual Tube Compressor/Limiter is like a wrestler running amok. It does not surrender, it gives no quarter, and it cannot be stopped from smothering signals in a sonic chokehold. This is both good

MAIN SQUEEZES

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Bellari
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Fletcher ElectroAcoustics/ PMI (distributor)
tel. (310) 373-9129; fax (310) 373-4714
TL Audio/Sascom Marketing (distributor)
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fax (905) 469-1129
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"most people are driven...

Geddy Lee, Rush

by the need to prove something to the people around them or to the public. But after achieving a certain measure of success, that need changes, and is focused more inward. You begin focusing on challenging yourself. I think that as your life changes, what drives you to create changes.

If in fact you decide you still want to have any drive at all... For me, there is no single way a song or musical piece is born. It's hard to trace the path back to that single moment of inspiration. It can be a lyric, or a powerful desire to express an emotion or anger in musical terms, an inspiring visual image, the dramatic arts... Once a musical image forms in my head, I need to get it on tape and run with it, exploit the moment so to speak, until the inspiration has passed, and then another side of the process takes over. That being the art of crafting what raw material you have, slowly and methodically, into a finished piece of music. This becomes the first version of a song. Where it goes from there depends on the strength of the original idea... I find all writing sessions to be highly charged, very creative times – my favorite times, in fact. These are the periods that make the work most worthwhile."

Geddy Lee

and bad. On the good side, the RP282 delivers gloriously over-the-top tube coloration that is reminiscent of the maximum compression on pre-*Tommy* Who records. If you lust after the wallop of late-1960s rock and blues recordings, this is the box to get. On the bad side, this is *not* the box to get if you sometimes prefer a less colored sound.

The RP282 was so rambunctious, in fact, that some pumping and breathing were always present no matter where the Attack and Release controls were set. (Bellari states that the RP282's compression has been "calmed down" on the current models.) Audible hiss was apparent, but not obtrusive, at low compression settings and fairly pronounced at higher settings.

Controlling the RP282's forceful personality took some tweaking—and even at its most well behaved, it never produced what I'd call light compression—so I tended to use it when I wanted to get a certain effect. For example, the RP282 transformed a rather sedate (sampled) Hammond performance into an undulating, sweaty swagger that emulated the sound of Rabbit Bundrick's organ on Free's 1972 classic *Heartbreaker* album. I wouldn't give the RP282 the sole compressor position in my rack, but as a second or third option, it can always be trusted to add some guts to genteel tracks.

SQUEEZED OUT

Whether you use compression as an invasive sound-sculpting process (as I do) or you simply wish to tame performance dynamics as naturally as possible, these Crush Masters make quite a tag team. So, if you want your tracks to really kick and punch, grab the compressor of your choice, pick a spiffy wrestler's alias ("The Squashmeister," "The Pulverizer," etc.), and start stomping all over those audio signals. It's time to rumble!

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The Windows Studio

Customize your PC into the ultimate multitrack hard-disk studio.

By Zack Price

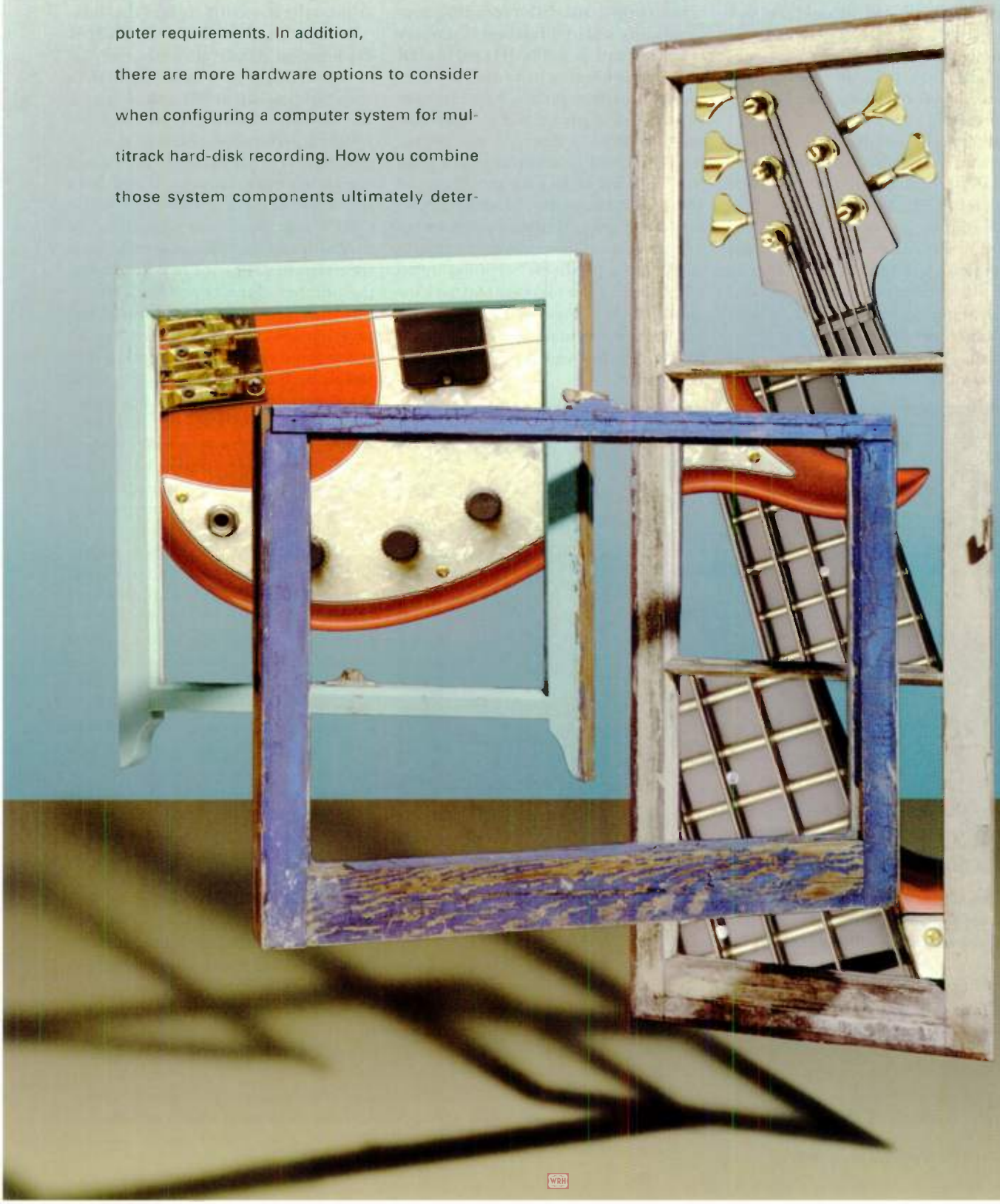
Hard-disk recording programs for Windows have improved dramatically in the last two years. The most obvious improvement is the increase in the number of digital audio tracks you can record with budget software. Most such software programs used to be limited to playing back only a single stereo track. Today, some inexpensive hard-disk recording programs running on fast computers are capable of playing back between twelve and sixteen audio tracks at once.

Another sign of change is the way in which digital audio playback synchronizes to MIDI sequences on the same platform. Until recently, this was only possible by simultaneously running a hard-disk recording program and a separate sequencing program. Steinberg's *Cubase Audio* (see **Fig. 1**) was the first Windows application to offer integrated MIDI sequencing and digital audio, but until version 1.6, it only worked with the pricey Yamaha CBX-D5 hardware box.

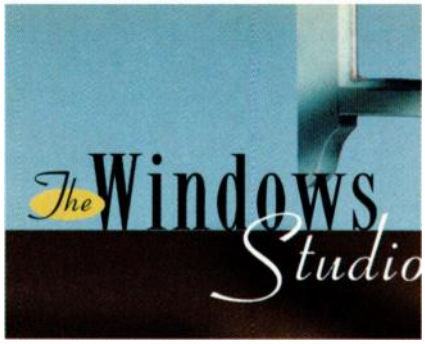
Cubase, *Cubase Score*, and *Cubase Audio* have all been upgraded to version 3.0. All three products can record digital audio with Windows-compatible sound cards. Musicator's *Musicator Audio*, Cakewalk Music Software's *Cakewalk Pro Audio*, and Voyetra's *Digital Orchestrator Plus* digital audio sequencers also support Windows sound cards. Emagic has promised similar sound-card support in its

Logic Audio 2.5.3 for Windows, which should be available by the time you read this.

However, this increased software capability has come at the cost of more demanding computer requirements. In addition, there are more hardware options to consider when configuring a computer system for multitrack hard-disk recording. How you combine those system components ultimately determines the maximum performance levels you can expect to achieve. (If you're unfamiliar with the basics of hard-disk recording for Windows, you should read "Diving into Digital" in the October 1994 issue of EM.)



Photography by David Bishop



GET YOUR MOTOR RUNNING

Digital audio recording programs do more than simply record and play back digital audio. They can also execute real-time changes in volume levels, pan, crossfades, and, in some cases, signal-processing functions such as EQ and compression.

Budget audio editors generally have no dedicated hardware, which forces them to perform these tasks using the computer's CPU. Therefore, these programs require a fast enough CPU to smoothly record and play back digital audio data. A faster CPU is also critical if you want to run other programs (e.g., a sequencer and a patch editor) simultaneously with your digital audio program.

Midlevel and high-end hard-disk recording packages, such as the Spectral Prisma system and Digidesign's Session 8, perform the same chores, but they generally include dedicated DSP hardware to manage these tasks. This takes much of the workload away from the computer CPU, so computer requirements for these types of systems often are less stringent. Even so, you are best off using the fastest computer you can afford. The program will perform more smoothly, and you can more easily run other programs simultaneously. Buying a second computer to handle those tasks can cost more than if you had just purchased a fast system.

For many hard-disk recording programs, the stated minimum computer requirement is a 33 MHz 80486DX CPU. However, minimum requirements usually translate into minimal software performance. For example, an 80486DX/33 machine will probably be limited to recording and playing back up to five or six tracks of 16-bit, 44.1 kHz audio. In addition, you may need to avoid using such features as real-time volume changes to ensure stable track playback. Stepping up to a Pentium 60 can increase playback capabilities. However, to bring out the full potential of many multitrack hard-disk programs, you'll need at least a Pentium 90.

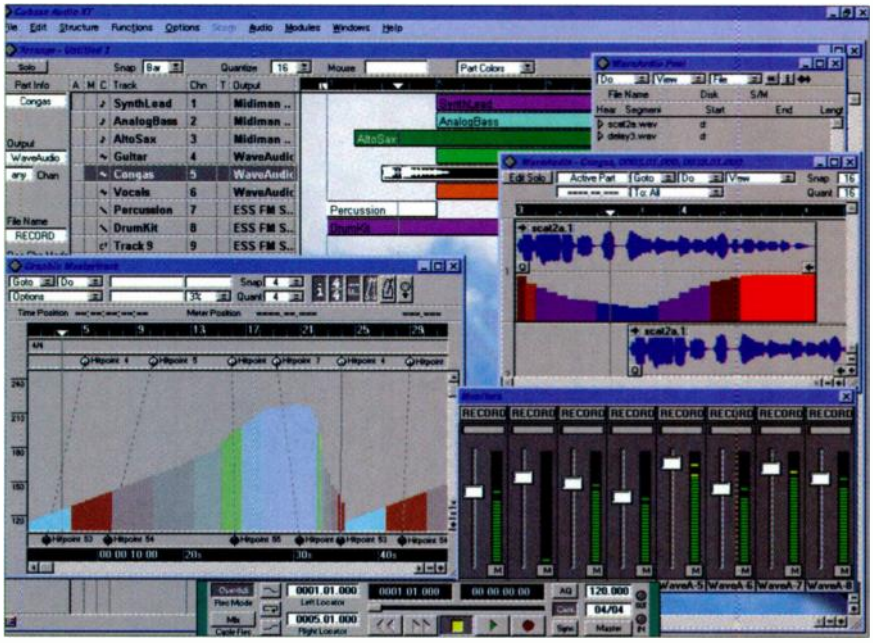


FIG. 1: Steinberg's *Cubase Audio* was the first Windows program to integrate MIDI sequencing and digital audio editing. *Cubase* 3.0, *Cubase Score* 3.0, and *Cubase Audio* 3.0 (shown here) all support digital audio recording with any Windows sound card.

The type of track being played affects overall performance, too. In most multitrack hard-disk recording programs, the tracks are virtual; that is, they consist of information that points to the digital audio data contained in different sound files on the hard drive. A track can refer to a single sound file or smaller sections of sound files that are pieced together as a playlist. A track made up of a single sound file is comparatively easy to play back, as all the information is in one file. However, a composite track constructed of numerous file portions forces the hard drive to work harder (and consequently more slowly) because it has to jump around the hard disk to find the data.

In addition, clock-doubled (DX2) or clock-tripled (DX4) '486s won't be able to record significantly more tracks than their supposedly slower counterparts. There will be a small increase in overall program performance because the real-time data is processed at a faster clock speed, but data transfers to and from the hard drive are handled at the CPU's base speed, not its doubled or tripled speed. As you can see, the base speed is a major factor in determining the number of tracks you can have.

However, dozens of real-world factors limit system performance. For instance, any real-time processing that has to be handled by the CPU slows down overall performance. For example, with my '486DX4/100 and Innovative Quality Software's *SAW Plus* (see **Fig. 2**), I was able to play back nine tracks, each consisting of a single sound file, but without any real-time panning or volume processing. System performance dropped to seven tracks when I added real-time volume and panning.

System performance can also vary from program to program. When I transferred the previously mentioned sound files into *Cakewalk Pro Audio* (see **Fig. 3**), I was able to play eight tracks without real-time processing. Playback dropped to six tracks when I used real-time panning and volume changes that were similar to the settings used in *SAW Plus*. (*Cakewalk Pro Audio* uses MIDI Control Change data to set volume and pan levels for digital audio tracks whereas *SAW Plus* does not.)

THE RAM AND THE SHEEP

Equally important is the amount of RAM installed in your computer. Most software packages state that a minimum of 8 MB RAM is required for proper operation. Once again, though, the minimum requirement isn't really enough to run the program at its maximum capability because many hard-disk recording programs use available RAM to carry out a variety of tasks.

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Mixing Some of our competitors' disk recorders use a portion of their recording LSI to provide mix capability. While this saves money, it can also produce audio artifacts like "zipper" noise when adjusting such critical functions like EQ, pan, and fader level. On top of that, many disk recorders won't even let you make real-time adjustments during mix down, eliminating a critical part of the creative recording process. The heart of the DR mixer is a 16-channel, 24 bit custom LSI designed to provide real-time dynamic digital mix capability. Built-in 99 scene snap-shot automation for all functions and dynamic automation via external MIDI sequencers, combined with 8 or 16 channel 3-band parametric EQ option, ensures that the only limit in the DR Series mixer is your imagination. With its built-in 16 channel mixer, the DR8 becomes the perfect compliment to any 8-track recorder you might currently own. It can mix down its 8 tracks of internal digital audio with an additional 8 inputs from a sampler, tape machine, or a live performance, all in the digital domain. The MT8 mix controller provides a 16 track console format for dynamic remote control of all mix and EQ parameters.

(Monitor/Keyboard/Iomega Drive and Batteries not included.)

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Keyboard Interface To increase the power of SuperView™ even further, we added an ASCII keyboard input to the SuperView™ card, allowing a standard ASCII keyboard to operate as a control interface for SuperView™ equipped DR Series recorders. Function keys will provide the ability to zoom in on a single track, as well as zoom in/out timewise for precise edit capability. All tracks and locate points can be named, allowing you to manipulate and track large amounts of data in a very simple manner. A unique interface has been developed to allow track arming, transport control, and edit functions directly from the keyboard, providing enhanced productivity through an intuitive human interface design.

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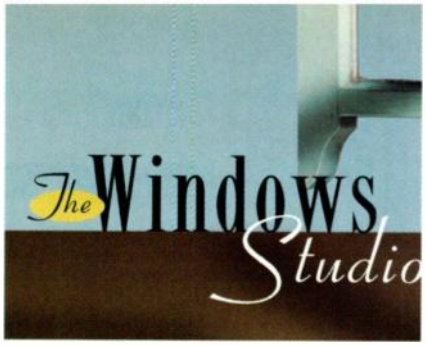

For instance, many recording programs use free RAM to nondestructively preview effects processing that will be performed offline. In addition, the real-time functions mentioned earlier (volume changes, fades, etc.) also use available RAM to smoothly execute the changes as they occur. Moreover, if you prefer to run separate sequencing and hard-disk recording programs concurrently on the same system, you'll need enough system RAM to operate both.

To give your programs enough headroom to carry out these varied tasks smoothly and transparently, 16 MB of RAM is the recommended minimum. However, although RAM is important to overall efficiency and performance in hard-disk recording, installing an inordinate amount of RAM won't get you around the CPU speed barrier. It's the interaction of all system components, both hardware and software, that ultimately determines overall performance.

FIG. 2: Innovative Quality Software's *SAW Plus* lets you record and edit more audio tracks than any other Windows program that uses standard Windows sound cards.

If you're thinking of using RAM-doubling software as a cheap alternative to upgrading your RAM, I have one thing to say: *don't!* Just as disk compression

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----Michael Molenda, Electronic Musician Magazine, January 1996

When it comes to choosing the right 8 bus mixing console, certain things need to be carefully considered. It may start with features and price, but sound quality and performance will most certainly be the deciding factors. The award-winning Mixdown Classic has all the features you want plus superb audio specifications, proven reliability and the performance you need. All this at a groundbreaking price for consoles in this class.

To prove our point, the Mixdown Classic 8 recently ran away with Electronic Musician Magazine's Editor's Choice Award for Best Recording Console for 1996. It was also nominated for a TEC Award and has received nothing but critical acclaim worldwide. The Mixdown Classic 8 provides features not found on consoles in this price range, such as its comprehensive MIDI muting system, internal modular design and an optional meter bridge.

MIXING WITH THE BEST!

"In a side by side contrast, the Mixdown Classic blew the Brand 'X' 8 bus away in sonic quality!"
----Michael P. Barton, Appleton, WI

"Great *&#@#*^ board...just great!"
----Sean Nolan, Denver, CO

"Studiomaster Mixdown Classic -I love you, man!"
----Jay Ohsiek, Savannah, GA

- 16, 24 and 32 channel versions
- Midi Muting
- 3 band EQ w/mid & bass sweep
- 6 aux sends per channel
- Balanced mic inputs on every channel
- Channel direct outputs
- Optional full-width meter bridge
- Rackmount external power supply

Studiomaster **IT'S ALREADY A CLASSIC!**

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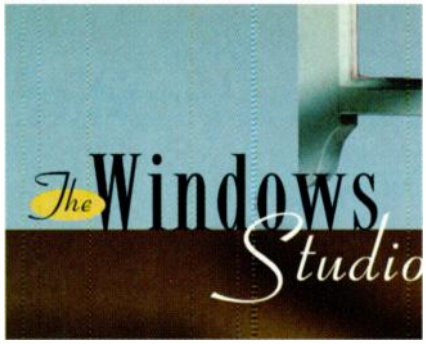

slows down hard-drive performance in hard-disk recording, so does RAM doubling (or real-time memory compression). To put a Zen spin on it, the essence of hard-disk recording is mindless action. Disk- and RAM-compression programs force your system to think about how to compress (or decompress) the data, which slows it down. Anything that slows down the hard-disk recording process is a no-no!

System RAM is not the only type of memory used for executing real-time functions. Video RAM (VRAM) is also used to provide fast onscreen redraws of program information. The speed at which these redraws occur can affect how smoothly the hard-disk recording program plays back tracks. More properly put, the amount of VRAM determines how much system RAM the computer is forced to use as an overflow buffer for video data. This can affect the number of RAM buffers available for processing digital audio files, which in turn determines the number of tracks that can be played back at once on the system.

In Windows systems, video performance depends on two factors: pixel resolution and number of colors. On average, 1 MB of VRAM is needed to display up to 1024 × 768 pixels at 256 colors (8-bit color resolution). However, pixel resolution diminishes as color resolution increases. For instance, that same 1 MB of VRAM provides a maximum resolution of 800 × 600 pixels with more than 65,000 colors (16-bit) and 640 × 480 pixels resolution with more than 16 million colors (24-bit). As you might guess, more VRAM is required to maintain the same pixel resolution at higher color rates.

How much VRAM do you need? That depends on the type of applications you use. Most applications, including hard-disk programs, are designed for 8-bit color, so 1 MB VRAM is fine. However, if you also work with creating multimedia products, you'll probably need at least 2 MB VRAM just to comfortably run 16-bit color at higher pixel rates. Serious hard-disk recording and video work on the same platform is performed using 24-bit color. For these systems, 4 MB VRAM is a necessity. However, as always, refer to your monitor and video controller spec sheets, as well as software specifications, to determine your VRAM needs.

DRIVE, HE SAID

To do multitrack hard-disk recording properly, your system also needs a fast hard drive dedicated to recording digital audio data. But how fast is fast enough? Well, to record and play back sixteen tracks of digital audio, the hard drive has to be able to move data at a sustained rate of 1,411,200 bytes/second, or roughly 1.4 MB/s. That's a lot of data!

Almost all the newer ATA-2 and SCSI-2 hard drives are able to transfer data at 1.4 MB/s without difficulty. Most have fast seek times (less than 12 ms) and fast disk-rotation speeds (5,600 to 7,200 RPM). Depending on the type of hard drive and advertising hype, published data-transfer rates typically range from 5 MB/s to 20 MB/s. In most cases, though, the specs are useless for comparative purposes because they're often based on burst-mode speeds, not the lower sustained rates.

Other factors also determine a hard drive's actual data throughput rate. As mentioned earlier, the CPU's clock speed sets the maximum rate at which data can be transferred and processed. The fastest drive in the world can't transfer data any faster than the CPU can accept it. Furthermore, as we will see later, the type of controller card and bus to which the hard drive is attached also affects the final data-transfer rate.

Certain settings in your CMOS setup utilities (or, with a SCSI device, in your SCSI setup utilities) can also have an impact on drive performance. The most important setting for our purposes lets the controller talk to the drive using synchronous versus asynchronous transmission. You're best off setting this for asynchronous transmission. All things being equal, though, here's the shorthand lowdown on hard drives for Windows systems.

ATA-2 (Enhanced IDE and Fast ATA), SCSI-2 (sometimes called Fast SCSI), and such newer variations as Fast/Wide SCSI hard drives are fast enough to record and play back multiple digital audio tracks. Most users think EIDE and Fast ATA drives are different names for the same type of drive, but this is not the case. Although there are many similarities in specifications, they aren't entirely congruent.

ATA-2 drives cost less than SCSI-2 drives and offer respectable levels of performance. On the other hand, SCSI-2 drives are faster, which might allow you to wring a few more tracks than you

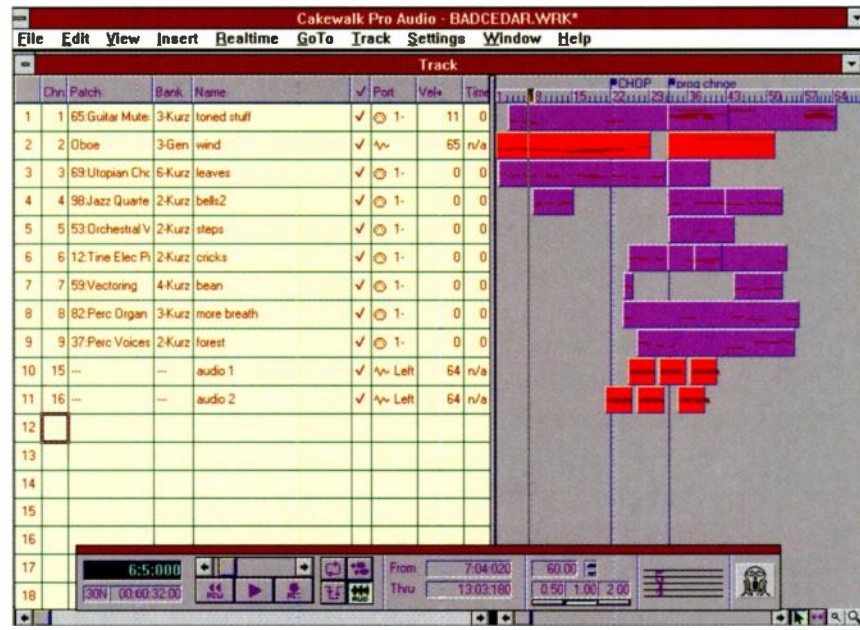

FIG. 3: Cakewalk Music Software's *Cakewalk Pro Audio* integrates MIDI sequencing and multitrack digital audio into one recording environment. However, it does not provide in-depth audio editing.

meet your next rack.
MR Rack.

64 Voices

12 Meg Wave ROM
Expandable to 84 Meg
(3 expansion card slots)

2nd-Generation
Transwaves™
(with digital resynthesis)

44.1 kHz Output

Four Outputs
(four 18-bit DACs)

All-new ESP-2 Effects
(26 MIPS of 24-bit DSP power)

SoundFinder™

GM Compatible

totally new totally awesome

The MR-rack cuts no corners to give you great sound – with 44.1 kHz playback through hardware that measures in at an awesome 102 dB signal-to-noise level. *(Four 18-bit DACs sure help with that.)*

Our all-new waveform ROM has 12 meg of the best sounds you've ever heard, including bigger and better piano, strings, brass, and voices. Plus the second generation of our unique Transwaves™, using digital resynthesis to give you sounds that move and transform under your control.

Great waves become great sounds thanks to MR-rack's all-new synth engine. Each sound is crafted with up to 16 sonic layers, creating the most realistic acoustic and the wildest synthetic sounds imaginable.

Our next-generation effects chip *(ESP-2)* provides 6 stereo busses for total mixing flexibility. Studio-quality reverb and chorus are always available, plus your choice from a broad selection of insert effects. And our thoughtful design lets you change the insert effect while the MR-rack is playing, without affecting the chorus and reverb.

Forget you ever heard the term "MIDI mode". Working with the MR-rack is easy, because it's always ready to receive on 16 MIDI channels. And it's just as easy to set up splits and layers on a single channel.

We've made selecting sounds a breeze with our proven SoundFinder™ interface – one knob selects the sound type; the other knob picks the sound itself. And with hundreds of great sounds to pick from, you might never need to tweak one. But if you do, we made the most important sound parameters easily available for editing.

Want more? We thought so. The MR-rack has the best expansion options of any synth, with 3 card slots for up to 84 meg of wave data. And we give you tons of memory for your money. *(Three times what anyone else offers!)* Like our upcoming 8 meg Drums at only $250, the 20 meg Dance/Hip-Hop card at $425, and the 24 meg World and Piano cards at $500 each.

Need another incentive? OK, buy an MR-rack and we'll give you a rebate coupon worth $50 off your first expansion card. *(This is a limited time offer good until we come to our senses!)*

Whoops – ran out of room! So if you want to hear all the other totally cool things about the MR-rack *(like the PCMCIA card slot, the 4 outputs, or the Unisyn MR editor we'll give you)* just call us, write us, or visit your ENSONIQ dealer and say "I'd like to meet MR Rack!"

You can reach us at:
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http://www.ensoniq.com on the Web
GO MIENSONIQ on CompuServe
800-553-5151 phone
610-647-8908 fax

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☐ ASR Series *samplers*
☐ KT Series *weighted action synths*
☐ KS-32 *weighted action synth* ☐ SQ Series *synths*
☐ DP Series *parallel effects processors* ☐ 1682-fx *mixer*

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City _____ *State* _____ *Zip* _____
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Mail to: ENSONIQ Corp, Dept. E-59, 155 Great Valley Pkwy
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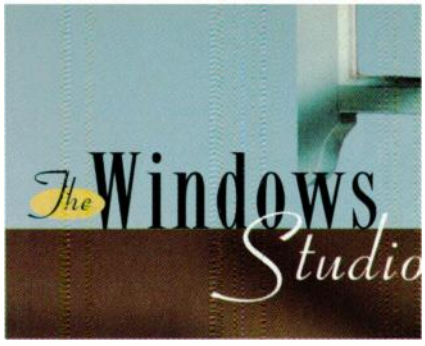


can with similarly equipped ATA-2 systems. In either case, you can enhance your drive performance by getting a caching controller card.

Regular IDE hard drives work just fine for storing and launching programs or as boot drives, but they're too slow for recording more than four tracks of digital audio. (Soundscape's SSHDR1 provides eight tracks using IDE drives, but it houses the drives in dedicated external units that do the DSP work. The computer simply acts as a front-end controller for these outboard units.) A faster system might be able to push that limit to eight tracks, but considering that you can get more tracks out of an ATA-2 drive for about the same amount of money, why bother using standard IDE drives for hard-disk recording? Besides, most new systems come packaged with ATA-2 drives.

Normal IDE drives are limited to 528 MB of storage capacity. Considering that a 4-minute song with eight tracks requires roughly 170 MB of disk space, that may seem adequate for most purposes. However, alternative takes and edits can easily take up another 170 MB. Bouncing tracks nondestructively eats up more hard-drive space. At this rate, you soon don't even have enough room to record a second song of equal length! ATA-2 and SCSI drives, on the other hand, typically have 1 GB or more of hard-drive capacity. That's usually more than enough room for eight tracks, alternative takes, edits, and additional songs.

Even though some 8-track stand-alone hard-disk recorders also use IDE drives, keep in mind that they can get eight tracks out of those drives because the units don't do as much system "housekeeping" as the average computer system. Some stand-alone units also divide up the functions among two or three different data processors for faster overall performance. Even so, their audio-editing functions aren't nearly as sophisticated as most budget hard-disk recording programs. In addition, their graphic-editing capabilities, as a rule, are practically nonexistent, the Akai DR8 and Roland DM-800 notwithstanding.

REGULAR OR PREMIUM?

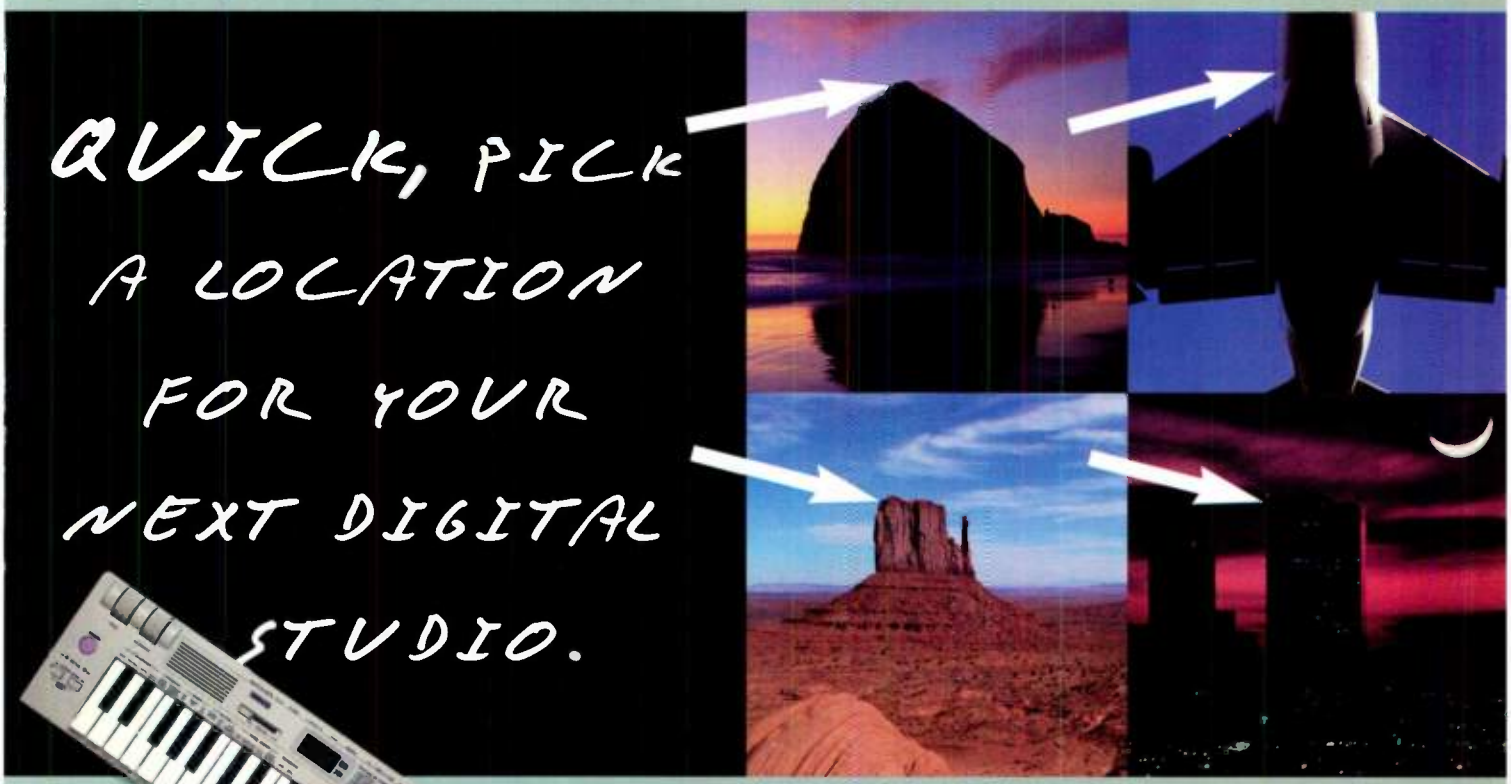
If ATA-2 and SCSI-2 drives perform similarly and have large enough storage capacities for hard-disk recording, why not just use the cheaper ATA-2 drives? The final decision whether to use ATA-2 or SCSI-2 drives may not depend as much on drive performance as on quantitative and qualitative differences in capabilities between the ATA-2 and SCSI based systems.

ATA-2 systems allow a total of four ATA devices in a computer. Devices are divided between two controller ports, with the typical configuration of two hard drives chained on one port and an IDE (ATAPI) CD-ROM drive and a tape drive chained to the second port. SCSI-2 systems, on the other hand, allow a total of eight SCSI devices (including the SCSI controller) in one chain on the system.

If you're on a budget, an ATA-2 system should be adequate for your needs. However, I suggest that you invest in a

Yamaha introduces the new SU10. Ever wish you could bring your entire MIDI studio with you on the road? With Yamaha digital musical instruments, you can. Yamaha is the only company that gives you a complete set of battery powered digital tools. We call them *The Studio To Go*. No matter where you move, your studio stays right with you. The newest member of the pack is the Yamaha SU10, the world's only handheld stereo digital phrase sampler. It combines CD-quality audio sampling, a unique touch-driven ribbon controller for realtime scratch and filter effects, special looping and edit features and a built-in 4-song sequencer. You can record and play up to 54 seconds from 48 mono or stereo waveforms. Then use the ribbon controller to scratch out a sound segment from your recording, slide the pitch, or control crossfading of local playback and an external input. Combined with a MIDI controller and tone generator (we've got those, too), you have everything you need to create complete musical compositions wherever you are (including 30,000 feet up in the air). You may even find yourself more creative on the road, given all those wonderful sounds to sample. You're going on the road and you've only got enough room to take one piece

Phrase sampler with up to 48 samples, CD-quality audio, extensive edit capabilities. $399.95



MIDI controller, XG tone generator with 737 voices, 3 effects processors, 32 notes poly, to-host computer connector, audio input, headphone output. $499.95

XG of gear. What's it going to be? We suggest the Yamaha CBX-K1XG. In one fell swoop you've got a 37-note MIDI controller, XG tone generator, to-host MIDI interface for a computer (like your laptop) and a personal stereo monitor system. With 737 high quality voices, 32 notes polyphony, 3 programmable effects processors, comprehensive XG MIDI control functions and the complete freedom of battery power, you can go anywhere and compose anything. No one will know you didn't do it in your mega-bucks studio back home. While you're at it, bring the SU10 (it's really, really small) and you also have a sampler to add local color to your music. And with just a little more room, the other members of the Yamaha *Studio To Go* let you have it all and take it with you. If you find yourself more at home on the road than in your house, you've got to have a *Studio To Go*.

YAMAHA®

CBX-K1. Stand alone battery powered MIDI controller for XG. $199.95

QY22. An all-in-one sequencer, tone generator, cool digital tool. $595.00

RY8. A rhythm programmer with guitar synth capabilities. $299.95

MU5. The world's smallest GM tone generator goes anywhere you do. $299.95

Yamaha Music Finance

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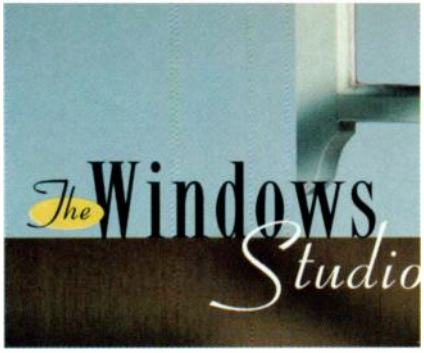


SCSI-based system because SCSI allows you to use a greater variety and better class of peripherals that are more useful for the hard-disk recordist. For example, SCSI-based tape drives can archive data up to ten times faster than IDE tape drives: 90 MB per minute as opposed to 9.5 MB per minute. Moreover, SCSI-based tape drives have a much greater storage capacity in comparison to IDE tape drives: 8 GB versus 1 GB.

Also, the leading-edge technology tends to favor the SCSI protocol, often leaving ATA-2 systems out in the cold. For instance, the new Iomega Jaz removable hard drives are fast enough for digital audio work but are priced low enough to make them an attractive alternative to tape-based MDMs. Another example is the CD-R drive, which enables you to make CD-ROMs and audio CD masters from digital audio files. (For more on CD-R, see "Burn, Baby, Burn!" in the June 1996 **EM**.) Neither of these types of devices uses the ATA-2 standard.

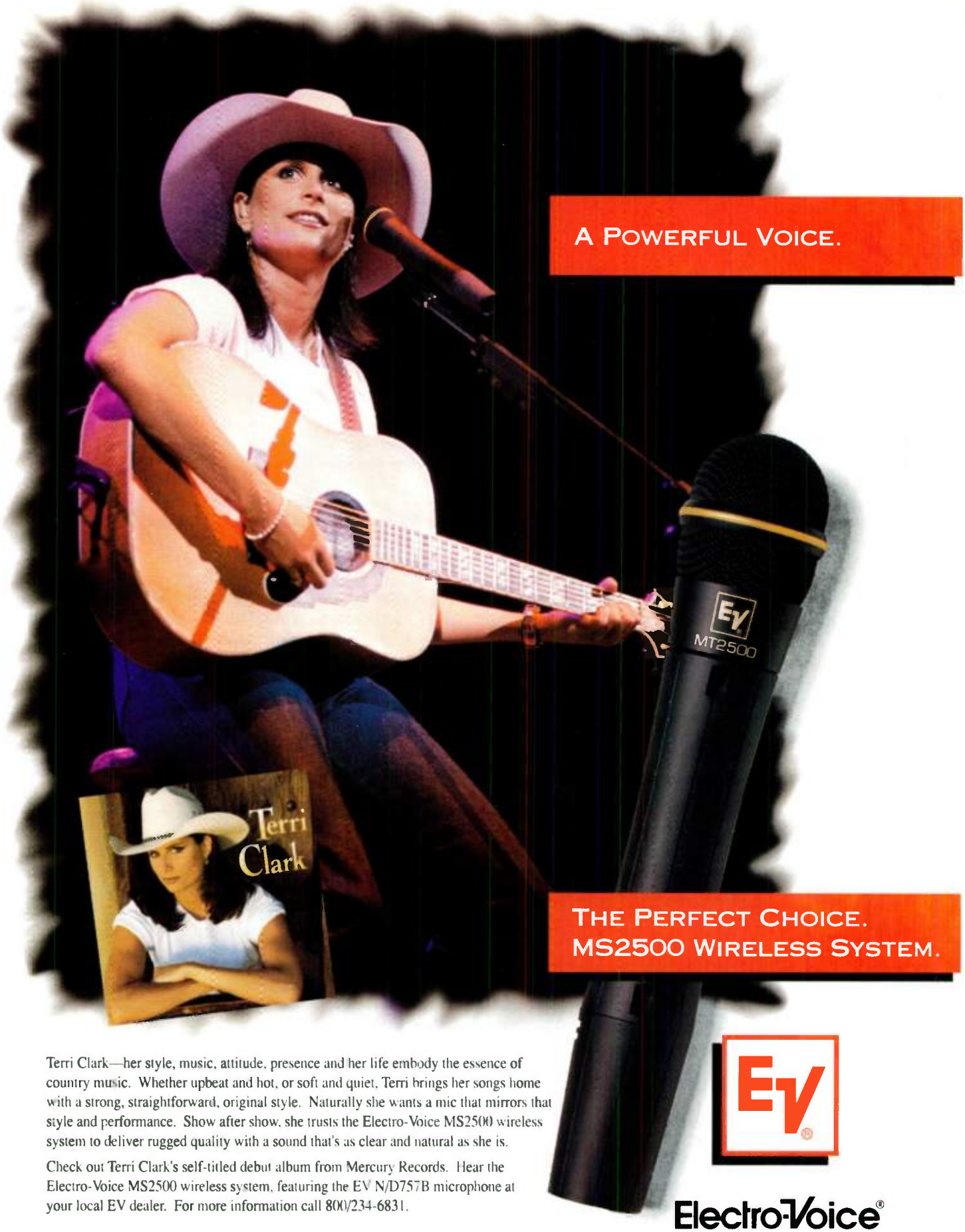
The only downside to SCSI peripherals is that they cost more than their ATA-2 counterparts. You get, however, much better performance from SCSI systems than from ATA-2 setups. For instance, adding an extra drive to your system is easy on SCSI systems. After all, there's room for adding seven peripherals to the SCSI controller. That's not so easy to do on ATA-2 systems because they're limited to four devices. If you're the average ATA-2 system user, it's likely you're already maxed out in the peripheral department, which leaves you nowhere to expand. Ultimately, the decision is yours, but I strongly recommend going with SCSI.

If you decide to go the SCSI route, you may be faced with the choice of buying "regular" drives or AV drives that have been optimized for audio and video work, hence the AV designation. The main difference between the two is

Minimum hardware requirements usually translate into minimal performance.

that "normal" SCSI drives use thermal-recalibration cycles as part of the process of maintaining overall drive performance and data flow. AV-optimized drives, on the other hand, do not use thermal recals, as they are typically termed. This can be important because thermal-recal cycles in some SCSI drives can interfere with digital audio data flow, causing recording and playback problems.

However, don't feel pressured into buying an AV-optimized SCSI drive. Although this matter is sometimes a subject of strong debate, there doesn't seem to be conclusive evidence that using AV-optimized drives is necessary. The thermal-recal problem has been greatly diminished over the last two years because the drives that had these



Terri Clark—her style, music, attitude, presence and her life embody the essence of country music. Whether upbeat and hot, or soft and quiet, Terri brings her songs home with a strong, straightforward, original style. Naturally she wants a mic that mirrors that style and performance. Show after show, she trusts the Electro-Voice MS2500 wireless system to deliver rugged quality with a sound that's as clear and natural as she is.

Check out Terri Clark's self-titled debut album from Mercury Records. Hear the Electro-Voice MS2500 wireless system, featuring the EV N/D757B microphone at your local EV dealer. For more information call 800/234-6831.

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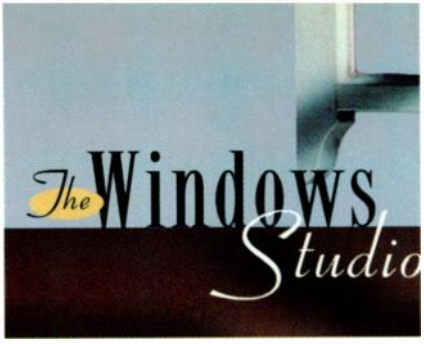


problems (notably those made by Fujitsu) are no longer on the market. In addition, using an AV-optimized drive is not always a guarantee that there won't be recording and playback problems when it's used with some systems.

Finally, most SCSI-2 drive users, myself included, use "regular" drives in their digital audio work without difficulty or loss of performance. It's hard to justify paying an extra $100 for AV-optimized drives when the nonoptimized versions work just as well. (For more on AV drives, see "Multimedia Musician: Are AV Drives for Real?" in the September 1994 **EM**.) But the bottom line is to check the sustained throughput rate and access speed before you buy a drive.

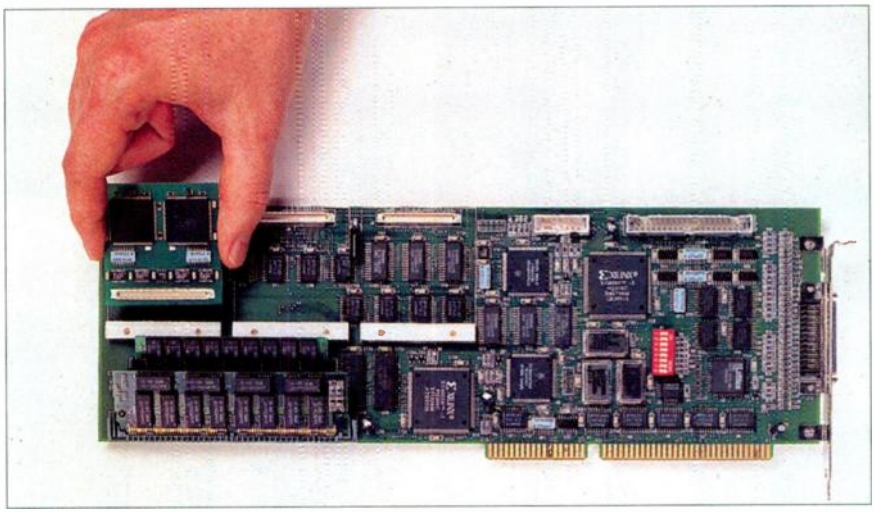


FIG. 5: Digital Audio Labs' V8 card connects to a rack-mount I/O box that offers up to sixteen analog inputs and outputs for true multitrack recording and playback. It also includes programmable DSP slots for real-time effects processing.

BUS RIDER

Both fast disk throughput and the ability to execute quick video redraws of onscreen program information are important for successful hard-disk recording. How fast your computer can perform these two tasks depends on the types of bus options (data-transfer pathways) available on your system. Although several types of bus options are available on PC-compatibles, most users work with only two of three bus types. They are, from slowest to fastest, the ISA bus, VL-Bus, and PCI bus.

The Industry Standard Architecture (ISA) bus, sometimes referred to as the AT bus, is the slowest bus of the three, but it is the most common. Every computer system from the lowliest '286 to the fastest Pentium has at least three to five ISA hardware slots. The most common type of hardware the average computer musician installs in these buses are sound cards and MIDI interfaces. However, depending on the type of BIOS, hard drive, and hard-drive controller card used, ISA bus systems can deliver hard-disk data at a maximum rate of 5 MB per second.

The Video Electronics Standard Association (VESA) Local Bus, or VL-Bus, is a data-transfer standard found on many '486s and some slower Pentium computers. It operates at the same speed as the CPU's base clock speed, up to a maximum of 50 MHz. For example, the VL-Bus operates at 33 MHz in a '486DX/33, '486DX2/66, and '486DX4/100 because the base clock speed is the same for all three computers.

Most '486 computers have at least a video VL-Bus controller built onto the motherboard. Higher-end '486s and slower Pentiums usually have two or three VL-Bus card slots. In this configuration, one slot is occupied by a video card and another by some type of hard-disk controller card. If there is a third VL-Bus card slot available, it can be used with an ISA-type device, such as a MIDI interface, sound card, or modem card.

The Peripheral Component Interconnect (PCI) bus found on the faster Pentiums and PowerPC computers is the latest bus option to gain wide acceptance. Like the VL-Bus, it runs at the computer's base clock speed. There are usually three or four PCI slots in these computers, two of which are occupied by a PCI-based video card and a hard-disk controller. Unlike VL-Bus slots, PCI slots cannot be used with ISA-type devices. But as we will see later,

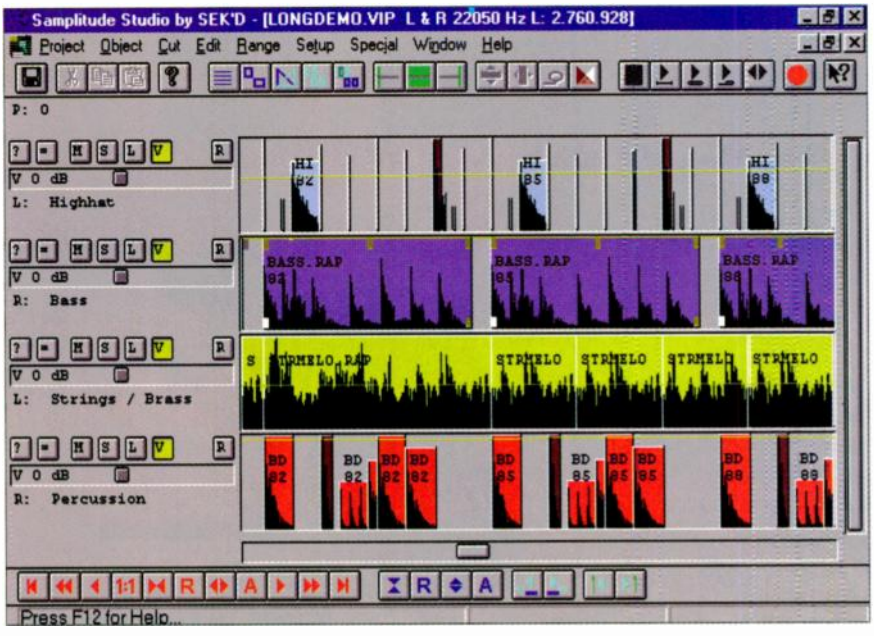


FIG. 4: SEK'D's *Samplitude Studio* plays back up to eight stereo or sixteen monophonic tracks. Track output can be routed to four different sound cards.

true 4-bus design • AFL/PFL • swept mid eq • 16 mic preamps

MORE BUSES, MORE PREAMPS, MORE EQ, MORE FEATURES. INTRODUCING THE NEW CR1604-VLZ.

Five years of user input, new materials, new technologies and the soul of our 8•Bus...we packed a lot in for just $1199*.

The original CR-1604 defined the modern compact mixer. Now we've "raised the standard" by adding over 20 new features like true 4-bus design, our famous mic preamps on every channel, flexible routing and monitoring, and swept mid EQ — for just $100* more than the original CR-1604. Call for a free 40-page brochure.

16 STUDIO-GRADE MIC PREAMPS *means the new CR1604-VLZ actually costs $100 less than our classic CR-1604 & XLR10 extender combination!*

VLZ (Very Low Impedance) CIRCUITRY *developed for our 8•Bus consoles, further reduces noise and crosstalk in critical signal path areas.*

SOLID STEEL *main chassis.*

SEALED *rotary controls.*

TRIM *control on the channel strip! 60dB total mic gain; –10dB "virtual pad" for line inputs.*

6 AUX SENDS *per ch. Aux 1 & 2 switch-able pre/post. Post-fader Aux 3-4 /5-6 selectable via Shift switch.*

HI EQ. *±15dB shelving at 12kHz.*

SWEEPABLE MIDRANGE. *Wide, musical peaking EQ with 100Hz to 8kHz range. ±15dB range.*

LO EQ. *±15dB shelving at 80Hz.*

LOW CUT FILTER *is a must for live sound and acoustic (microphone) recording. Sharp, 18d3/octave @ 75Hz high-pass filter lets you add Lo shelving EQ to vocals without boosting undesirable mic thumps, stage rumble, wind noise, P-pops, etc.*

PAN *control with constant loudness to maintain stereo perspective.*

MUTE *switch.*

MUTE & OVERLOAD *LED.*

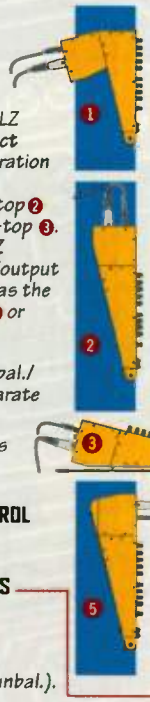
–20dB SIGNAL PRESENT & SOLO *LED.*

SOLO. *In-place AFL or PFL.*

BUS ASSIGN *for Subs 1-2, 3-4 & Main L/R.*

60MM FADERS *with 8•Bus log taper, special lip seal & long-life wiper material.*

5-WAY PHYSICAL CONFIGURATION *via our famous rotating input/output "pod." In minutes you can switch the CR1604-VLZ between ultra-compact 8-rack space configuration with pod to back ❶, rackmount jacks-to-top ❷ or tabletop/jacks-to-top ❸. Optional RotoPod-VLZ bracket places input/output jacks on same plane as the controls (tabletop ❹ or rackmount ❺).*



MONO OUTPUT *(bal./unbal.) has separate level control.*

RCA TAPE *inputs and outputs- (unbalanced).*

Separate **CONTROL ROOM OUTPUT** *(bal./unbal.).*

DIRECT OUTPUTS *(bal./unbal.) channels 1-8.*

SUBMASTER OUTPUTS *(bal./unbal.).*

AUX SEND 1 & 2 MASTERS.

Stereo **AUX RETURNS 1 & 2** *with 20dB gain above Unity for boosting weak effects.*

EFFECTS TO MONITORS *controls fold Aux Return 1 & 2 back into Aux Sends 1 & 2 so that on-stage performers can hear effects.*

AUX SEND 1 & 2 SOLO *switches with LEDs.*

Stereo **AUX RETURNS 3 & 4.**

Aux Return 3 **ASSIGN SWITCHES** *to Main Mix, Subs 1 & 2 or Subs 3 & 4.*

Aux Return 4 **ASSIGN** *to Control Rm/Phones.*

CONTROL ROOM/PHONES *level control.*

TAPE INPUT LEVEL *control and* **TAPE TO MAIN MIX** *switch.*

SWITCHING MATRIX. *This fantastic creative feature lets you route any combination of Tape, Subs 1 & 2, Subs 3 & 4 or Main Mix to Control Room/Phones bus. Lets you create custom headphone or broadcast mixes, monitor 2-track output or route a cue/click track to phones, create a second stereo main output with its own level control & more (covered in the extensive manual).*

Global **SOLO** *level control.*

Global **AFL/PFL SOLO** *switch.*

SUB ASSIGN *to Left or Right Main Mix.*

**Suggested U.S. retail; higher in Canada.*

MAIN MIX FADER.

BNC *lamp socket.*

Global **AUX RETURN SOLO** *with LED.*

LED **METERS** *with –30 to +28 range &* **LEVEL SET** *LED.*

RUDE SOLO *LED.*

HEADPHONE *output.*

60mm **SUBMASTER** *log-taper faders.*

BUILT-IN *power supply.*

PHANTOM POWER *switch.*

Studio-quality **DISCRETE MIC PREAMP** *on every channel.*

Pre-fader **INSERT** *on every ch.*

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SEE US AT NAMM BOOTH #642

there are some trends developing that guarantee these extra slots won't stay empty for long.

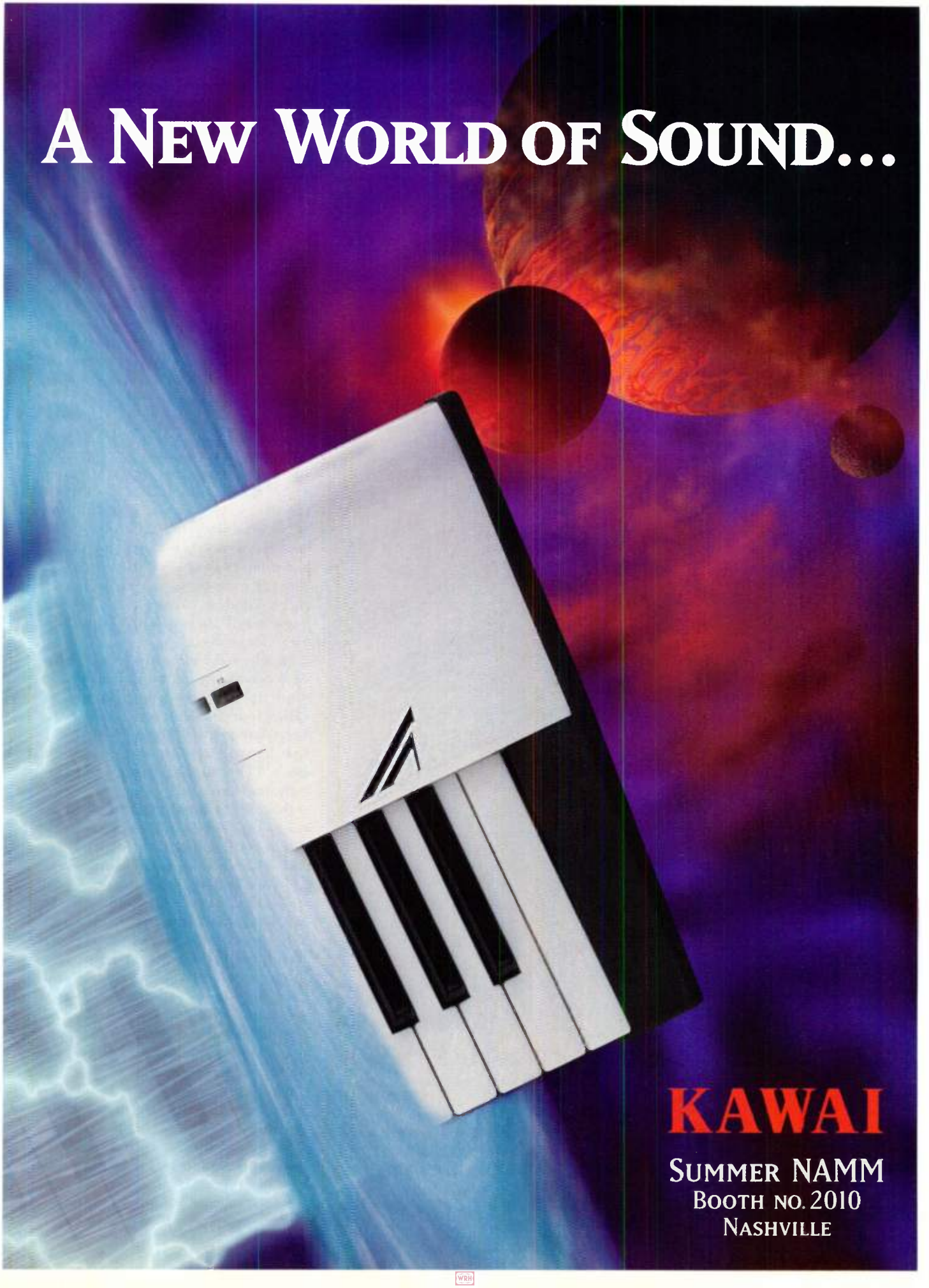
YELLOW FLAGS

Even though video, SCSI-2, and ATA-2 hard-drive controller cards are available for all three bus types, you should always use the fastest available bus on your system. That's as simple as matching the controller card with the appropriate bus and pairing the proper hard-drive controller with the right kind of hard drive. However, there are a few things to be aware of when setting up your hard drives and controller cards.

Most ATA-2 controllers either have an onboard BIOS or driver software to control both types of ATA-2 drives. If you plan to connect ATA-2 drives to an ISA bus, make sure your computer has an updated BIOS that allows for the use of EIDE and Fast ATA drives. Another option is to make sure that the ATA-2 controller card you install has an onboard BIOS or the appropriate driver software to manage these drives. If you use a card with an onboard BIOS, disable the hard-drive control settings in the computer's BIOS.

Similarly, don't chain regular IDE and ATA-2 drives together on the same cable unless your controller card's instruction manual specifically states that you can do so. Otherwise, disk operation will be slowed down to the speed of the slowest drive in the chain. Needless to say, that's the last thing you want for hard-disk recording.

Finally, hard-disk recordists often mix different hard-drive types. The most common setup is to use an IDE drive as the boot or program drive and a second, faster drive for digital audio data. Although this is perfectly acceptable, you need to be aware that you can't always mix different hard-drive controller types on the same bus. For instance, using a VL-Bus SCSI controller and a VL-Bus IDE controller usually doesn't work. However, you can usually use different controllers on different bus types. For example, you can use a VL-Bus SCSI controller and an ISA bus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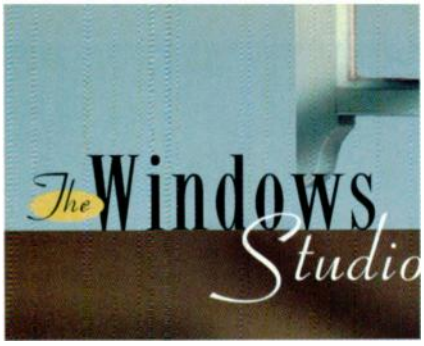

IDE controller (or vice versa) on the same system without any difficulty.

SOUPED-UP SOUND CARDS

Many of the newest budget multitrack hard-disk recording programs, such as SEK'D's *Samplitude Studio* (see **Fig. 4**), support the use of multiple MME-compatible sound cards. This offers the user the option of individual analog audio outputs for monophonic tracks or multiple stereo mixing buses. Furthermore, users with sound cards that don't support full-duplex operation (that is, simultaneous record and playback) can now record through one card while they monitor playback through a second card.

Similarly, you can combine digital I/O sound cards with conventional analog sound cards to hear the recordings you digitally transfer between your system and a DAT or other digital audio device. You can also use a DAT or A/D converter as a front end for your digital I/O card so you can record into your computer while you monitor with a separate, analog sound card. (For more information concerning digital audio cards, read "Audio Abduction" in the January 1996 **EM**.)

There are several caveats regarding the installation of multiple sound cards in your system. First, make sure you have enough card slots available to physically install the sound cards. After all, you may need to use other devices (such as MIDI interfaces) that occupy card slots, too. Also, make sure that there are enough available IRQs, port addresses, direct memory access (DMA) channels, and free upper memory blocks (UMBs) for each sound card you install in your computer. The difficulty of ascertaining this depends on the number of cards you want to install and the number of other peripherals you already have on your system. Fortunately, Windows 95 can identify many of these conflicts and notify you when there's a problem.

Finally, make sure your sound cards' drivers support multiple cards of the same type. For instance, if you wish to install four Turtle Beach Tahiti cards, be certain to install the software driver that lets you use four Tahiti cards at once. (The normal driver addresses only one device.)

Despite the advantages of multiple sound-card access, most budget hard-disk recording programs for Windows still suffer from one major drawback: users are limited to recording only one stereo track or two monophonic tracks at a time, no matter how many sound cards are on the system. You can get simultaneous multitrack recording using multiple MME-compatible sound cards with more expensive software, such as *SAW Plus*. The number of recordable tracks depends on the number of sound cards and the usual system performance limitations.

Not all multitrack digital audio software supports the use of multiple sound cards. This forces the user to rely on one card for recording, playback, and monitoring. If you use this type of program, it is imperative that your sound card supports simultaneous recording and playback. In other

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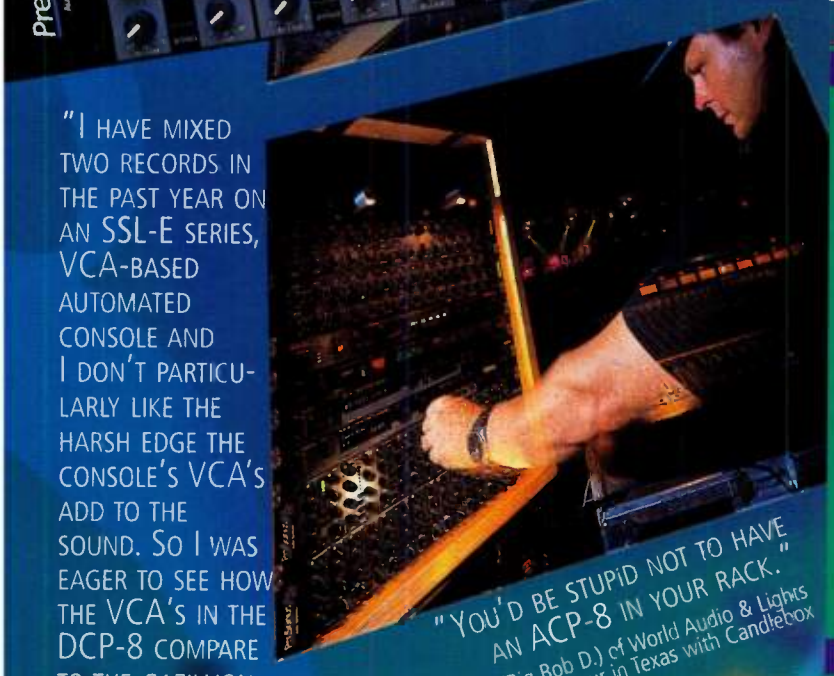

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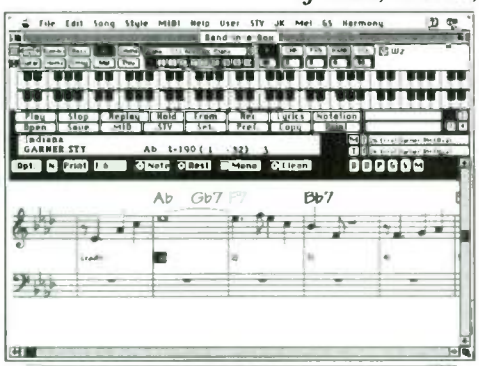

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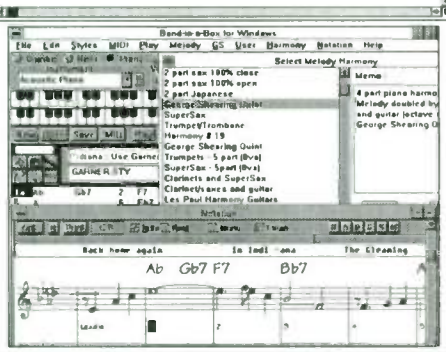

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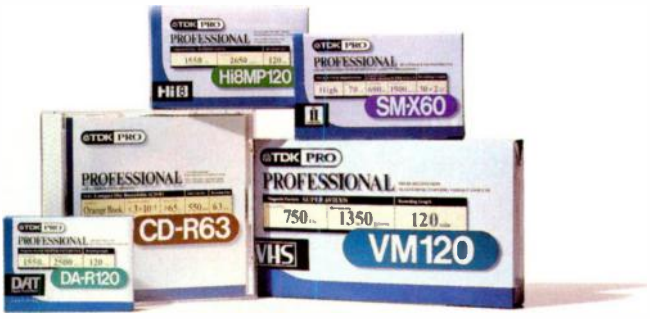

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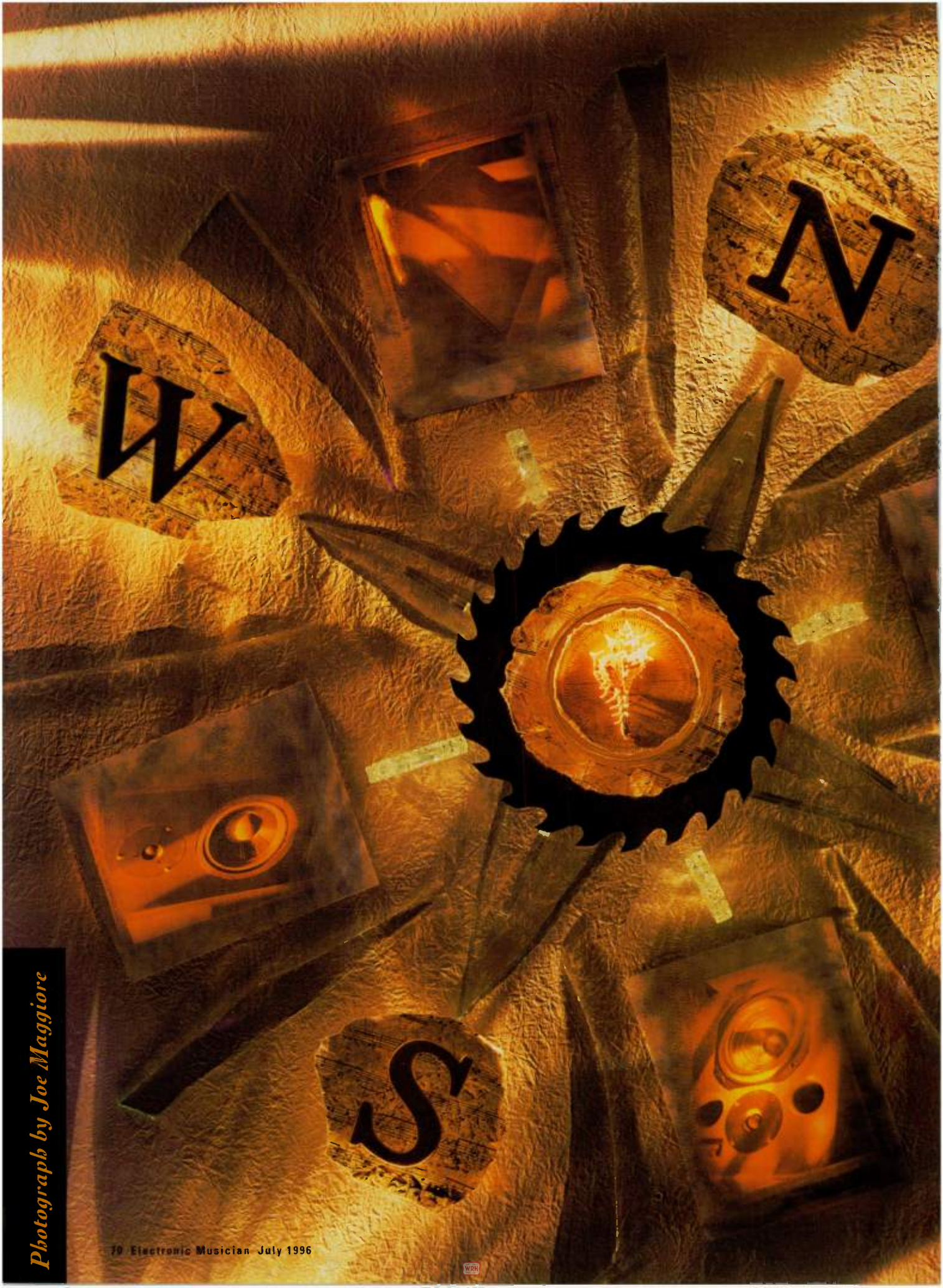

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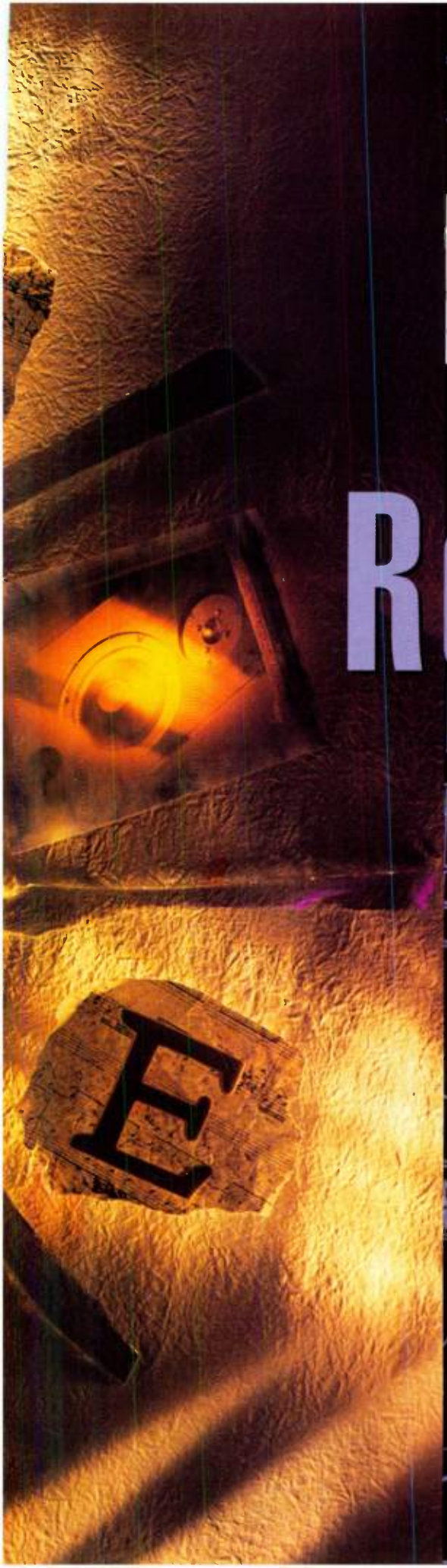
Points of Reference



Remember the logical positivists? No, they weren't a feel-good rock band made up of Norman Vincent Peale devotees. The logical positivists were a group of early twentieth-century philosophers who held that metaphysical theories were pretty much meaningless. A statement had meaning, they felt, only if it could be proved true or false by reference to empirical facts. In other words, science can objectively measure the world, and the resulting measurements are the final say. Anything else is, well, mere opinion.

Obviously, a logical positivist seeking a career as a record producer would be one seriously frustrated thinker. Empirical data doesn't really cut it in the recording studio, as the process of making music is savagely ruled by—horrors!—personal opinion. Take sound, for example. Scientists can measure its many attributes, but the empirical references of test tones and frequency-response charts are only part of the picture. That's because people don't listen to test tones and pink noise, they listen to *music*. And here's the kicker: everyone hears differently.

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Points of Reference

Amid such rampant subjectivity, the only prayer for consistent, objective audio data is the studio reference monitor. A perfectly realized reference monitor would translate an input signal into a virtual carbon copy of the source sound—no hype, distortion, or alterations of any sort, just the pure, unvarnished truth. Of course, we don't exist in an ideal world, but at the very least, a recordist needs a relatively accurate reference monitor to ensure that his or her mixes sound wonderful on all playback systems. In other words, if you mix a tune with a fat, thumping bass line, you want that jumpin' low end to translate—without compromise—to the listener's home-entertainment system, car radio, boom box, or other audio source.

So, to appease the logical positivist that lurks in all music producers, we've launched a comparison of four current reference monitors aimed at the budget home or project studio. The monitors we tested—KRK's K•RoK, Tannoy's SBM, Yamaha's S-55, and Yorkville's YSM-1—are priced at less than $450 a pair and are 2-way, close-field models. Two popular choices, the Alesis Monitor One and the JBL 4206, were not included because they were featured in our previous monitor face-off. (See "Boom Boxes" in the November 1994 issue of **EM**.) Read on to get the facts about how these four critical references delivered the goods on sonic precision.

SKIN DEEP

Before delving into the aural arena, let's focus for a minute on superficial considerations—that is, how these monitors look. Of course, that's not to suggest that you should pass on an ugly pair of awesome-sounding monitors. But for many of us, cosmetic appeal has its place, especially on studio components as visually prominent as monitor speakers. And besides, a close physical inspection also reveals craftsmanship and design features that can affect performance.

KRK K•RoK. Described by reviewer Rob Shrock as a monitor that "would look at home in a Mayan priest's project studio" (see the full review in the August 1995 issue of **EM**), the K•RoK is arguably the most distinctive-looking close-field monitor on the market. Its gray, pebbled, faux-granite finish imparts a sense of solidity, and the rounded corners and trapezoidal shape give the box a sturdy, imposing look. The cabinet is dual-ported (cylinder style) in front, with a 7-inch, latex-coated, long-stroke woofer and a 1-inch silk-dome tweeter. Speaker connections are secured with plastic-covered screw-down knobs on top of gold-plated posts that also take banana plugs.

The KRK K•RoK monitor is an aggressive thumper with articulate high mids.

Tannoy SBM. The SBM is a spartan, rectangular box with sharp corners and an attractive, mottled black-and-gray finish. The monitor's cabinet is constructed of high-density chipboard, and the face is carefully fitted with a fine, textured black vinyl. A 6.5-inch injection-molded woofer and ¾-inch dome tweeter are flush-mounted above the slot-shaped front port and silver Tannoy logo. Speaker connections are made with plastic knobs that also accept banana plugs.

In the extra-mention department, the SBM is the only monitor of the bunch that comes with a user's guide. The manual explains things such as biwiring, biamping, and polarity, and it offers a detailed account of why 2-way reference monitors should be mounted upright, with tweeters on top. (Thus positioned, they minimize time-arrival differences and give the mix engineer the widest range of movement in the horizontal plane, which is where stereo "happens.") The manual also details an inexpensive test method (using duct tape and a piece of string) for determining the extent to which console reflections could be spoiling the smooth response of your close-field monitors.

Yamaha S-55. The S-55, being a multipurpose monitor, is the odd man out in the looks department. The gray, molded-plastic cabinet employs a trapezoidal shape that's larger in front than in back and, thanks to the sideways positioning of the Yamaha logo, is reminiscent of a backseat speaker for cars that go boom in the night. To enhance this cruise-car attitude—and to further diminish a studio vibe—the 6.5-inch cone woofer and 1-inch "wave guide" horn are hidden behind a protective metal grille that can be pried off only with a screwdriver. Cylindrically dual-ported in front, the unit has threaded screw holes on both the bottom and side, allowing it to be stand-mounted or permanently installed using wall brackets. The S-55 utilizes push-terminal speaker connections.

Yorkville YSM-1. Tallest of the bunch and finished in a handsome black-stained wood grain that's reminiscent

Audio Lingo

Because the colloquial terms for frequency ranges are so commonly—and inconsistently—bandied about, I thought it would only be fair to specify the ranges as I've referred to them in this face-off.

Lows	20 Hz–80 Hz
Low Mids	80 Hz–320 Hz
Mids	320 Hz–1.2 kHz
High Mids	1.2 kHz–7.5 kHz
Highs	7.5 kHz–20 kHz

of the Yamaha NS10M, the YSM-1 has a no-frills, get-down-to-business look—that is, once you remove the black nylon grille cloth. The 1-inch dome tweeter and 6.5-inch woofer are mounted slightly forward (the tweeter more so than the woofer) to minimize reflections off the cabinet face. The cabinet, made of high-density chipboard, has a single cylindrical port in front, just beneath the woofer. Speaker cable is secured with plastic screw-down knobs over gold-plated posts that also take banana plugs.

NAME THAT TONE

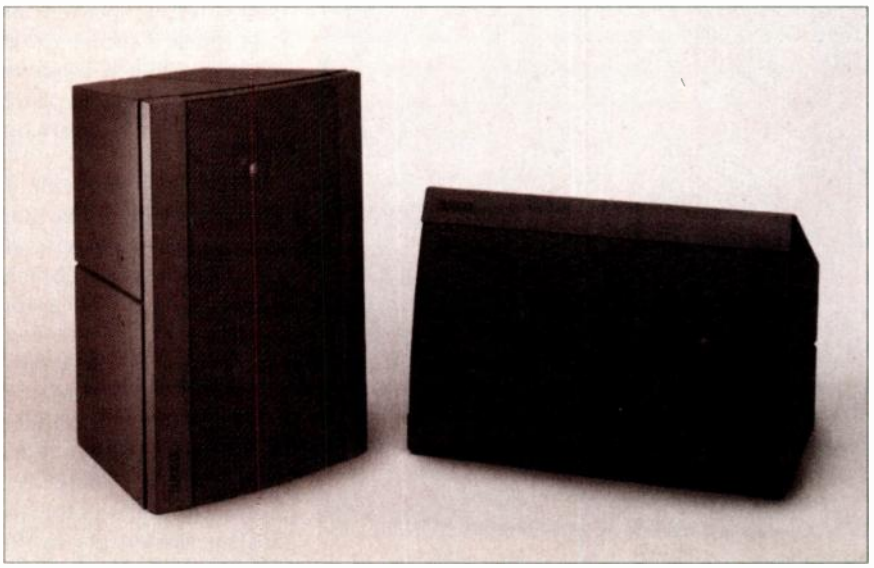
To honor the ghosts of the logical positivists, I began the face-off by listening to how each monitor reproduced some test tones. Using *Sound Check: The Professional Audio Test Disc* (produced by Alan Parsons and Stephen Court) and the *Mix Reference Disc* (available for $14.95 from Mix Bookshelf; tel. 800/233-9604 or 908/417-9575; fax 908/225-1562), I played a series of sine waves through each monitor at an output level of 0 VU.

Even though none of the monitors has a bass response rated below 40 Hz, I began with 20 Hz and 40 Hz tones to determine whether any harmonic content was evident. To test the low midrange frequencies (see the table "Audio Lingo" for a breakdown of frequency terminology), I auditioned 100 Hz and 250 Hz tones, followed by 1 kHz for the mids, 4 kHz for the high mids, and both 10 kHz and 16 kHz for the highs. Here's how each monitor fared.

KRK K•RoK. There was a whole lot of shakin' going on, but at 20 Hz the K•RoK's woofer didn't produce any real tone. It did, though, put out a substantial warbling note at 40 Hz, despite its modest low-end rating of 57 Hz. The 100 Hz sine wave produced a reasonably tight tone, but it was also plagued by warbling. In the low-mid territory, 250 Hz delivered a solid, very pronounced timbre. Both 1 kHz and 4 kHz frequencies were clean and steady, albeit with a distinctive bite. The high end seemed to roll off smoothly, with pure tones at 10 kHz and 16 kHz.

Tannoy SBM. The SBM's woofer made a flapping noise at 20 Hz and 40 Hz, but it managed to produce a recognizable tone at 40 Hz. The 100 Hz tone was warm and fat, but a slight buzziness was apparent. In contrast, the 250 Hz tone was clean, robust, and very musical. The 1 kHz and 4 kHz frequencies were equally pure and steady. High frequencies were pure and pleasant with a musical-sounding roll-off.

Yamaha S-55. Aside from an unpleasant cabinet buzz, the S-55 had nothing to report from the 20 Hz sine wave. The 40 Hz frequency fared better (the S-55's low end is rated at 55 Hz) but



The Yamaha S-55 can handle lots of power and a variety of tasks.

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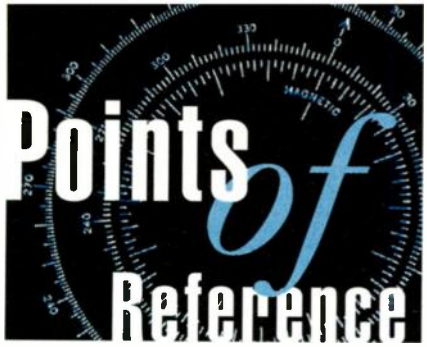

was marred by a mild flutter. A musical note emerged at 100 Hz, but it was brassy sounding and produced, once again, a slight flutter. Not until 250 Hz did the S-55 speak with robust, musical authority. Only in the mid and high-mid frequencies did the S-55 produce pristine tones. A slight brassy coloration was evident in the high-mid frequency (4 kHz), and on the 16 kHz tone, which in itself seemed pure, I could still make out some noise that seemed to be coming from the cabinet.

Yorkville YSM-1. According to Yorkville's technical specifications, the YSM-1 is the basso profundo of the bunch with a low end rated at 40 Hz. The specs panned out, as the monitor produced a steady tone at 40 Hz. It was accompanied, however, by a barely discernible hacking sound, like a throat being cleared. Surprisingly, the YSM-1 also delivered a smooth, warm rumble at 20 Hz. The 100 Hz tone was nicely focused without being boomy. All other test tones from 250 Hz to 16 kHz sounded smooth, pure, and unadulterated.

CRITICAL MUSICALITY

Test tones, of course, are about the furthest thing from music—a fact that becomes painfully evident after about twenty seconds of listening to them. When it comes to choosing a pair of reference monitors, it's the sound of the music that matters.

I auditioned each monitor with a half-dozen pieces of music encompassing a wide range of instrumentation, musical styles, and recording techniques. I also auditioned unprocessed tracks of individual instruments, such as guitars, pianos, strings, and drums. Finally, to get a feel for how mixes produced with these monitors would translate to the real world, I did a quick mix on each monitor and then referenced the results on my trusty boom box, a lame car stereo, a pair of Grado Labs SR325 reference headphones, and a pair of

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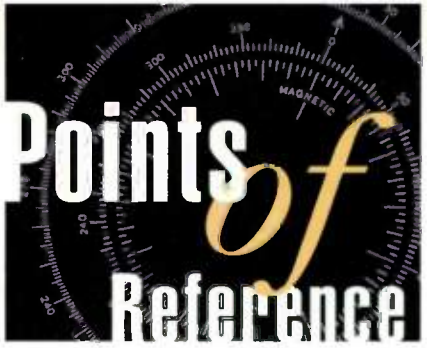

Meyer Sound HD-1 powered monitors.

In addition, I enlisted second opinions from the expert ears of Chris Michie, technical editor for *Mix* magazine. Over the past 25 years, Michie has accumulated studio and live-sound engineering credits with Pink Floyd, Roxy Music, Blondie, Burt Bacharach, Sarah Vaughn, Fripp and Eno, and countless others.

All of the comparison tests were conducted using Pro Co's excellent RMS-1A switcher box. This unit has two switches—one that flips between MAIN speakers and ALT and a second that toggles between ALT A and ALT B—that allow A-B-C comparisons between three pairs of monitors at once.

TRACKS TO DIE FOR

I began my listening tests with "Trans-Island Skyway," an upbeat, funky shuffle that features a colorful palette of bells, blocks, triangles, and other percussive hits from Donald Fagen's 1993 solo effort, *Kamakiriad* (Reprise). Next up was the Van Morrison tune "Tupelo Honey"

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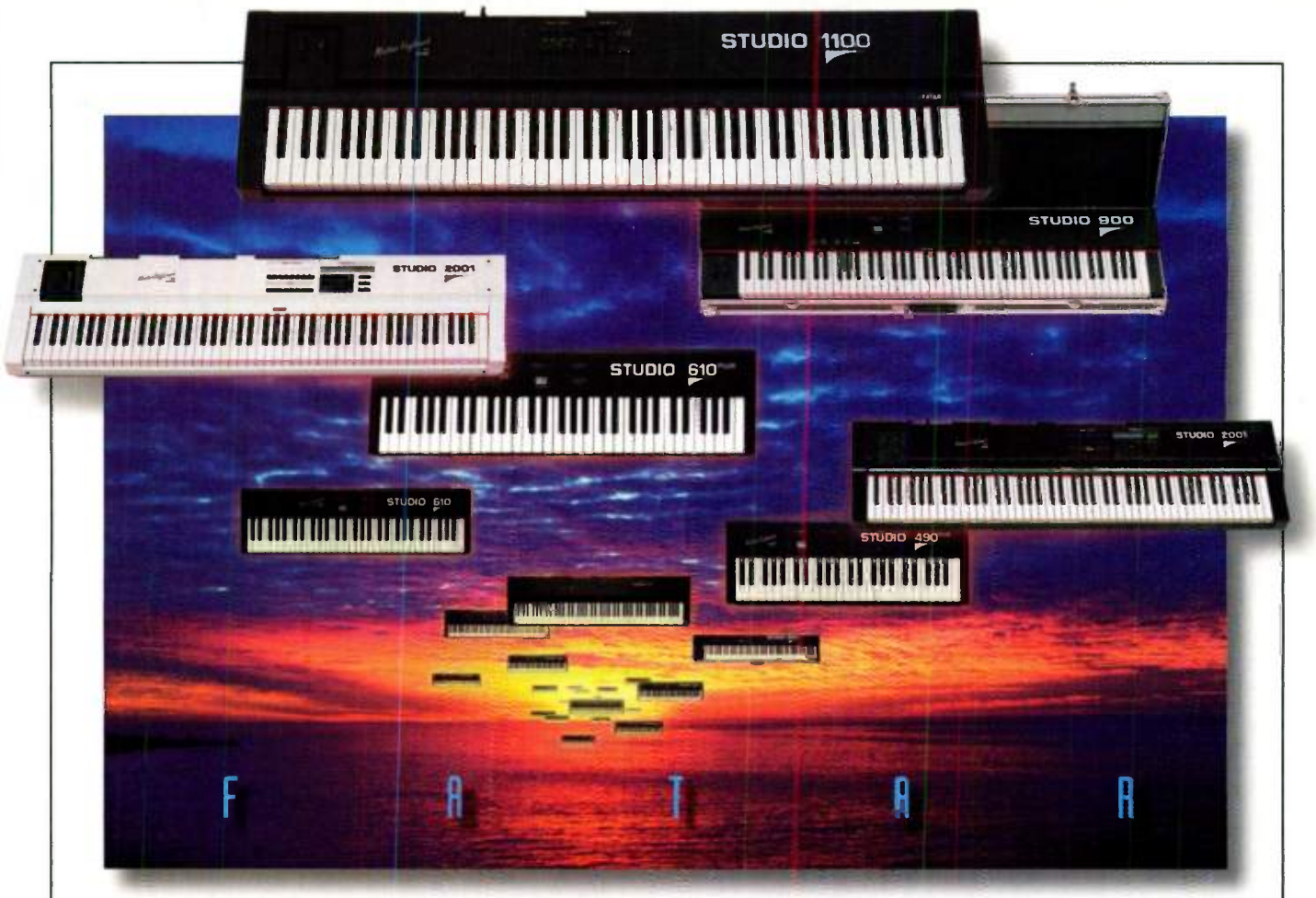

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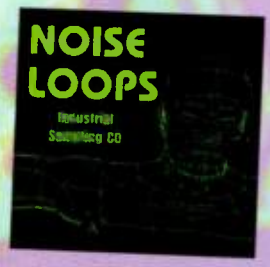

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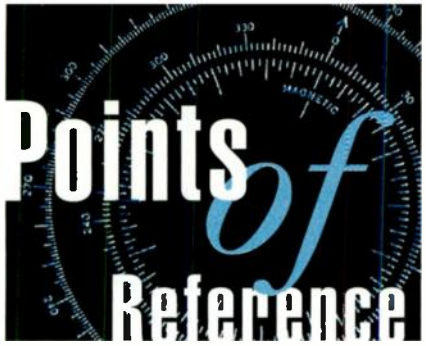

as interpreted by Cassandra Wilson on her album *Blue Light Till Dawn* (Capitol). This mix is especially notable for its acoustic-bass timbres, a backbeat played with brushes, a superb mandocello solo, and Wilson's rich, oozing vocal performance.

For some classical ambience, I chose Mahler's Symphony No. 8 with Eliahu Inbal conducting the Frankfurt Radio Symphony Orchestra (Denon/Nippon Columbia). This proved an excellent test of the monitors' imaging and soundstage capabilities, as the single-point stereophonic recording captured 150 musicians, a chorus of 350, and eight solo vocalists. Other references I used included the songs "Hangin' On to the Good Times" from Little Feat's *Let It Roll* (Warner Bros.), Coolio's remake of "Too Hot" on *Gangsta's Paradise* (Tommy Boy), and Alison Krauss' "That Makes One of Us" from *I've Got That Old Feeling* (Rounder). Here are the results of these critical listening tests.

KRK K•RoK. The K•RoK is a visceral, rich-sounding monitor with lots of low end and edgy high mids that can make you squint at high volumes. My immediate hit was that everything sounded great on them. They provide good imaging and a deep soundstage with plenty of detail. For example, the chimes, ice bells, and other percussion on the Fagen tune were crystal clear. However, the K•RoK's low mids seem a bit hyped, which accentuates the remarkable bass response but also adds a bit of "honk." Nothing drastic, mind you, but enough to foreground the center high mids, giving the monitors an aggressive, in-your-face sound that might promote ear fatigue during long mix sessions.

The K•RoKs do a fine job of maintaining tonal relationships at soft and medium volumes as well as at loud levels. The mixes I did on them sounded true on other playback sources, with only a slightly perceptible dip in the high mids.

Tannoy SBM. The SBM exhibited a warm, compact sound that *Mix*'s Chris Michie described as "rounded and fruity." Though lacking the rich rumble of the larger K•RoK, the SBM has what it takes to articulate bass guitar and kick-drum hits. The highs are smooth and balanced, with no hint of harshness. I was particularly impressed by the SBM's "true to life" reproduction of

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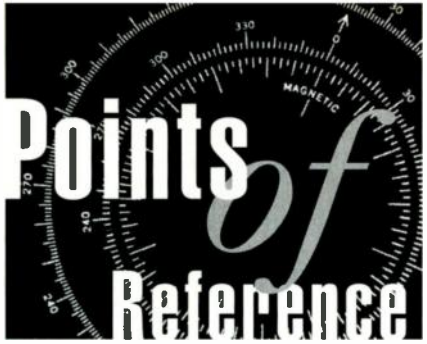

drum-set timbres, namely kick, snare, and cymbals.

The SBM delivers crisp mids, but the sound of the player's fingernails on an acoustic guitar and the scraping of a slide against the strings of a dobro were more transparent and detailed on the YSM-1s and the K•RoKs. Stereo imaging is good, but compared to the other speakers, the overall soundstage of the SBM seemed a bit small. When I listened to the Mahler symphony on the K•RoKs and the YSM-1s, for example, I could almost point to where the soloists were standing as they sang. This level of detail was not as evident on the SBMs.

Despite these findings, my finished mixes held up well on each outside playback medium. During high- and low-volume referencing, the SBMs maintained tonal balances, and the overall warmth of the speakers ensured that I could mix for hours without experiencing ear fatigue.

Yamaha S-55. The S-55s are designed for a wide range of applications, including commercial sound installation, multimedia, and reference monitoring for home and project studios. This versatility has its merits, but being a jack-of all-trades, the S-55 is quite possibly the master of none. It certainly hasn't mastered the mission of a first-rate reference monitor: of the four monitors tested, the S-55 is the most colored.

Initially I thought the monitors' metal grilles might be affecting the sound, but after I pried the grilles off (with permission from Yamaha), the sound remained the same. The S-55s don't sound *bad,* mind you; they just aren't as "true" sounding as the other monitors. To begin with, low-end response is a bit thin, with a cold, almost metallic quality. Kick drums lacked "oomph," and otherwise thumping bass lines lost some of their thump. The monitors also exhibited a hollow, slightly canned sound that Michie described as "pinched."

On the up side, the S-55s are the punchiest, most efficient monitors of the lot. They have a very smooth high-end response, decent imaging, excellent shielding (which means they're ideal for positioning next to your computer's monitor screen), and a low ear-fatigue factor. Though I was nervous about mixing on the S-55s, the resultant mixes held up surprisingly well when referenced on other speaker systems.

Multifunctionality is a not-to-be-overlooked feature of these monitors. While rehearsing a band in my studio, the S-55s turned out to be excellent PA speakers. The group was a relatively quiet ensemble—vocals, acoustic guitar, electric bass, and drums played with brushes—but I cranked up the volume at one point and the S-55s didn't flinch. These babies can really handle the juice.

Yorkville YSM-1. The YSM-1 is a full-bodied, sonically neutral monitor that, to my ears, wins the prize for delivering the most realistic picture of the aural spectrum. Although not as punchy as the SBM or S-55 nor as instantly likable as the K•RoK, the plain, rather understated personality of the YSM-1 reproduces timbres with near pinpoint accuracy. Overall tonal relationships between low, mid, and high frequencies are remarkably well balanced, even when referenced at different monitoring levels.

Bass response is smooth and focused without boominess. When I cranked up the Coolio tracks, the front ports blew out an initial wad of dust, but the woofers translated the massive kick beats with nary a groan. Mids and high mids were clean and articulate. For example, the percussion on "Trans-Island Skyway" was sharply detailed, and I could readily discern audible tape hiss on the Alison Krauss mix. Only when Krauss belted certain high notes did I detect a touch of tweeter grit.

Stereo imaging on the YSM-1s is not as impressive as on the K•RoKs, but the soundstage seemed equally deep. During the Mahler piece, with eyes closed, I could easily follow the location of each solo vocalist amid the huge choir, even when there were four soloists singing at once.

It was a pleasure mixing on the YSM-1s, and the resultant mixes translated exceptionally well to other playback systems. (In fact, the mixes I did using the YSM-1s were my favorites.) And, thanks to the monitor's overall smooth response, ear fatigue was nonexistent.

FINAL PASS

It wasn't too many years ago that the most affordable audio components were often the least desirable. This is no longer the case. Clearly, speaker manufacturers are continuing to hone their craft while keeping a deft eye on

Points of Fact

Manufacturer/ Model	Type	Frequency Response	Sensitivity (1W/ 1 meter)	Crossover Frequency	Power-Handling Capacity	Nominal Impedance	Dimensions (inches)	Weight	Price (per pair)
KRK K•RoK	front-ported	57 Hz–19 kHz (±3 dB)	92 dB	2.5 kHz	100W continuous/ 250W peak	8Ω	14 × 12 × 10	18 lbs.	$449
Tannoy SBM	front-ported	45 Hz–20 kHz (±3 dB)	90 dB	3.2 kHz	100W peak	6Ω	14 × 9 × 9	13 lbs.	$295
Yamaha S-55	front-ported	55 Hz–40 kHz (±3 dB)	90 dB	2.5 kHz	140W program/ 250W peak	6Ω	15 × 10 × 9	11 lbs.	$398
Yorkville YSM-1	front-ported	40 Hz–20 kHz (±3 dB)	90 dB (2.83 V/1 meter)	2.5 kHz	70W program	6Ω	16 × 10 × 9	18 lbs.	$280

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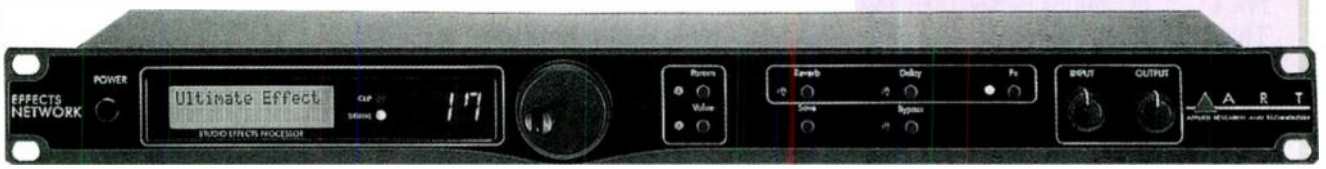

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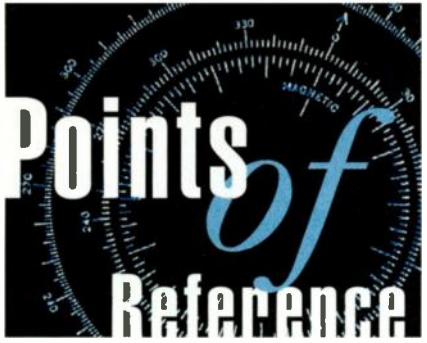


the demands of the market. It may not seem logical, but the positive news is that good reference monitors *can* be had for less than $450.

All four of the models I compared in this face-off are exceptionally good values. Each monitor has its virtues and shortcomings, but considering the prices, they're all winners. Of course, the whole point of a comparison is to split hairs and magnify differences, so here's how I would choose my points of reference.

Wide-open spaces. For a big, bright image with bone-shaking lows, nothing here tops the KRK K•RoK. This was my favorite monitor for delicious playbacks, and several of my musician friends liked them best as well. Their thundering aggression is matched with remarkable clarity and midrange detail, and their imaging was the best of the bunch. Furthermore, I dig the way they look. On the downside, although I love the initial K•RoK blast, I'm a bit wary of their tendency to make ordinary tracks sound awesome. For a critical reference monitor, I tend to prefer a somewhat tamer beast that doesn't "hype up" the delicious frequencies.

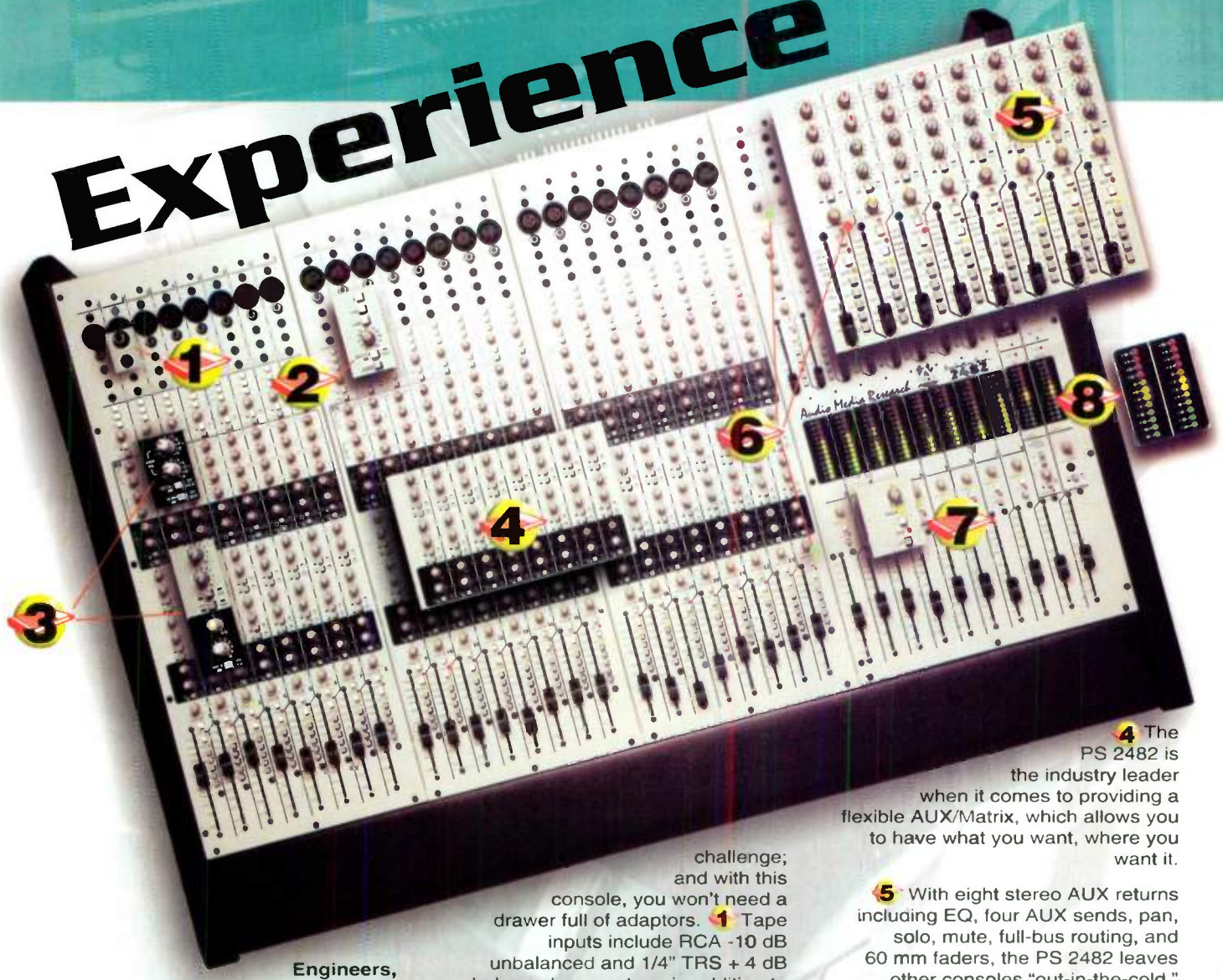
Smooth ride. I'm not sure what Tannoy had in mind, but in my book, SBM stands for Small Blastin' Monitor! The tight bass response is impressive, and the high-end resolution is smooth without a hint of grittiness. The SBM is a good-looking monitor as well, with classic restraint and a smart, dappled finish. Though some listeners may like the warmth of the SBMs, I found that the slight lack of "air" in the upper mids sometimes made it difficult to hear subtle details.

Here, there, and everywhere. The Yamaha S-55 strives to be all things to all users, and it is somewhat compromised by its versatility. Although it is certainly seductive enough for home-theater use, punchy enough for multimedia-game play, and powerful enough to see action as a live-performance speaker, the S-55 isn't quite accurate enough for studio reference monitoring. These monitors might prove an ideal choice for the singer/songwriter who records demos during the week and plays coffeehouses on weekends. (The push-terminal speaker connections make setups and breakdowns a snap.) Frankly, they're not my cup of tea in the looks department, but then I never understood all the fuss over Sharon Stone, either.

Trusty compass. Verisimilitude is seldom a provocative or exciting quality, but it's a fundamental issue for reference monitors. The Yorkville YSM-1 isn't big on personality, but its honest portrayal of the audio spectrum makes it a monitor worth befriending. Stereo imaging is very good, resolution is consistent in every frequency range, and bass response is excellent. Considering that it's the least expensive of the lot, I was quite impressed by the YSM-1. When the YSM-1 says, "Trust me," you can count on its tonal integrity without reservation.

Assistant Editor **Brian Knave** *regards audio transduction as one of life's great wonders. Really.*

Experience



Engineers, producers, and recording artists with extensive commercial recording experience will tell you that a recording console has to be functional when the clock is ticking, but must also have superior auditory performance. That experience created the PS™ 2482. Peavey's Audio Media Research division has made "in-studio" functionality and auditory performance key objectives in the PS 2482 production console.

To get the best signal performance, input levels need to match. The PS 2482 meets that challenge; and with this console, you won't need a drawer full of adaptors. 1 Tape inputs include RCA -10 dB unbalanced and 1/4" TRS + 4 dB balanced connectors, in addition to XLR mic and 1/4" line-in and direct outputs. 2 Phantom power, polarity reverse, and pad switches are functions that experienced engineers will not do without, so we've incorporated them into our discrete preamp's gain section. A channel/tape switch allows you to "flip" between channels and tape (like every good in-line console should), and we also give you a high pass filter.

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By Julian Colbeck

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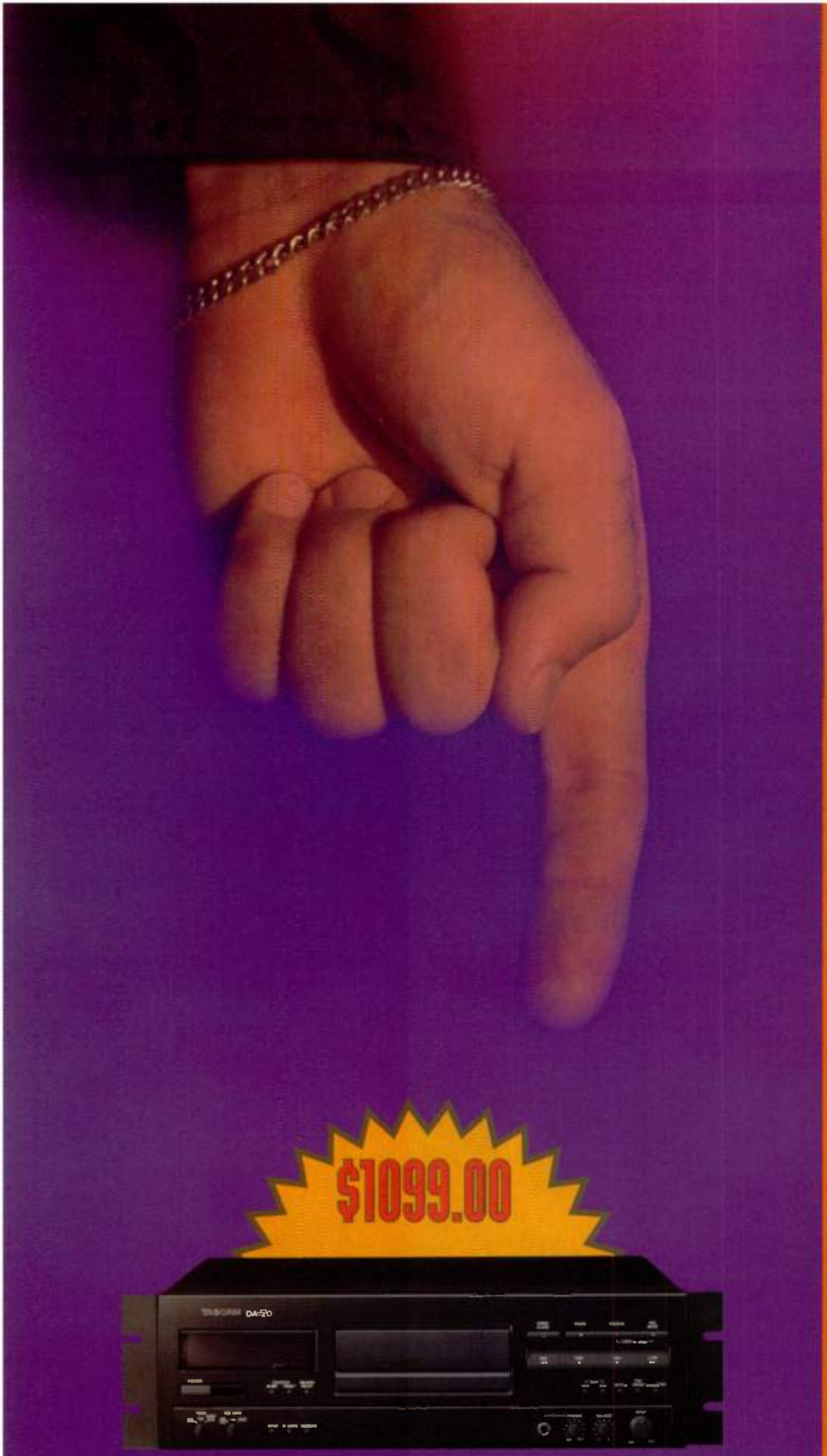
- **Unless you work in international** finance or have been a member of the U.S. Air Force, the northern German city of Frankfurt probably means just one thing to you: hot dogs. Indeed, wurst of one persuasion or another is a delicacy here, but Frankfurt is also the scene of the musical-instrument industry's premier trade show. By comparison, America's Winter NAMM show is nothing more than a pipsqueak.

- **The Frankfurt Musikmesse** ("music fair") is particularly interesting for a couple of reasons. First, the synthesized dance music we know as "techno" was forged in the warren of ear-shattering nightclubs in and around Frankfurt. In addition, although European manufacturers are going through something of a renaissance in the mid 1990s, much of their progeny is not widely available in America, and in some cases, these products are not available at all in the U.S.

- **Most of the hot** European manufacturers these days are found in Italy and Germany. The U.K. is still strong in sound reinforcement, but it's only sporadically active in other segments of the market, most notably with analog synthesizers from Novation.


Illustration by Jamie Hogan
Frankfurt
PASSPORT
United States of America



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Italy boasts Generalmusic, Farfisa, Viscount, Eko, Orla, and Fatar, which maintain the country's output of organ-oriented home keyboards and digital pianos. German manufacturers come in three distinct flavors: traditional, organ-based companies such as Hohner, Wersi, Bohm, and Solton; special-interest synthesizer companies, including Waldorf, Quasimidi, and Doepfer; and software companies, such as Steinberg and Emagic.

Yamaha MD4

SYNTHESIZERS

At the Musikmesse, Doepfer's A-100 system (see "Living Fossils" in the November 1995 **EM**) could be heard burbling away with its vast army of modules in tow. A high-end VCO (A-111) with soft sync inputs and linear FM was previewed along with a Digital Noise/Random Clock/808-Source module (A-117). Purists might prefer the A-117, which employs analog square-wave oscillators, to Roland's new MC-303 unit, which uses TR-808 samples. Doepfer also unveiled some splendid vocoding modules, including the A-129/1 Analysis and A-129/2 Synthesis Units, the A-129/3 5-fold VC Slew Limiter/Freezer, the A-129/4 5-fold Attenuator/Offset Generator, and the A-129/5 Voiced/Unvoiced Detector.

A horizontal half-rack sound module was the only new item in the Electric Music booth, although there were a number of vintage synths on hand. The Will Systems MAB-303 appears to be a sensible blend of authentic TB-303 features, complete with 18 dB/octave filtering, Slide and Accent functions, and modern control features, such as Aftertouch control of filter and pitch. Based on the current exchange rate for the German mark, its price is at least $500.

Sibelius *Sibelius 7*

Waldorf has made a name for itself in the U.S. with the imposing and stylish Wave keyboard synth and MicroWave sound module, both derived from the PPG school of wavetable synthesis. The company now offers the Wave in a range of colors, polyphonies, and keyboard sizes.

Also in the Waldorf booth was the X-Pole Dual Filter, a 2U rack-mount filter module culled from the Pulse synthesizer (described in "NAMM's Greatest Hits" in the May 1996 **EM**). This is a 24 dB/octave, 4-pole cascade filter that can be used in stereo or dual mono; the filters can also be cascaded for 48 dB/octave operation. According to a company representative, Waldorf only decided to make this product two or three days before the show, so no price details were available.

Finally, Waldorf showed the Gekko, a bright green blob of plastic with a single button that provides chord memory for any keyboard. You connect it to the keyboard via MIDI, play a chord, and press the button. Then, when you play a single note, the specified chord appears (transposed according to the played note). If you've ever bemoaned the removal of this feature from modern synths, the Gekko is for you. It's not coming to America, though, so you will have to import one.

Electronic percussion is a field that has become quite spacious now that KAT seems to have exceeded its limit of nine lives. This product genre was

invented by Britain's Dave Simmons back in the 1980s. Although the Simmons company is but a shadow of its former self, the TurtleTrap (a drum-KAT lookalike) may yet revive Simmons with its ten small hexagonal pads within a larger hexagonal frame.

StringDrum is a Swedish company whose eponymous product line is a series of electronic-drum modules. These devices look like space-age guiros with wires stretched across the top, which you strike to play notes. You can change the tension of the wires without affecting the pitch, which lets you change the tactile characteristic of each unit. Happily, StringDrums are not expensive (less than $100 per unit). This product is ingenious, and it follows Sweden's apparent penchant for electronic-drum products; after all, the ddrum was born there, too.

MINIDISC RECORDERS

Frankfurt used to be strictly a music messe, as opposed to a pro audio or recording messe. In 1995, two additional halls were opened for the recording and sound-reinforcement industries. It was here, in the TASCAM booth, that I saw the first of three MiniDisc-based multitrack/mixer combos, which may represent the shape of things to come in the entry-level home-recording field. All three units at the show can record up to 37 minutes of audio per track thanks to data compression. In addition, they all use MD Data discs, which are more robust than standard MiniDiscs.

TASCAM's 4-track 564 Digital Portastudio includes a jog/shuttle wheel, 3-band EQ with sweepable mid, S/PDIF digital output, direct track outputs, and four balanced, XLR mic inputs. Unlike analog cassette multitracks, the 564 lets you bounce tracks to different songs while retaining their stereo image. Up to 99 nameable Index points let you play song sections in any order, and you can divide and combine different sections at will. The price has not been established. TASCAM expects the unit to ship by late summer.

Yamaha's offering, firmly ensconced in plexiglass in the company's booth, is the MD4. This unit syncs to MIDI Time Code and includes a 4-channel analog mixer with 3-band EQ and a single aux send and return. The MiniDisc medium provides speedy access to any point within a song for both recording and playback, but there's no jog/shuttle wheel. The MD4's list price is currently specified at £1,000 (less than $1,500).

The bustling Doepfer booth at the Frankfurt Musikmesse.

Sony's MD-MTR features an analog mixing section with four mono channels, one stereo channel, and two stereo aux returns, for a total of ten inputs. The MD-MTR includes a jog/shuttle wheel, footswitch punch in/out, and plenty of digital editing features, such as undo, move, and combine. No price was announced.

SOFTWARE

Among the most exciting software offerings at the show was a notation package from Sibelius in England. Called *Sibelius 7*, this program is unusual for several reasons. First of all, it runs on an Acorn RISC computer, not a Mac or PC. Coupled with the fact that the program is written in assembly language, this makes the system extremely fast. It's so fast that reformatting after

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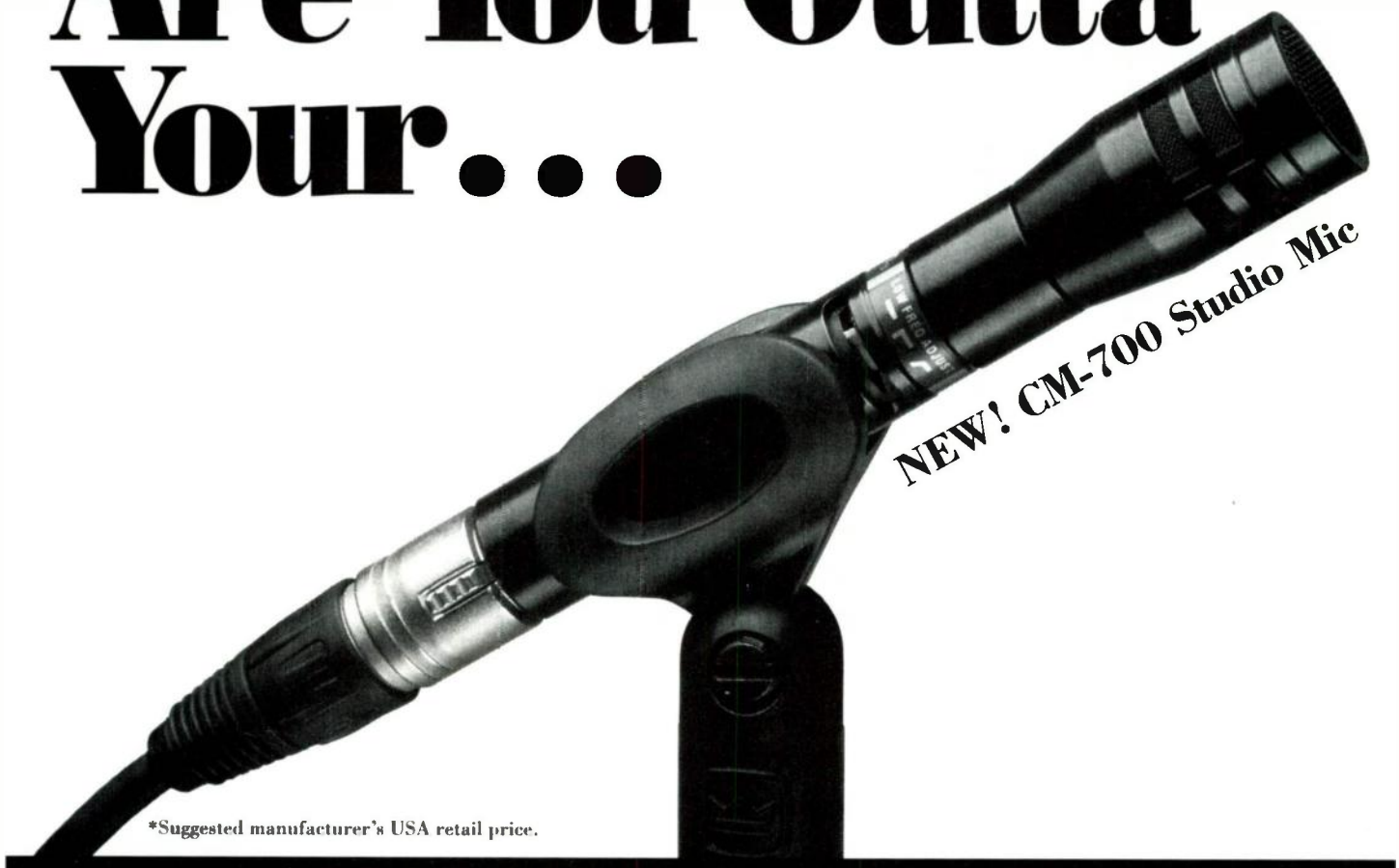

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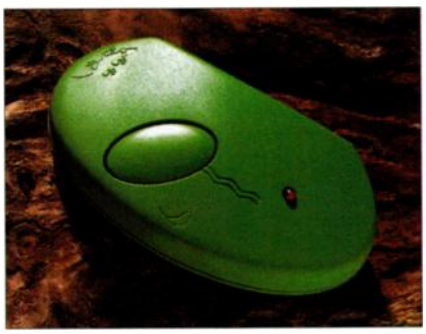
editing a score the length of Wagner's *Ring Cycle* takes less than a tenth of a second!

Sibelius 7 is an extremely intelligent program, and all the mechanics of notation are present. These include automatic positioning of flags, spacing, and insertion of rests as soon as you place a single note in a bar.

In addition, the program automatically transposes for the appropriate instruments. Most recently, the program's developers have included the ability to transcribe rubato input from a MIDI keyboard (a feature they call Flexi-time); the internal clock responds instantaneously to your changes in tempo. The cost of a complete system, including an Acorn computer (which can be upgraded with a PC card to run Windows 95), is around £2,000 ($3,000).

In Europe, most MIDI music is created on Atari computers. Sadly, these machines are no longer in production. However, C-Lab showed a cost-effective, modular system centered on the Falcon MK X, the latest incarnation of the Atari architecture that C-Lab is now manufacturing. Even the most basic system offers up to sixteen channels of digital audio running software such as Steinberg's *Cubase Audio.*

For editing and mixdown, the C-Lab system includes both ADAT and S/PDIF I/O options. For more sophisticated mastering jobs, the SoundPool Audio-Master upgrade lets you perform multiple crossfades and sample-accurate edits, and it saves files in AIFF format. The system can even be upgraded to provide computer-animation and video capabilities with a Falcon MK X package from Studio Capitale in France.



Waldorf Gekko

On a slightly less rarefied level, C-Lab is offering "the heart of an Atari ST in the body of a PC." The STzer is an ISA-bus card complete with MIDI ports and a cartridge slot that fits inside your PC, which lets you run Atari ST programs, such as *Cubase* and *Notator.* This is most pertinent to the legions of European ST users who are currently frustrated with music packages for the PC.

DANCE THIS MESSE AROUND

So the next time someone mentions Frankfurt, don't just think of the wurst; think of one of the European music industry's best trade shows. And speaking of the best, I'm off to the hof brau to sample the local art of brewing. Cheers!

Julian Colbeck *is a working keyboard player, author of far too many books, part-time vidiot, and co-creator of the Twiddly Bits MIDI files.*

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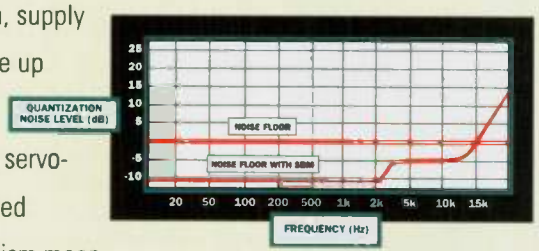

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WORKING MUSICIAN

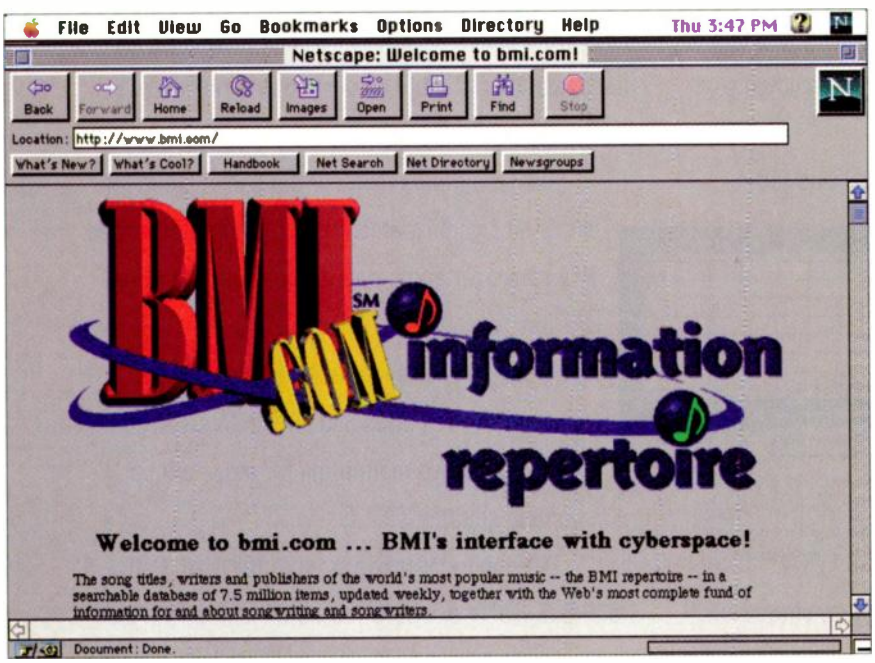
The Road to Self-Publishing

Learn how to establish and maintain your song-publishing rights.

By Michael A. Aczon

Sometimes I ask myself, "What if John Lennon and Paul McCartney had read an article of mine back in 1960? What business advice would I have tried to impart to a pair of young and terribly gifted songwriter/musicians?" The relative bargaining position of performing songwriters has changed in the last few decades, so my hindsight is clearly 20/20. Given that music publishing has turned some songwriters into millionaires, my advice to those lads from Liverpool would have been to hang on for dear life to the rights to those songs and publish the songs themselves.

If you're not comfortable giving away or sharing the publishing rights to your songs, you should consider establishing your own publishing company. In this month's column, I will go over the basics of music publishing and arm you with enough information to help you decide whether you should tackle the administration and exploitation of your songs all by yourself.



Performing-rights societies can be crucial to a working musician's livelihood. Some of the services they provide are licensing the use of your compositions and collecting and paying out royalties. BMI, whose home page is shown above, is one such organization.

THE ROOT OF IT ALL

The U.S. copyright law was originally enacted in 1909 and was amended to its present form in 1976. From this law emanate the rights that establish the basis for the entire multibillion-dollar music-publishing industry.

Copyright holders are entitled to five basic sets of rights. The first of these is the right to issue mechanical licenses to produce records or print sheet music. Second, there's the right to perform your copyrighted works. This is the primary right that allows performing-rights societies to collect and pay royalties for radio and television airplay. Third is the right to make derivative works (e.g., adding lyrics to instrumental-only works or having music sampled by other artists). This right enables copyright

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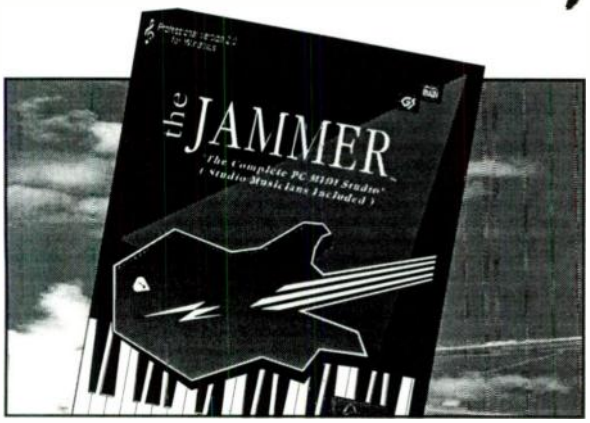

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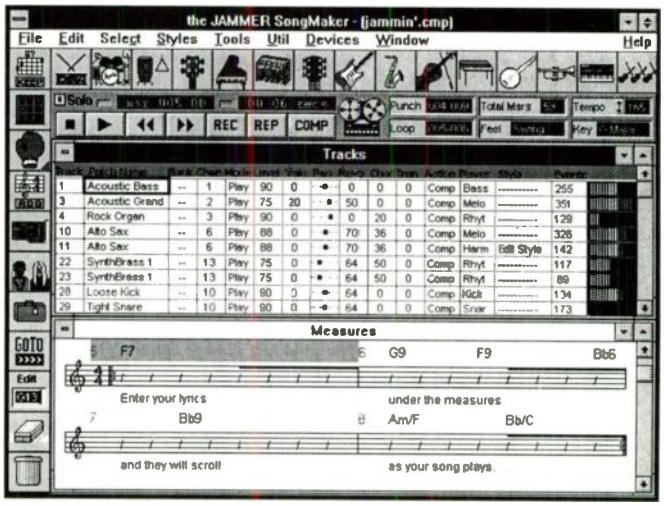

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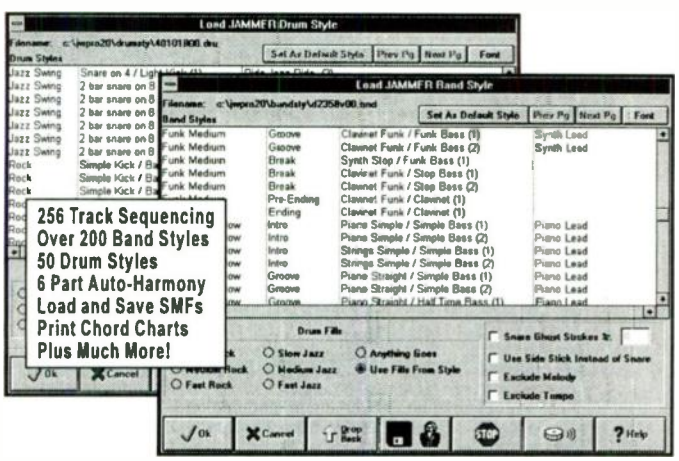

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holders to either prevent alteration of their works or receive payment or royalties from the persons altering the original work. Fourth, there is the right to display. This right has traditionally related to visual works but is now becoming an important issue for use of musical works, especially with the emergence of multimedia "displays" of music via the Internet and CD-ROM. Fifth, copyright holders have the right to publish or exploit their work through business transactions, essentially the buying and selling of musical compositions.

COPYRIGHT REGISTRATION

I like to think of the copyright registration for a musical composition as being analogous to the "pink slip" for an automobile. When a song is fixed in a tangible medium (for example, tape recorded, sequenced and saved, or charted out using notation software), it's eligible to be registered with the Register of Copyrights. By filing a copyright registration form, paying a fee of $20, and submitting a copy of the work, the copyright holder has the composition filed away in a massive database of works and protected by the copyright law.

There are a few registration details to note, however. Remember that there is a distinction between the registration of a composition (the song itself) and the registration of a sound recording (the tape the song is recorded on). In cases where both the song and the master are owned by the same party or parties (e.g., a solo songwriter/musician cut a master of a number of songs that he wrote by himself), one form (copyright registration form SR) can serve to register both copyrights. Another often-asked question is whether a number of songs can be registered on the same registration form to save money. The answer is yes, but if any one song is to be sold or licensed, be sure to file a separate form with the copyright office, explaining that one song is being extracted from the multiple registration. Using the "pink slip" analogy, it would be disastrous to sell away an entire fleet of cars, thinking that you were only selling one of them.

THE INCOME BREAKDOWN

Let's turn now to the various sources of income generated by the exploitation of copyrights of musical works. The income is split into four main categories: print, synchronization, performance, and mechanical.

Print income. Historically speaking, this was the primary source of income in the early years of the music business. Back in the days of vaudeville, before there was widespread radio and phonograph ownership, sales of sheet music and folios were the staple of the music-publishing trade. Even though audio technology has pushed the sales of sheet music to a lower percentage of publishing income, behind mechanical and performance income, music-publishing technology may be bringing print income back somewhat. It is not unusual to go to a music store now and order up sheet music from a database housed in a kiosk, hit a print key, and have sheet music printed right on the spot. With the availability of easy-to-use notation software, it is relatively simple for individuals to go into the sheet-music business if they can find a niche market. I once represented a sheet-music publisher who specialized in arrangements of Latin music for high school and college bands and did pretty well for himself.

Synchronization income. When a song is utilized in synchronization with a film, video, or other audio-visual work, the copyright holder issues a "sync" license to the user, establishing the type, duration, and price for such use. With the proliferation of television stations, independent movies, infomercials, CD-ROMs, games, and various multimedia opportunities, synchronization income is turning into

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the lifeblood of many independent musicians.

The price of a sync fee varies dramatically based on a number of factors, including whether or not the song was a hit, how the song is to be used, whether the song will be altered (as with the commercial adaptation of the lyric "nacho man" to the Village People hit "Macho Man"), and how long the song will be used. Given all of these factors, one-time use of a song that a company is going to use for an in-house training film may only amount to a hundred dollars, but multiyear use of a hit song for a beer commercial can easily run into the hundreds of thousands of dollars.

Performance income. From the use of musical compositions in restaurants and airplanes to airplay on radio, television, and the Internet, performance royalties generate a substantial amount of income for songwriters and publishers. By affiliating with ASCAP, BMI, or SESAC, an independent songwriter/publisher grants one of these performing-rights societies the right to license others to use the songs, collect the money generated from such use, and pay out royalties (see "Working Musician: Performing Rights Societies" in the October 1992 **EM**). These organizations issue "blanket licenses" to users such as radio and television stations, allowing them to use all songs in each society's catalog. The license fees vary based on the size of the potential audience. A small restaurant with eight tables will pay a much smaller license fee than a 50,000-watt radio station with a large listening audience.

Songwriters and publishers inform their performing-rights societies of songs they have recorded and are likely to perform. Performing-rights societies then use a number of surveying techniques—including television logs of the songs and actually listening to radio stations—to determine approximately how often a song was performed and, in turn, what share of the total license revenue each song generated. A portion of this income is retained by the societies for administrative costs, and the balance is paid out to the songwriters and publishers of the various songs. A crossover hit, such as a song that is at the top of both the pop and country charts, can earn in excess of $125,000 to $200,000 in a year, based on the longevity of the song.

Mechanical income. The easiest income to calculate for the independent writer/publisher is mechanical income. In order for a record label to manufacture and produce records containing a copyrighted song, the copyright holder must issue a mechanical license to the label, setting forth the fee, the timing of payment (e.g., quarterly or semiannually), and any applicable restrictions regarding the sale of records using the song. Although the mechanical-license fee is negotiable, the copyright tribunal (an administrative body established in accordance with the copyright law) sets a statutory rate for mechanical licenses. Currently, this rate is 6.95 cents/song per record sold. Assuming sales of 100,000 units of a 10-song album, $69,500 is generated from the use of the songs. This income is usually split evenly between the songwriters and publishers.

GOING SOLO

Most budding musicians are forced to self-publish simply because no one else is interested in doing it for them. But

with so many artists making a go of it with independent releases, many are also opting to keep the publishing duties—and income—to themselves.

The primary roles of a publishing company are to *(a)* perform A&R duties, find writers, and match up the songs with the right artists; *(b)* be a sales vehicle for the writer's talents by finding writing and publishing opportunities, such as pitching songs to artists, arranging collaborations, or even shopping a record deal; and *(c)* handling the executive, administrative, and business duties, such as filing the copyright forms, cutting deals to share publishing revenue, interfacing with performing-rights societies, issuing mechanical licenses, and collecting the money.

If you find yourself able to perform most of the duties listed above—particularly if you are releasing your own record—perhaps you should control your own copyrights. There are some business basics to adhere to when setting up a publishing company, so take heed. Just like setting up your own band or record label, forming a publishing entity may include drafting a partnership agreement if you're working with others, getting a separate tax ID number, and so on (see "Working Musician: Getting Down to Business" in the January 1993 **EM**). Before filing for a fictitious business statement in your county and investing in stationery and business cards, it would be wise to reserve your proposed publishing-company name with the performing-rights society of your choice. Many writers are disappointed when they find out that the fanciful name they've wanted to use for years is already in use by another publisher.

If your songs are being released by a third-party record company, you can either issue a mechanical license yourself with the aid of an entertainment lawyer or other music-savvy advisor or utilize the services of the Harry Fox Agency, a mechanical-licensing organization located in New York City that, for a small fee (usually about four to five percent of what it collects), issues mechanical licenses and collects and disperses the royalties to publishers. If you are putting out your own record, it is good practice to issue yourself a mechanical license to keep a clear business separation between your record-company activities and publishing activities. Another option may be to hire a music-licensing consultant to take care of these administrative duties for you. A consultant's fees vary between an hourly rate, a percentage of your earnings, or a hybrid of the two.

Next, you should report all of your songs to your performing-rights society so they will show up on the survey of airplay. ASCAP, BMI, and SESAC cannot look for your songs if they are unaware of what they should be looking for, so don't overlook this detail.

Probably the most difficult task is finding homes for the songs. If you release your own record, I recommend that you try to expand the uses of your songs by pitching them to bigger acts, independent multimedia and video producers, or independent-music supervisors looking for songs for films and/or TV. Let's face it: you will probably charge a lower sync fee than Sting, and you are also bringing them a master recording, so they can do one-stop shopping.

▼

Acting as your own publisher lets you keep a bigger piece of the royalty pie.

AND YOU WERE THERE

Although I can't turn back the clock and place myself in Liverpool in the early '60s, I can snap out of my daydream and say that the opportunities available to self-publishers today are literally limited only by your imagination. With the major gains in technology fostering more independent productions, I can only imagine what kind of damage Paul and John could have done by keeping their copyrights. Hopefully, you can do the same by keeping your copyrights and publishing your own songs.

Michael A. Aczon *is an entertainment lawyer who teaches music publishing in the Music and Recording Industry program at San Francisco State University.*

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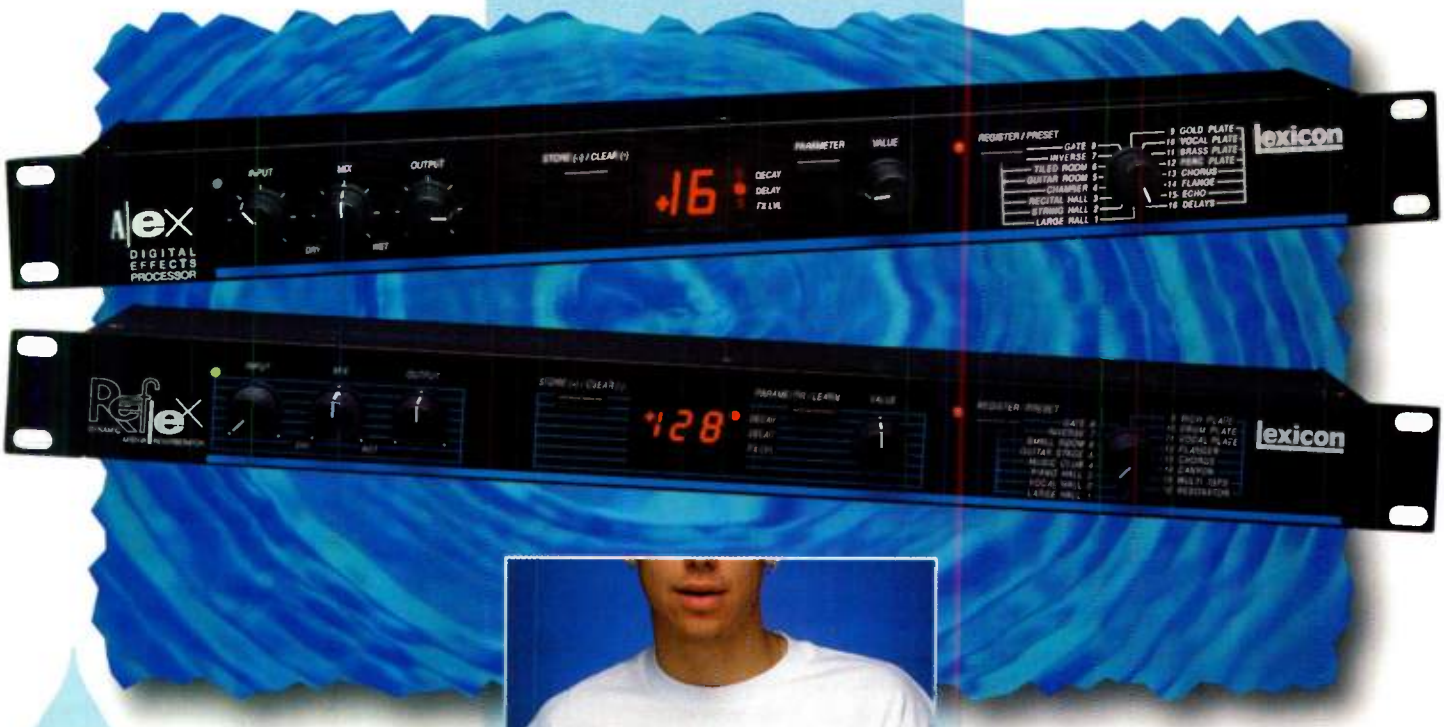
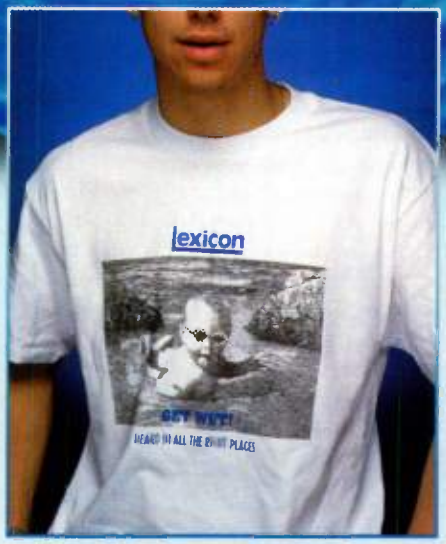
PERFORMANCE SERIES

Here's Three Very Cool Ways to Get Wet This Summer



Cool Way #1: *Alex™ offers Lexicon's legendary digital reverb & effects processing in a remarkably affordable package. There's* ***16 phenomenal presets*** *including numerous superb reverb programs with halls, rooms, plates, gates — even an inverse room. For preset tweaking, there's up to 3 adjustable parameters (over 4,000 effects combos!) — and another 16* ***user registers*** *for storing your own unique patches. Alex is stereo In & Out and also features multi-voice chorusing, flanging, straight echoes & stereo multi-tap delays.*

Cool Way #2: ***Reflex™*** *is our Dynamic MIDI® reverberator — it goes beyond Alex with* ***new effects*** *like randomizer and early reflections, tunable chromatic resonator...and full* ***Dynamic MIDI implementation*** *(with up to 4 patches/effect).* ***Reflex*** *offers an advanced programming mode and* ***MIDI Auto Tempo*** *for synchronizing delays to MIDI. Visit your participating "Get Wet" Lexicon dealer now (see list at left) and check-out the really cool summer deal$ on* ***Alex*** *and* ***Reflex*** *- but only while supplies last.*



Cool Way #3

Get your own "Get Wet! Classic Lex T"

For a limited time only, "Get Wet" by following the instructions in the coupon.

Lexicon

Heard In All The Right Places

Tel: 617/736-0300 Fax: 617/891-0340
E-Mail: 71333.434@compuserve.com

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GET WET!

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*Address*_____

*City*_____ *State*____ *Zip*____

*Phone ( )*_____

Size (check one) Large ❑ Xtra-large ❑

Price: $13.95 U.S. (includes shipping & handling). Please allow 2-4 weeks for delivery. To place a credit card order call: 1 (800) 924-4950. Money Orders also accepted. Offer valid in U.S.A. only while supplies last. Send coupon to: ***Lexicon Get Wet T Offer*** *100 Beaver St. Waltham, MA 02154*

DESKTOP MUSICIAN

Postcards from the Web

EM *reviews some cool Web sites (so you don't have to).*

By Jennifer Conrad Seidel

The only thing more frustrating than not having World Wide Web access is having it and not using it. If you're like most of us, you already have a day job that crowds in on the time you have to make music. So spending a few more hours away from your music to browse the Web in the hope of finding *something* that will enrich your musical pursuits isn't really practical (especially because browsing can be like digging for buried treasure with a spoon).

DMITRY PANICH

In the face of such frustrations, we've decided to take a good, close look at some Web sites a few times a year and let you know what we've found. Your time is precious, so we won't just announce these sites, we'll review them. We'll get input from some of our writers and look at everything we can, whether homemade or professional, free access or subscription based, nonprofit or commercial.

You'll find addresses (aka URLs) for the sites mentioned here in the sidebar "Recommended Viewing." You may also want to look at the glossary of Internet terms in this month's "Square One" column on p. 108.

SITE INSPECTION

After a lot of U-turns and false leads, I came across some great pages. These site descriptions are intended to give you an idea of whether you or your projects would be enriched by a visit.

Home Recording Rights Coalition. The HRRC describes itself as "a coalition of consumers, consumer groups, associations, retailers and consumer electronics manufacturers dedicated to preserving your right to purchase and use home audio and video recording products for noncommercial purposes." At their site, you'll find updates on proposed congressional legislation, an archive of past HRRC newsletters, petitions against pending legislation that you can "sign," and a link to the

64 VOICE POLYPHONY---5 MEG OF ROM---640 PROGRAMS---61 NOTE KEYBOARD---500 MIXES

Creativity Is Priceless. Now, It's Also Affordable.

Introducing The Alesis QS6

How much is your creativity worth? You really can't put a price on something so valuable. The powerful new **QS6™ 64 Voice Expandable Synthesizer** gives you everything you need to push your creativity to new levels. It's the affordable solution for musical inspiration.

Studio Quality Sound

The QS6 has everything from realistic acoustic instruments to cutting-edge and vintage synth sounds, all accessible at the touch of a button. Its digital 16-bit linear non-compressed samples provide warm, clean, and incredibly accurate voicing for every performance. The onboard multieffects - reverb, chorus, flange, delay, rotating speaker effects and more - use the same advanced processor as our Q2™ Master Effects. Combine these effects with the massive sound library, and you'll create CD-quality mixes right from your synth. QS6's rhythmic/ sonic loops let your creativity groove just by holding down a single key. The semi-weighted keyboard offers velocity, release velocity and aftertouch for expressive playability. It's all packed into a tough all-metal chassis that will take the punishment when you take your show on the road.

Variety and Expandability

The QS6 offers a huge palette of internal sounds - 8 megabytes of sample waveforms, 640 Programs, and 500 Mixes - giving you thousands of timbral options to choose from. This sonic library can be expanded instantly by simply plugging in a 4MB or 8MB Alesis QuadraCard™, like our acclaimed Stereo Grand Piano card.

Also, the QS6 includes Alesis' exclusive Sound Bridge™ software (for Mac and PC) which allows you create custom cards with your own sound files from your computer. This innovative technology guarantees that you'll always have access to new sounds.

Powerful Synthesis Engine

The QS6 uses the same advanced synthesis architecture as its big brother, the QuadraSynth Plus™. True 64-voice polyphony lets you assemble complex sequences and rich, stacked chords. Its 16 channel multitimbral Mixes and a built-in computer interface (also for Mac and PC) give you easy access to the world of MIDI sequencing, software and composition. In fact, we've included a free CD-ROM with the QS6 that's packed with extra sounds, killer sequences, and Steinberg's Cubase Lite™ sequencing software to help get your creative juices flowing.

The QS6 is an instrument that was crafted to help you unlock your creative talents. Stop by an Alesis Dealer and start creating new music with the newest keyboard from Alesis.

For more information about the QS6, see your Authorized Alesis Dealer or call 310-841-2272.
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ALESIS

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EXPANDABLE TO 16MB---RHYTHMIC GROOVES---SOUND BRIDGE---ALESIS EFFECTS---SOFTWARE---QUADRACARDS---SERIAL DATA PORT---GENERAL

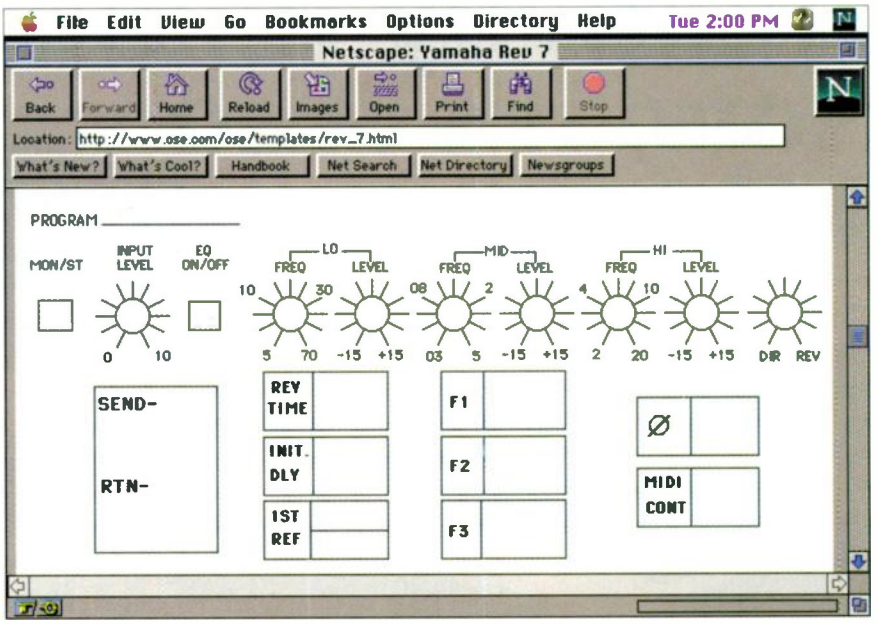

FIG. 1: OnSite Entertainment's Web site includes parameter templates for more than 30 signal processors, such as this one for the Yamaha Rev 7.

Digital Future Coalition's home page.

You don't have to be a staunch fighter of big government to be interested in the HRRC site. Music consumers and producers alike would benefit from investigating current home-recording laws. I suggest that you drop in on this site every few months, especially when legislation is pending, to keep yourself involved and informed.

MIDI Home Page. I looked around at about a dozen good MIDI-related sites, but the MIDI Home Page, maintained by Heini Withagen, was the best one-stop site I found. One of the site's strongest points is, obviously, its links to all the other MIDI pages. You have to start somewhere, and I suggest you start here.

The MIDI Home Page provides resources to both MIDI veterans and newcomers. Those new to MIDI will find helpful features such as an introduction to MIDI and an online explanation of the differences between GM (General MIDI) and GS (Roland's superset of GM Level 1).

More experienced MIDI users will love the links to newsgroup sites (such as news:rec.music.makers.synth and news:alt.music.midi). These newsgroup sites have archives of articles and discussions on every MIDI-related topic imaginable. Another irresistible link jumps to an overview of online MIDI archives—an incredible list of programs and patches for all types of music.

OnSite Entertainment, Inc. At first glance, this site seemed to do what some other sites already do better: give links to entertainment-industry contacts and related newsgroups (such as rec.audio.high-end and relcom.commerce.audio+video). But this home page offers one thing that I haven't seen anywhere else: parameter templates for "the most common outboard gear found in modern recording studios." Recordists who don't have fancy

RECOMMENDED VIEWING

Christian Music Industry E-mail List
http://www.cis.ohio-state.edu/hypertext/faq/usenet/music/christian/industry/faq.html
Home Recording Rights Coalition
http://www.access.digex.net/~hrrc/
The Internet Music Dealer Network
http://www.musicdealer.com/
MIDI Home Page
http://www.eeb.ele.tue.nl/midi/
MIDI Web
http://www.digiface.nl/midiweb/index.html
OnSite Entertainment, Inc.
http://www.ose.com/ose/
Synth Zone http://www.rain.org/~nigelsp/
Worldwide Internet Live Music Archive (WILMA)
http://www.wilma.com

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TRINITY
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KORG®

automated mixing systems can use these templates to write in parameter values and document favorite settings.

You'll find these templates (see **Fig. 1**) in JPEG (.jpg) format in the Assistant Engineers Corner. The last time I visited, I had a choice of 31 templates for products such as the dbx 165A, the Yamaha Rev 7, and the Roland SDE-3000. Printing one of these templates is as easy as hitting the link and choosing Print. OSE welcomes any templates you have; just e-mail their webmaster from the OSE home page.

Synth Zone. Electronic musicians will be happy to discover that Synth Zone, "an attempt to ease the search for synth resources on the Internet," does what it sets out to do. Synth Zone's home page features buttons that bring up information on synths made by twenty manufacturers, including Alesis, E-mu, Ensoniq, and Roland, to name a few. I checked out a couple of these pages to see what kind of resources were offered. The Korg page had links to twenty Web pages, nineteen patches, and fifteen types of software. The Oberheim page, however, only had a total of six links to sites and patches.

The Synth Zone home page also has a section for Other Related Resources, including links to pages of analog-synth resources, online dealers, MIDI goodies, and products and demos from a variety of manufacturers. The Products & Demos page had 77 links to manufacturer sites, FTP sites, and unofficial product sites—quite a cache for synth-minded musicians.

Worldwide Internet Live Music Archive (WILMA). This is a pretty popular spot on the Web (see **Fig. 2**). It is the kind of site people have in mind when they talk about the democratic opportunities made possible by the Internet. With WILMA, the not-so-big-time musician has the same access to the Web-wide audience that bands on million-dollar national tours have.

Users can search WILMA's Search-O-Matic database of nearly 5,000 venue listings and more than 1,600 artist listings by artist, city, or venue. Adding your own gigs to the database is free and easy with their online form. If you don't have your own Web page on which to promote your shows, you'll find that WILMA is a great alternative. If you let people know that you're part of WILMA, they can search the database to find out about your upcoming shows. Even those people who have never heard of you might see your shows listed when they search by city or venue. Get on it!

UGLY DUCKLINGS

During my quest for the best Web sites, I came across a few diamonds in the rough. These sites have potential, but they can't compete with the big guys yet. A few of these Web sites depend on user contributions, so if you do your

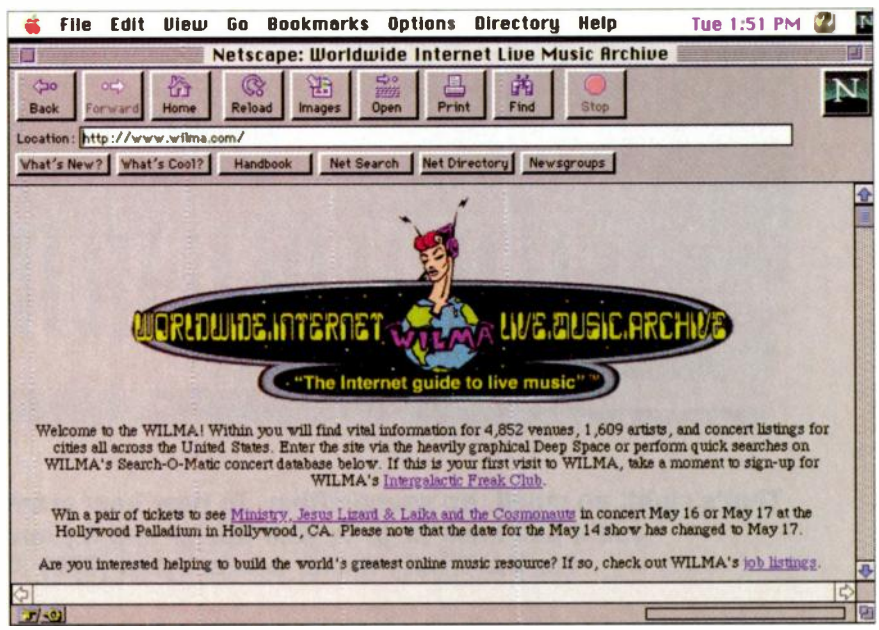


FIG. 2: You can get national publicity for even your smallest gigs with WILMA, the Worldwide Internet Live Music Archive.

part, these may appear on the "best of" lists before long.

Christian Music Industry E-mail List. Those of you involved with any of the underappreciated music genres (such as Celtic, electronic, or bluegrass music) should take a cue from this page: it's a text-only page of contact information for people working in or associated with contemporary Christian music (aka CCM). This page is ugly, but an unsigned artist could cover a lot of ground by contacting the deejays, radio-program directors, record companies, publications, and journalists listed here. When I looked at the "other" listings, I came across national and international numbers and addresses for managers, songwriters, concert promoters, recording studios, engineers, and even video directors. Users are, of course, welcome to add to any part of the list.

The Internet Music Dealer Network. This site could rival the "Musical Instruments, Retail" section of your yellow pages if it gets more dealers to participate. (Music dealers have to pay to be listed, of course.) The site intends to be a nationwide database of dealers that users can search by product or location. Currently, the database is in sorry shape and the search options are sparse. When I searched for "any participating music store" in Berkeley, California, I got a listing for a store in Pepperland, Florida. This site obviously does not live up to its promise of "allowing *local* musicians to locate their favorite music gear from their nearest *local* music store," but it shouldn't give up yet.

▼

The Synth Zone site features links for synths made by twenty manufacturers.

MIDI Web. This user-supported page is waiting for your input. Raymond Zwarts, the man behind MIDI Web, is soliciting articles (e.g., tutorials and explanations of commands), DIY projects, and for-sale and wanted ads. He makes a special plea for input from Mac users, as requests for Mac information exceed what has been contributed. This is a great opportunity for MIDI users from around the world to share their experiences and projects with one another.

WISH YOU WERE HERE

One of **EM**'s greatest resources is our readership. We would love to hear from those of you who are using the Web as a resource for your projects and endeavors. Send a list of your favorite sites and the reasons why they're your favorites to emeditorial@pan.com. We look forward to seeing what sites you recommend.

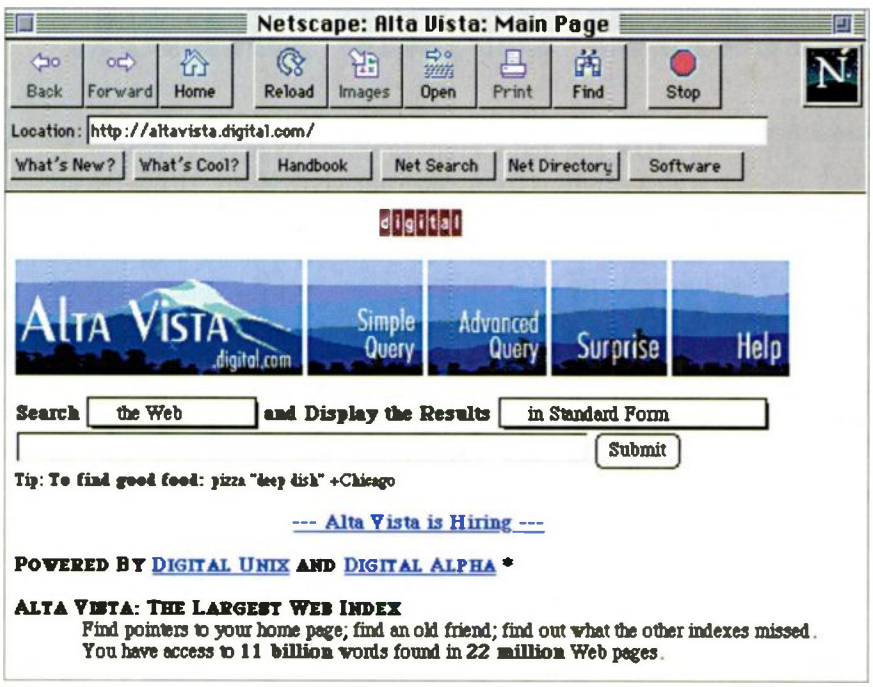
EM *Editorial Assistant* **Jennifer Conrad Seidel** *really got a kick out of researching this article. "Sprout" was busy doing the hokeypokey in her tummy while she browsed the Web.*

Internet Glossary

A beginner's guide to the signs along the information superhighway.

By Scott Wilkinson

The explosive growth of the Internet has spawned a whole host of new terms, acronyms, and phrases to learn. It is important for electronic musicians to understand this new lexicon if we are to make our way past the infobahn's pitfalls and potholes. So here are many of the terms that all netnauts must know—from slang to technospeak—along with their definitions. Terms in italics are defined elsewhere in the text. Happy surfing!



Alta Vista (shown in Netscape's *Navigator* 2.0 Web browser) offers one of the most powerful search engines on the Web.

A

address A string of characters that identifies the location of a *site* on the *Internet*. This term often refers to the destination of an *e-mail* message. The first part of an address is the user name, or *handle*, followed by an "at" symbol (@) and the *domain name* of the service that maintains the e-mail account. For example, one of **EM**'s e-mail addresses is emeditor@aol.com.

agent A type of software program designed to autonomously perform specific tasks in the background. For example, an agent might search the *Internet* for references to a particular subject you wish to study.

Archie A software program that resides on a *host* computer for finding specific files available from *FTP* sites.

ASCII Acronym for American Standard Code for Information Interchange. A cross-platform, standard code in which numbers are assigned to represent letters, numbers, punctuation marks, and common symbols. This allows different computers and applications to read each other's text.

attached file A program, document, or other file that is linked to and sent with an *e-mail* message. The attached document does not appear within the e-mail message; instead, it is linked to the message and sent along with it.

It took 10 years to get this one note perfect.

It will take you one second to agree.

Large, easy-to-use buttons provide instant access to several dedicated functions including independent control for eight keyboard zones.

The VE-RD1 Voice Expansion Board is where we put our years of sampling experience, our new stereo piano sample, 64-note polyphony and 128 sounds including classic keyboards, strings, basses and more.

Foot controller and footswitch inputs, hold pedal input and a unique total volume pedal input, left and right outputs, headphone output and even a breath controller input will make you one of the most well-connected players anywhere.

We've spent a lot of time looking for the perfect piano sound. You could too. Or you could simply look at the A-90EX Expandable Controller. With sound, feel, action and control perfectly combined, you'll discover an emotional connection you haven't experienced since playing your favorite acoustic piano.

By combining our all-new stereo grand piano sound with our proprietary award-winning PA-4 hammer action, the A-90EX has become our most dynamic keyboard ever. 20 assignable controllers include sliders, wheels, a bender/modulation lever and aftertouch for unsurpassed realtime performance control. The A-90EX even has four independent MIDI outs to control 64 MIDI channels and patch names for selecting sounds from many of Roland's expansion boards and sound modules.

The A-90EX is also available as the A-90, without the VE-RD1 Voice Expansion Board. Try one for yourself. And see how long it takes before you have to have it.

Roland

A-90EX Expandable Controller

Roland Corporation U.S., 7200 Dominion Circle, Los Angeles, CA 90040 (213) 685-5141
Roland Canada Music Ltd., 5480 Parkwood Way, Richmond, B.C. V6V 2M4 (604) 270-6626

SEE US AT NAMM BOOTH #'S 109 & 110

CompuServe: GO ROLAND Fax-Back Information: (213) 685-5141, ext. 271 http://www.rolandus.com

Both sender and receiver must use an e-mail program that supports attachments.

B

bandwidth A measure of the amount of information that can flow through a connection or device. In telecommunications applications, bandwidth is typically expressed in bits per second (bps), kilobits per second (Kbps), or megabits per second (Mbps).
baud rate The rate at which a *modem* can transmit and receive information. It is roughly (but not precisely) equal to *bandwidth*.
binary file Any file, such as a program or graphic document, that is not in *ASCII* format.
BinHex A method of encoding *binary files* so they contain nothing but *ASCII* characters. After encoding, binary files can be sent via *e-mail* without having to be an *attached file*. The receiving computer must have software that can decode a BinHex file back into its original format.
black hole On the *World Wide Web*, a *hyperlink* to a document that has been erased or moved.
browser A software program that lets you *surf* the *World Wide Web*, browsing for interesting information. Most current browsers can display graphic information, but a few (especially older ones) support text only. Popular examples include Netscape's *Navigator* and Microsoft's *Internet Explorer*.

C

channel A particular topic of discussion within *IRC*. Your computer must have IRC *client software* to participate in real-time chats, or you must be proficient in the use of a *UNIX shell account*.
client software A software program that resides in your computer and lets you access various *Internet* resources.
compression A means of reducing the amount of data needed to represent a file. Files on the *Internet* are often compressed to reduce *download* time or allow real-time playback over the phone lines.
cyber A prefix indicating a computer-oriented concept. For example, "cyberspace" is a term that generally refers to the *Internet*.

D

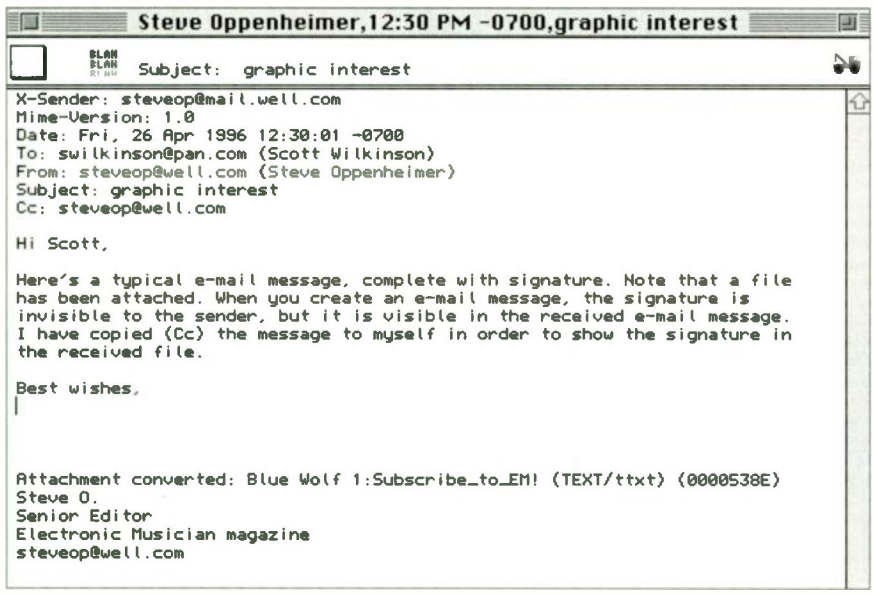
daemon A software program that manages requests for various types of files. Daemons are found on *host* and local computers.
decryption The process by which an *encrypted* message is decoded.
dialup access A means of connecting one computer to another (or to a network such as the *Internet*) using a *modem* to dial a certain phone number.
domain name The name used by organizations and individuals to identify their location on the *Internet*. In the United States, most domain names end with one of several 3-letter extensions: .com (commercial), .edu (educational), .gov (governmental), .net (network), and .org (organizational). In Europe, most domain names end with an extension that indicates the country, such as .uk (United Kingdom).
download The process of requesting and receiving a file from a remote computer via *modem* or *terminal adapter*.

E

e-mail Short for electronic mail. The process by which messages are sent over a network such as the *Internet*. Internet e-mail messages may include *attached files*.
emoticon A set of *ASCII* characters that form a sideways face. For example, :-) might mean "I'm happy," and :-(might mean "I'm sad." Also called a "smiley."
encryption The process by which a message is encoded so that no one other than the intended recipient can read it. This provides some security from *hackers*.

F

FAQ Acronym for Frequently Asked Questions. Most *newsgroups* and *mailing lists* include a FAQ file for *newbies* to catch up with the topics under discussion so they don't ask questions that have already been dealt with.
finger An *Internet* utility residing on a *host* computer or your local computer that lets you obtain information about anyone with an *e-mail address*. This information is stored in a "finger file" maintained by each user's *service provider* and normally includes the user's name, street address, and other information, such as a list of log-on dates and times. Some service providers let you establish a "plan" file, which includes any information you wish to make available to anyone who fingers you. Some service providers refuse finger requests in the interests of their customers' privacy.
flame An *e-mail* or *newsgroup* message that includes abusive or inflammatory language often sent in response to a *rave* or *spam*.
FTP Acronym for File Transfer Protocol. A set of rules that determine how files are transmitted over the *Internet*. To use FTP, you must have FTP *client software* that lets you *upload* and *download* files to and from an FTP *server*. Examples include *Fetch* and *Anarchie*. Many *browsers* also include FTP client functions. In some cases, you must log in with a password to exchange files



This e-mail message was created and mailed using Qualcomm's *Eudora Pro* 2.1.3. An attached file has been converted, as indicated above the signature. *Eudora* is also available in a shareware version.

with the server, but many servers include files that are available to anyone through a procedure called "anonymous FTP."

FTP archive A directory of files available using *FTP*. Sometimes called an "FTP site."

G

Gopher A software program that uses a menu system to help you find files, software, documents, and other resources. Many *host* computers include this program, and there are also versions for your local computer. This search method is somewhat outdated.

H

hacker A person with in-depth programming knowledge. *Internet* hackers often try to break into computer systems for either benign or nefarious purposes.

handle The name you use as the first part of your *e-mail address*. For example, **EM**'s handle on the PAN *online service* is emeditorial.

helper program In a *browser*, a supplementary program that handles multimedia files, such as animation, video, and audio. Most browsers do not include helper programs, which must be downloaded from the *Internet* and configured for your browser.

home page The point of entry into a *Web site* that links to other pages and documents on the *World Wide Web*.

host Any computer that makes files and applications available to users of the *Internet*.

HTML Acronym for HyperText Markup Language. This is a set of conventions used to prepare documents for display on the *World Wide Web*. In conjunction with *HTTP*, it allows Web authors to embed *hyperlinks* in Web documents.

HTTP Acronym for HyperText Transport Protocol. This is a standard that supports the exchange of files on the *World Wide Web*. In conjunction with *HTML*, it allows Web authors to embed *hyperlinks* in Web documents.

hyperlink In *hypertext*, an underlined or otherwise emphasized word or phrase that displays another, related document when selected (e.g., by clicking with a mouse).

hypertext A document in which certain words or phrases are underlined or otherwise emphasized. Selecting these words or phrases opens a related document. Hypertext is created using *HTML* and *HTTP*.

I

Internet A worldwide system of interconnected computer networks based on the *UNIX* operating system. It is estimated that the Internet currently includes more than 2 million computers serving more than 20 million users. Also called the "infobahn" or the "information superhighway."

IRC Acronym for Internet Relay Chat. A chat service that lets you communicate with other users in real time on the *Internet* by typing on your computer. Various topics are discussed on different IRC *channels*. You must have IRC *client software* on your computer to use this service or access it directly with a *shell account*.

ISDN Acronym for Integrated Services Digital Network. A phone system that allows digital information to be transmitted directly. Basic ISDN provides

two data channels (called "B" or "Bearer" channels), each of which can carry up to 64 Kbps. Primary ISDN provides up to 23 channels, each with 64 Kbps *bandwidth*. To use this system, you must have an ISDN line installed and a *terminal adapter*. In addition, your *service provider* must provide ISDN access to the *Internet*.

J

Java A programming language developed by Sun Microsystems. Java lets programmers develop small applications called "applets." Because these applets are hardware-independent (i.e., they can run on any type of computer, at least in theory), they are ideal for the *Internet*. (See "Tech Page: Java Jive" in the March 1996 **EM**.)

Jughead A function within *Gopher* that lets you search for key words that appear in directory titles, not menu items.

L

lurk To read *newsgroup* or *mailing list* messages without *posting* any of your own. This is a good way to become familiar with a newsgroup before participating.

M

mailing list A service that compiles information on a specific topic. After you *subscribe* to a particular mailing list, you regularly receive *e-mail* on that topic. Some mailing lists are managed with a program called *Listserv*.

modem Short for modulator/demodulator. A device that converts (modulates) digital signals from a computer into analog form so they can be sent on standard telephone lines. It also reconverts (demodulates) these signals back into digital form at the receiving end of the line.

moderator The person who oversees a *newsgroup* discussion or *mailing list* and tries to keep it on topic.

N

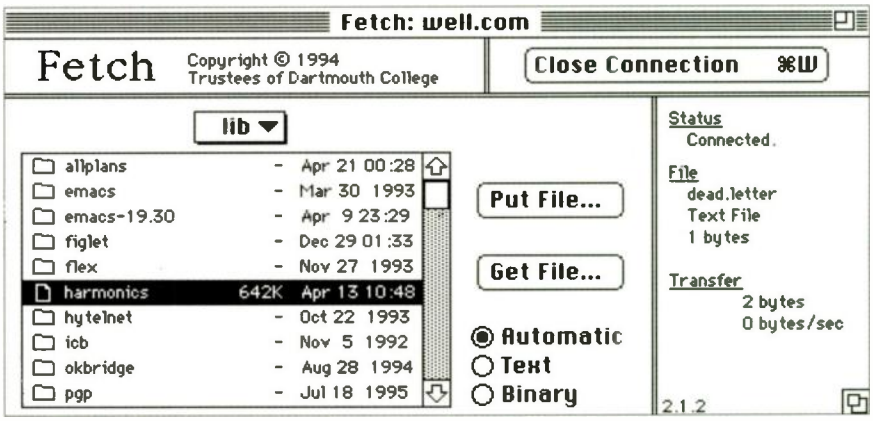
netiquette A set of informal rules that define reasonable behavior on the *Internet*. For example, typing a message in all caps is considered shouting and should be avoided except in the most extreme cases.

netnaut Someone who uses the *Internet*.

newbie Someone who is new to a particular *newsgroup* or *mailing list* (or the *Internet* in general). Newbies should *lurk* for a while and read any available *FAQ* files before sending messages of their own.

newsgroup An *online* discussion group devoted to a particular topic, such as *Star Trek*, the Grateful Dead, etc. Members of a newsgroup contribute to the discussion by *posting* messages. See *usenet*.

newsreader A *client software* program that lets you subscribe to *newsgroups*. Many *browsers* include newsreader client software.



***Fetch* 2.1.2 is a simple, shareware File Transfer Protocol (FTP) client program that lets you upload and download files.**

O

online Of or related to the *Internet*. Also, to be connected to a remote computer.

online service A commercial enterprise that offers news, encyclopedias, airline reservations, and many other forms of information to users who connect to the service with their computers and *modems*. Most online services also provide access to the *Internet*. Examples include America Online and CompuServe. (See "Online Juke Joints" in the July 1995 **EM**.)

P

POP Acronym for Point of Presence. A geographical area in which it is possible to access a wide-area network *(WAN)* or *online service* with a local phone call.

post To send a message to a *mailing list* or to a *newsgroup*. Also, a posted message.

POTS Acronym for Plain Old Telephone Service. The standard phone service available in most areas of the world.

PPP Acronym for Point to Point Protocol. One of two standards for connecting computers directly to the *Internet*. The other standard is *SLIP*. PPP is newer than SLIP, and it incorporates superior data negotiation, compression, and error correction.

R

rave To carry an argument beyond reason in a *newsgroup, mailing list,* or *e-mail*. Considered a breach of *netiquette*.

S

search engine A service that helps you find information, particularly *Web sites*, on the *Internet*. Examples include Yahoo (http://www.yahoo.com), Lycos (http://www.lycos.com), and Alta Vista (http://www.altavista.digital.com).

server A computer that offers various documents and resources to users of the *Internet*. Examples include *FTP* and *World Wide Web* servers.

service provider A commercial enterprise that offers direct connection to the *Internet*.

shell account An inexpensive but limited type of *dialup access* to a *UNIX* computer. Once you are logged on, you must use the UNIX command-line interface to invoke various *Internet* applications, such as *Telnet, Gopher,* and *IRC*.

signature A short note at the end of *e-mail, mailing list,* or *newsgroup* messages that typically includes the sender's name, organization, and e-mail *address*.

site A specific location on the *Internet*.

SLIP Acronym for Serial Line Internet Protocol. One of two standards for connecting computers directly to the *Internet*. The other standard is *PPP*.

spam To *post* the same, often irrelevant, message to many *newsgroups, mailing lists,* or *e-mail* recipients at once. Also, to post the same message many times to the same newsgroup, mailing list, or e-mail recipient. (Spam is very annoying, and

it's an example of bad *netiquette.*) Also, a term referring to self-promoting messages and junk mail.

spider A type of software program that prowls the *Internet* looking for any specified information. New resources are added to a database that users can comb with a *search engine.*

subscribe To add your name and *e-mail* address to a *newsgroup* or *mailing list* you wish to join.

surf To wander the *Internet.*

T

T1/T3 Two types of high-bandwidth digital phone lines. T1 can carry up to 1.544 megabits per second (Mbps); T3 can carry up to 44.21 Mbps. Both of these types of phone lines are much faster than *ISDN.*

TCP/IP Acronym for Transmission Control Protocol/Internet Protocol. These standards, or protocols, allow data to be transmitted from one computer to another over the *Internet.*

Telnet An *Internet* function that lets you connect to other computers on the Internet, even if they don't support *TCP/IP.* This provides a text-only interface to the remote computer. You must have Telnet *client software* on your computer to use this function. Examples include *NCSA Telnet* and *Comet.*

terminal adapter A device that connects to a computer and sends and receives digital data on an *ISDN* phone line. This serves essentially the same function as a *modem,* but it doesn't convert digital messages to analog form.

thread A chain of messages that relate to a single subtopic within a *newsgroup* or *mailing list.*

troll To post a facetious message containing an obvious error within a *newsgroup* in the hopes of causing a gullible person to respond and point out the error.

U

UNIX The operating system software used by most *Internet host* computers.

upload The process of sending a file from a remote computer to a *server* via *modem* or *terminal adapter.*

URL Acronym for Uniform Resource Locator. A string of characters that identifies a particular *Internet site,* usually a *World Wide Web, FTP,* or *newsgroup* site. All *Web site* URLs begin with "http://" followed by the site's *domain name* and any directory paths. URLs for FTP sites begin with "ftp://" and URLs for newsgroup sites begin with "news:"; otherwise, these are identical to the URLs for Web sites.

usenet The conglomeration of *newsgroups* on the *Internet.* Most newsgroups fall into one of seven basic categories, based on the topics they address: alt (alternative), comp (computer), misc (miscellaneous), news, rec (recreation), sci (science), soc (society), and talk (controversial topics). Each usenet *site* includes some but not necessarily all newsgroups.

UUCP Acronym for UNIX-to-UNIX Copy Program. A utility that lets *UNIX* computers exchange files, *e-mail,* and *newsgroup* articles.

UUCode A process whereby a *binary file* is encoded into an *ASCII* file, which can then be sent as *e-mail* or *posted* to a *newsgroup* or *mailing list.* The receiving computer must decode the message to restore the binary file. This is similar to *BinHex.*

V

Veronica A function within the *Gopher* software program that allows you to search for key words that appear in directory titles and menu items.

virtual Of or relating to computer-based entities. For example, a computer-generated environment is called "virtual reality."

virus A software program designed to wreak havoc with computers. These programs are often distributed clandestinely over the *Internet.*

W

WAN Acronym for Wide Area Network. A network that connects computers over much longer distances than local-area networks (LANs) allow. Some WANs, such as Tymnet and SprintNet, provide local *dialup access* to *online services* and the *Internet.*

Web page One screen or document within a *Web site.*

Web site A particular location on the *World Wide Web* that offers information and downloadable files.

World Wide Web A global *hypertext* system that uses the *Internet* to transfer information. It is often abbreviated as Web or WWW.

Z

zine Slang for *online* magazine.

EM *Technical Editor* **Scott Wilkinson** *thanks Peter Freeman for his help with this article.*

RECORDING MUSICIAN

Working on the Sidechain Gang

Plug into this unsung feature of dynamics processors.

By Brian Knave

Gear is so sophisticated these days that the capabilities of a single box can saddle the user with a learning curve steeper than the national debt. Therefore, unless you actually enjoy reading instructional manuals, some of a unit's more advanced—and hip—features can be obscured behind a veil of user ignorance. Hey, it happens.

Now, I'm not suggesting that you need to know every trick in the book to produce great mixes; but exploring the full potential of your musical tools is a valuable endeavor. For example, are you aware that your dynamics processor has a sidechain? This auxiliary function provides awesome sound-sculpting possibilities, so let's check out some sidechain applications so you can incorporate a few big-studio tricks into your small-studio mixes.

The full-featured front panel of the Aphex 622 Logic Assisted Expander/Gate provides a key-listen button for studio monitoring and a key-monitor jack for listening to the sidechain during live-sound applications.

WHAT IS IT?

A sidechain allows you to customize the response of your dynamics processor. Ordinarily, the processor's level detector (which responds solely to amplitude) is controlled by the main input signal. When a signal is introduced into the sidechain return, however, it takes control away from the main signal. Therefore, the sidechain input is also called a *control* or *key input.* (For a thorough look at how sidechains work, see "Square One: Dynamic Duos, Part 2" in the January 1995 issue of **EM**.) Simply put, the new signal tells the unit when and how much to work. This signal can come from practically anywhere: another instrument, an equalizer, or even a click from a metronome.

Perhaps one reason a sidechain gets overlooked is that often the only evidence of it—the input and output jacks—is located on the rear panel of the dynamics processor. To remedy the hassle of accessing these jacks (especially if the processor is rack-mounted), I recommend wiring each sidechain's send and return into a patch bay. Keep in mind that the send is the output and the return is the input; specifically, the send carries a copy of the main input signal (sending it *out* of the jack) whereas the return is where you input the auxiliary signal.

Note that some single-channel dynamics processors have a third jack, called a *link,* that is grouped with the

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sidechain send and return. This jack allows you to link two identical units together for stereo processing or to have one unit (the master) control the other (the slave). On dual-channel dynamics processors, this feature is typically accessed from a front-panel switch called *stereo* or *couple*.

The most common sidechain applications are ducking, frequency-dependent processing, and instrument synchronization. Let's see how each of these applications can be used to enhance a mix.

WHY A DUCK?

Basically, audio ducking pushes one sound beneath another. On a radio jingle, for example, ducking can automatically reduce the amplitude of the music bed below that of the announcer's voice. In this case, the music bed is the main audio signal and the announcer's voice is the key.

To set up this classic type of broadcast ducking, route the music track into the main input of an expander and the voice track into the key input. The expander's threshold, ratio, and range settings will determine how much the music volume "ducks" when the announcer speaks. (For this application, note that nothing is plugged into the sidechain send.)

Obviously, ducking is critical for ensuring that a broadcast "pitch" is not obscured by its music track. But ducking can be equally useful for dipping effects beneath a voice or lead instrument during a mix. For example, a mega-delayed wash of reverb on a vocal track may linger so long at the end of a phrase that it obscures the singer's next line. This can be remedied by compressing or expanding the reverb signal and using the vocal track as a key to "fade down" the ambience when the vocal appears (see **Fig. 1**). Because the reverb signal will be ducked each time the vocal appears, tuning in the attack, release, and threshold settings is critical in this application to avoid having the reverb sound as if it is jumping in and out of the mix. Spend some quality "tweaking time" to ensure that the reverb fades naturally into (and out of) each vocal phrase. (For a tutorial on the workings of various dynamics processors, see "The Sophisticated Mix" in the April 1996 issue of **EM**.)

A CODEPENDENT THING

By introducing a bandpass filter or equalizer into the sidechain's signal flow, we can instruct the dynamics processor to respond to specific frequencies only. This technique allows for a number of tricks that can salvage less-than-perfect tracks. For example, you can create a vocal de-esser by coupling an equalizer with the sidechain of a compressor.

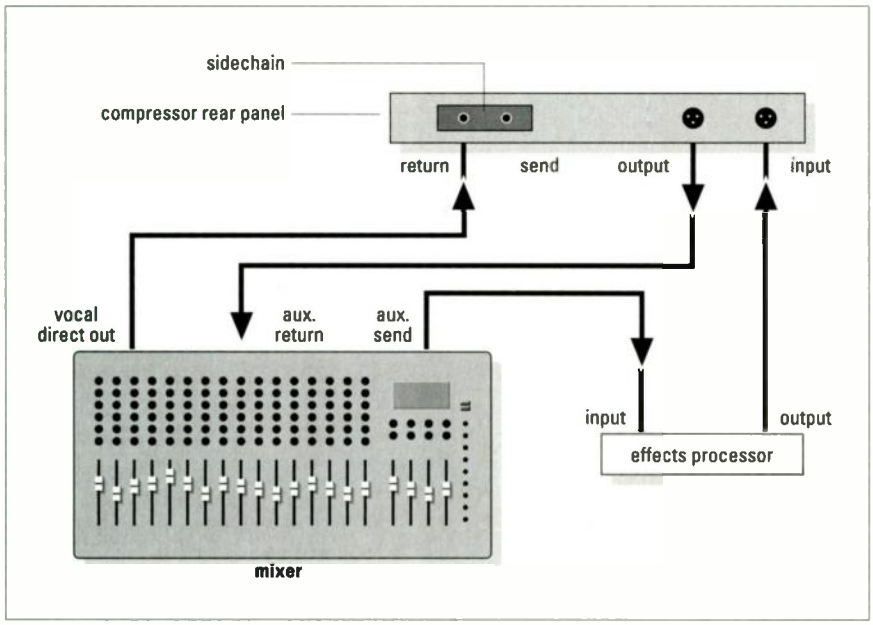

FIG. 1: Ducking isn't for live broadcasts only. In this application, a vocal track that has been cloaked heavily in reverb and delay is used to duck those same effects so the lingering wash doesn't obscure the first words of the singer's next line.

First, patch the sidechain's send (output) into the input of an equalizer. Then connect the equalizer's output to the sidechain's return or input (see **Fig. 2**). Now, use the equalizer to *boost* the sibilant sounds that you want to get rid of (these usually occur in the 2 kHz to 10 kHz frequency range) while reducing the other, nonproblematic frequencies. Remember, the equalizer is now the key that controls the level detector in the compressor. Because it is set to amplify the sounds you don't want, it tells the compressor to reduce those sounds first.

Be careful not to go overboard when de-essing. "I have yet to hear a de-esser that *really* works," explains Marvin Caesar, president of Aphex Systems. "They knock out the sibilants, but they also knock out the high end." So take care to boost only the offensive frequencies, and make sure the compressor settings are appropriate to the task at hand. "Use a high ratio, a fast attack, and a fast release," says Caesar. "You just want to knock the sibilance down a couple of dB when it hits. Get in and out really quickly."

The same technique can be used to quell a vocalist's "wolf note." Independent producer and **EM** contributor Larry the O calls this application "the poor man's multiband compression."

"If your singer has one note that really sticks out and sounds terrible," he says, "sometimes general compression just doesn't cut it; in fact, it can make the note even more conspicuous. One solution is to put a filter in the sidechain and tune it to that awful note. Then the compressor is more sensitive to that note and brings its volume down."

This setup can also be used to reduce inadvertent gain reduction caused by low frequencies, which isn't an uncommon problem. "If the dynamics processor's level detector is wideband," explains Caesar, "it's going to react to the highest amplitude of the signal, regardless of where that amplitude occurs in the frequency range. Low frequencies normally contain the highest amplitude. Therefore, in a given spectrum of sound, the low-frequency content may cause the compressor to work too hard, resulting in various compression artifacts such as hole-punching, in which entire sections of the audio disappear momentarily. And because our ears are more sensitive to

changes in mid and high frequencies, the resultant overcompressed audio might also end up sounding dull. But by introducing a low-cut filter into the sidechain, you can tell the level detector to see only the upper lows, mids, and high frequencies. Then it won't be fooled by all the energy coming from the extreme low end."

The previous applications involve compressors and expanders, but gates are also commonly used for frequency-dependent processing, especially on drums. The array of microphones typically employed to capture the many sounds of a drum set is an open invitation to mic bleed. But, by carefully determining the primary frequency of a tom, hi-hat, kick drum, or whatever, you can set up a filter in the sidechain that will instruct the gate to close as soon as that instrument is not making a sound.

Obviously, it could take several gates, equalizers, and patch cables to gate an entire drum kit this way, which is usually not an option in a small home studio. The solution is to pick out the one or two drums or cymbals most in need of frequency-dependent gating. The snare drum is often a good candidate because it typically gets treated with a healthy dose of reverb, and without the gate, the reverb intended for the snare is likely to end up on the hi-hats as well. (Note that many high-end dynamics processors feature built-in filters designed specifically for these and other applications.)

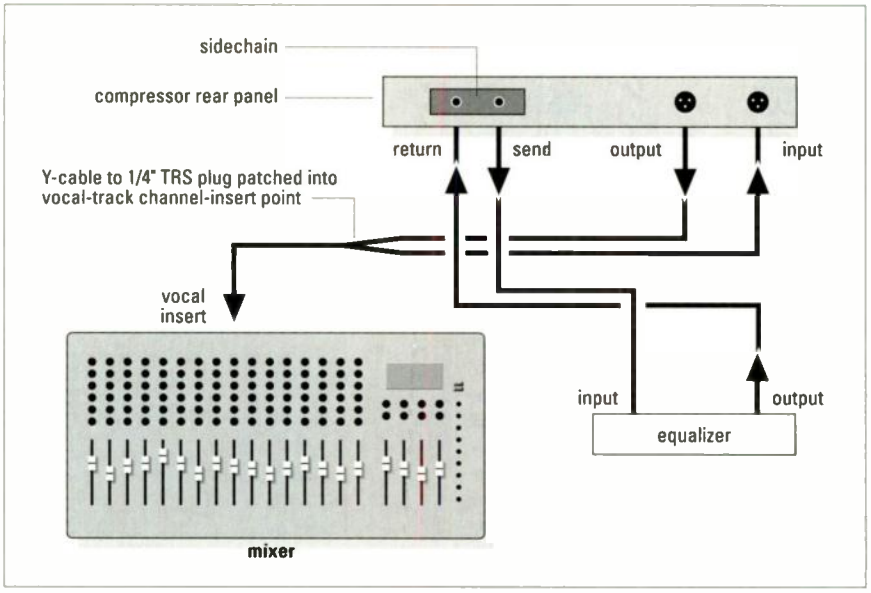

FIG. 2: You don't have a dedicated de-esser? Not to worry. The setup shown here was used to tame sibilance long before de-essers hit the market, and it's still a workable solution.

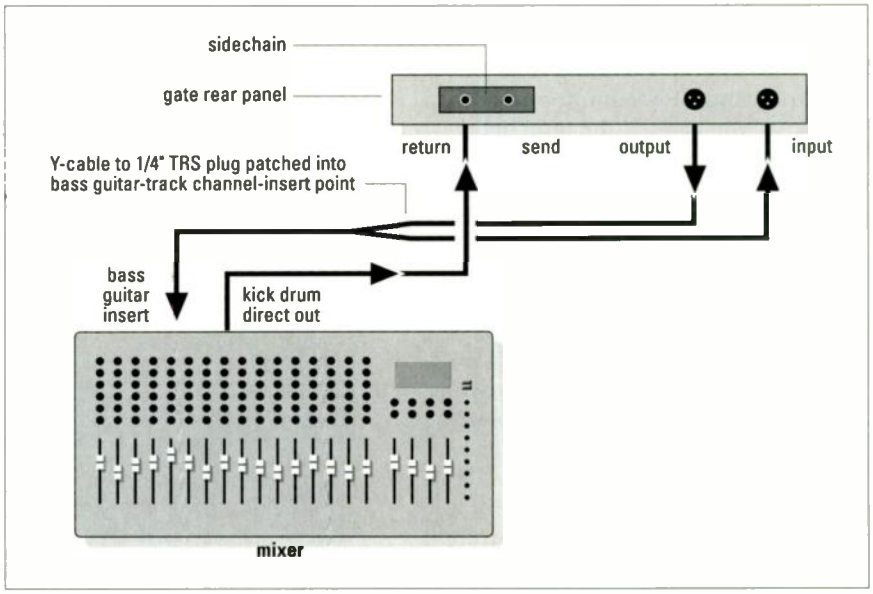

FIG. 3: Here's just the ticket for locking a kick drum and bass guitar together to create a single, wallop-packing punch. The same arrangement can be used to synchronize horn hits, organ stings, or skankin' guitar pops with a snare-drum backbeat or syncopated figure.

HITTING AS ONE

Have you ever recorded rhythm tracks only to discover later that the kick drum and bass guitar weren't always hitting exactly together? Or perhaps in an otherwise tight rock groove, the backbeat guitar chords weren't consistently in sync with the snare hits? Such timing problems—unless they're really dire—can sometimes be alleviated via sidechaining. The trick is to have one instrument control a gate on the other.

To accomplish this, first determine which of the two instruments is playing the part most to your liking. Now patch the signal from this instrument (the control) from a direct out on the board into the sidechain return of a gate. Then put the other instrument (the "controllee") into the gate's main input.

For example, if the kick drum is in the pocket but the bass guitar occasionally gets out of sync, put the kick-drum signal into the sidechain and the bass into the gate (see **Fig. 3**). Set a fast attack on the gate so it opens immediately when the kick drum hits. Then set the release time so the gate stays open only as long as you want it to. (You'll probably want to make sure it closes before the tail of a bass note bleeds into the following kick-drum beat.)

This application works great whenever you need to synchronize two instruments so they hit at the same time. "For instance," says Larry the O, "sometimes you want to layer a guitar chord on top of an organ chord. Of course, the organ has an extremely fast, almost instantaneous attack, as opposed to the guitar, which has a slower attack. Using the sidechain allows you to make the guitar chord hit at exactly the same instant as the organ chord. This tightens up the tracks and makes them punchier."

Of course, because the gate allows one instrument to sound only when the other plays, this application is most appropriate for arrangements in which two instruments are meant to hit together—and *only* together. If, as in the example above, you set up the kick drum to control the bass guitar and the bass is playing embellishments or sustained notes between the kick-drum hits, these will be lost when the gate shuts.

IN THE BAG

There's nothing worse than letting a flawed mix go out the door because you thought you didn't have the gear to fix a problem, only to discover that you *had* the gear, but you just didn't know how to use it. Hopefully, these sidechain applications will expand your working knowledge of dynamics processors and add a few helpful remedies to your sonic first-aid kit. Properly administered, sidechaining can treat a wide range of aural ills. So go ahead, get acquainted with those extra jacks. And remember, whoever said ignorance is bliss didn't work in a recording studio—at least not for long. ●

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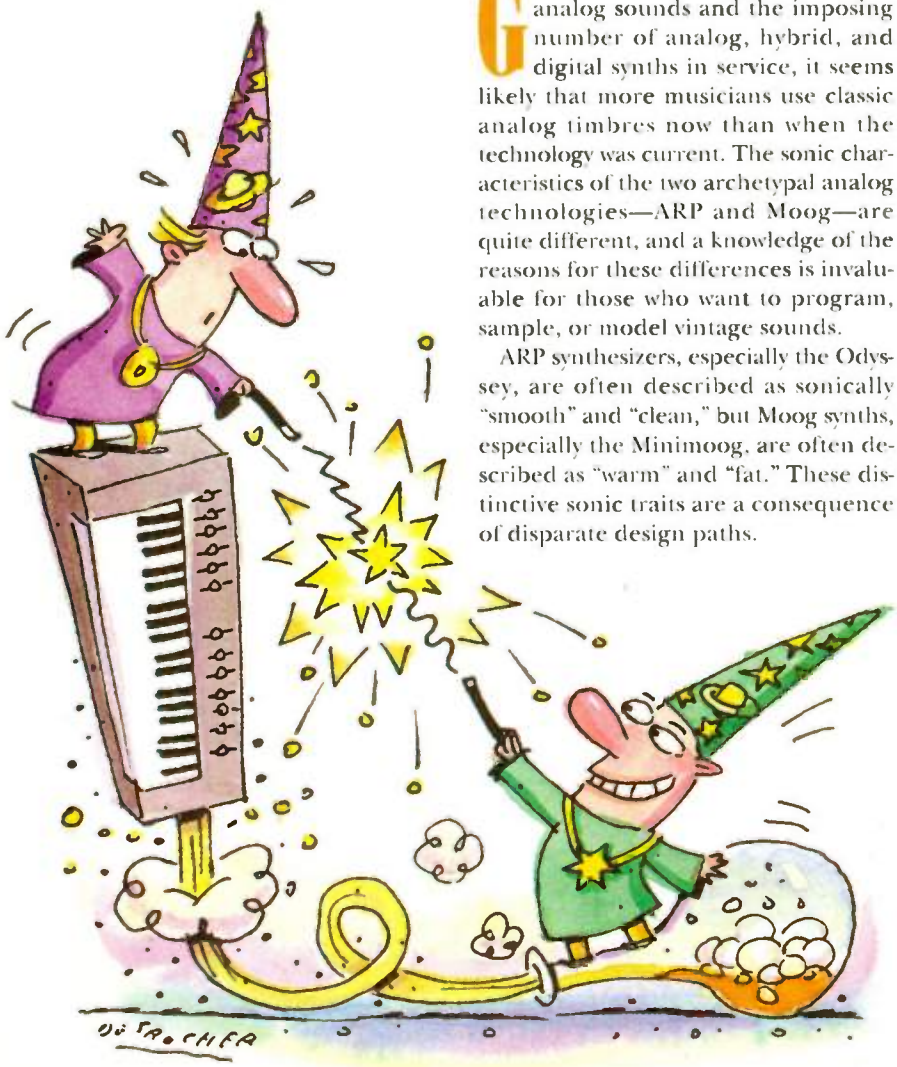
SERVICE CLINIC

Analog Potpourri

ARPs may sound smoother, but the Minimoog is magical.

By Alan Gary Campbell



Given the enduring popularity of analog sounds and the imposing number of analog, hybrid, and digital synths in service, it seems likely that more musicians use classic analog timbres now than when the technology was current. The sonic characteristics of the two archetypal analog technologies—ARP and Moog—are quite different, and a knowledge of the reasons for these differences is invaluable for those who want to program, sample, or model vintage sounds.

ARP synthesizers, especially the Odyssey, are often described as sonically "smooth" and "clean," but Moog synths, especially the Minimoog, are often described as "warm" and "fat." These distinctive sonic traits are a consequence of disparate design paths.

The Odyssey VCO waveforms are comparatively uniform; the Minimoog waveforms are slightly glitchy, which adds timbral interest. The Minimoog also offers more waveforms than the Odyssey, including the composite triangle/sawtooth waveforms of VCOs 1 and 2. The Odyssey provides only two VCOs; the Minimoog provides three, which combine to produce very fat sounds.

The Odyssey VCF is a 12 dB/octave, resonant, lowpass filter that is designed to run clean. The Minimoog employs the legendary Moog filter, a 24 dB/octave, resonant, lowpass VCF designed to be deliberately overdriven. The added, overdriven harmonics and the pronounced phase shifts that occur with the fairly steep cutoff give the Moog filter an unmistakable, gutsy sound. (I explained how to build a Moog filter in the March 1996 "Service Clinic.")

The modulation sources and performance controls of the two instruments are conspicuously different and affect their sonic signatures considerably. For modulation, the Odyssey has a simple sine/square LFO whereas the Minimoog uses the full capabilities of its third VCO, which include multiple waveforms and audio-range frequency modulation.

Early Odysseys offer only a crude modulation-amount slider. Later versions incorporate ARP's Proportional Pitch Control (PPC), an underrated

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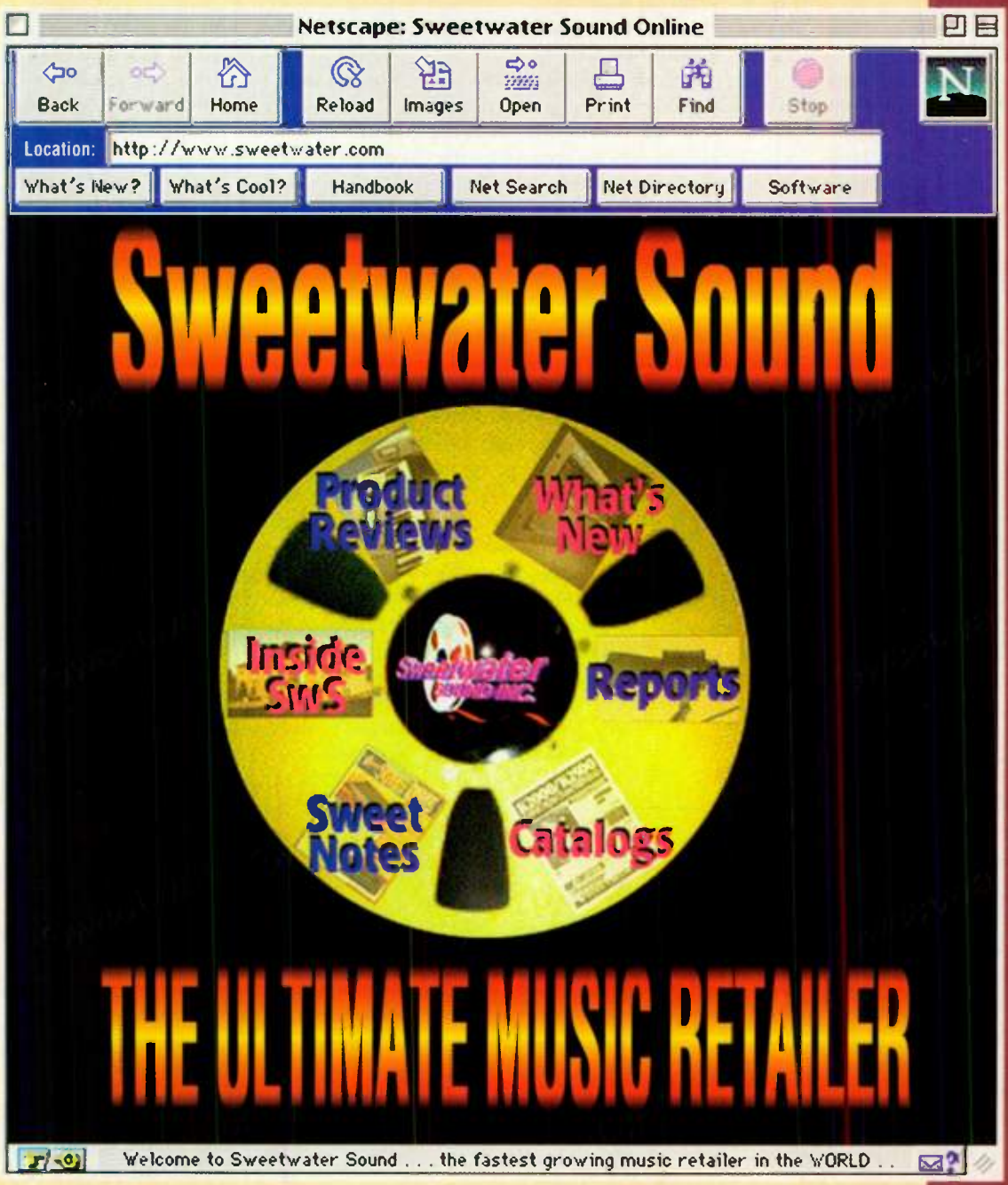

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scheme that is effective and responsive. PPC consists of three adjacent, touch-sensitive pads. You control modulation amount via the center pad and bend the pitch flat or sharp via the left or right pads.

The Minimoog was the first commonly available instrument to offer the now-standard modulation wheel. The Minimoog also provides a modulation mix of noise and VCO 3. Even when set up to produce simple vibrato, its low-frequency triangle wave gives a more harmonically rich vibrato than the Odyssey's sine wave does.

The early Odysseys offered no pitch-bend device other than a tuning pot. The ARP PPC, despite its effectiveness, did not gain general acceptance. However, the Minimoog's pitch-bend wheel, like its modulation wheel, became a *de facto* standard.

Ironically, the Odyssey might be considered superior to the Minimoog from a basic engineering standpoint, as it offers cleaner, more stable oscillators and control circuits. But the Minimoog's imperfections give it an almost organic quality that has ensured its continued popularity and widespread imitation.

NOISE SOURCES

An analog synth typically includes a noise generator that augments the sound-generation capabilities of the VCOs and VCF. The earliest noise sources used special noise diodes, designed to operate in a reverse-biased configuration and generate "breakdown" noise, which approximates a white-noise spectrum.

Noise diodes are comparatively expensive, however, and it was soon determined that the base-emitter junction of a common, bipolar transistor, when operated in a strongly reverse-biased mode, produced a satisfactory result. This design is used in the Minimoog (see **Fig. 1**). In practice, transistors with the most stable noise-output characteristics are selected from a batch by simple substitution.

It is reasonably straightforward to filter white noise to approximate pink noise. Although the resulting frequency spectrum is only an approximation, it is still quite useful. Additional filtering is possible to produce other noise "colors." The Minimoog and some modular synthesizers provide severely lowpass-filtered red (subaudio frequency) noise, which can be used as a random control-voltage source. The Minimoog allows the user to set a mix between red noise and the output of Oscillator 3 using the front-panel Modulation Mix control. You can route the mix through the modulation wheel, which is a very cool feature.

Other noise sources have also been developed. An interesting type is the Pseudo-Random-Binary Sequence generator (PRBS). The PRBS incorporates a pseudo-random-data generator and a simple digital-to-analog converter in an 8-pin DIP. (Technically, this is a digital device, but its inclusion in various analog synths, such as the Moog Rogue, justifies its discussion here.)

The PRBS is relatively inexpensive and highly reliable, and it requires no selection or testing to achieve uniform output characteristics. However, its basic design has a limitation: because the data sequence is only approximately random, it eventually repeats, and this causes an audible, low-frequency glitch in the output. Many synthesists have used this telltale "heartbeat" to advantage in machine-like sounds with repetitive characteristics. Later, more expensive versions of the PRBS have longer sequences, and the glitch is less noticeable.

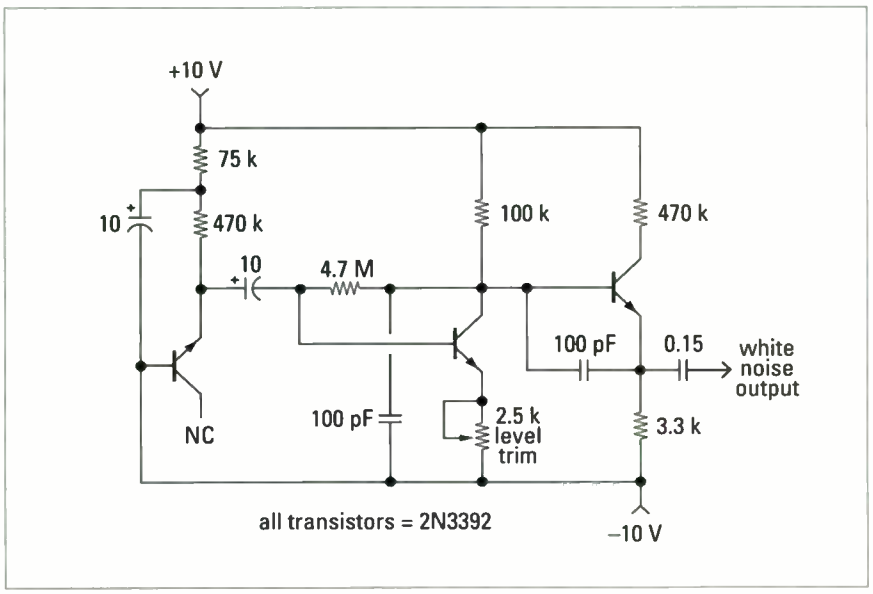

FIG. 1: In the Minimoog's noise source, the base-emitter junction of the first transistor is strongly reverse-biased to generate breakdown noise.

MINIMOOG CALIBRATION

The Minimoog has frequently served as an example for circuits and concepts in "Service Clinic" and is the subject of the majority of vintage-instrument inquiries I receive. Many readers have asked for basic Minimoog-service information, and a brief discussion of Minimoog oscillator calibration serves as a good introduction to calibration in general.

Note that before attempting to calibrate a Minimoog, it is critical for you to clean the keyboard contacts and verify the power-supply voltages. J-wire type key-contact cleaning was covered in the December 1995 "Service Clinic," and power-supply testing and service were covered in the October and November 1995 "Service Clinic" columns. (Back issues are available from Mix Bookshelf; tel. 800/839-5977 or 510/653-3307; fax 510/653-5142.)

Depending upon its revision number and field updates, a Minimoog will have either the original or updated oscillator card. When the rear panel is removed, the oscillator card is the rightmost card. The original oscillator card provides only Range and Scale adjustments for each oscillator, but the updated card provides additional adjustments (see **Fig. 2**) and the old Range adjustment is renamed "Shift."

A strobe tuner is recommended for Minimoog calibration. Connect the strobe tuner and a monitor amp (or headphones) to the Minimoog line output. Set all the oscillators for square-wave output, 75% level; make sure oscillator 3 is set for the audio frequency range and keyboard control. Set the

master Tune control and the Oscillator 2 and 3 Frequency controls at zero. Turn oscillator modulation off, and set the pitch-bend wheel at detent position. Set the VCF for maximum cutoff, minimum resonance, and minimum contour amount.

Even the earliest Minimoogs provide pass-through holes to access the basic Range and Scale trimpots, so any Minimoog with the old oscillator card can be calibrated with the rear panel in place. But it is fairly common to find Minimoogs that have been field-retrofitted with the updated card yet have not had additional holes drilled to accommodate the six new trimpots. It is often necessary to remove the rear panel to determine the card type. Although the Minimoog service manual states that the cover should be in place for accurate calibration, good results are possible with the cover off if you allow about one hour of extra warm-up time and avoid drafts in the work area. Keep the Minimoog away from exterior walls and windows, and close nearby heating and air-conditioning vents just prior to calibration.

Calibrating the original oscillator card is easy. Switch Oscillators 2 and 3 off. Set Oscillator 1 at its 2' range. Depress and hold high A, and adjust the Oscillator 1 Range trim to A-3520 (Hz), which is four octaves above A-440. Depress and hold low A, and adjust the Oscillator 1 Scale trim to A-440. Repeat the two adjustments until no further improvement is obtained. Duplicate the procedure for Oscillators 2 and 3.

Calibrating the updated oscillator card is more involved, and the octave sequence of the basic procedure is inverted. Switch Oscillators 2 and 3 off. Set Oscillator 1 at its 8' range. Depress and hold low A, and adjust the Oscillator 1 Shift trim to A-55 (four octaves below A-440). Depress and hold high A, and adjust the Oscillator 1 Scale trim to A-440. Repeat the adjustments until no further improvement is obtained. Select the 2' range. Depress and hold low A, and adjust the Oscillator 1 Shift trim to A-440. Depress and hold high A, and adjust the Oscillator 1 Hi End trim to A-3520. Repeat the adjustments. Recheck the Shift and Scale adjustments performed previously, and repeat both procedures, if necessary, in sequence.

Select the 32' range. Depress and hold high A, and adjust the Oscillator 1 Shift trim to A-220. Select the 2' range. Depress and hold high A, and adjust the Oscillator 1 Octave trim to A-3520. Repeat the adjustments until no further improvement is obtained. Select the 8' range. Depress and hold high A, and adjust the Oscillator 1 Shift trim to A-440.

Duplicate the complete procedure for Oscillators 2 and 3. Note that the calibration accuracy of the updated card is so much greater than that of the original that it is possible to obtain a tight tuning that loses some of the Minimoog's signature "randomness" or "fatness." This can be returned by deliberately misadjusting the oscillator Scale trims very slightly.

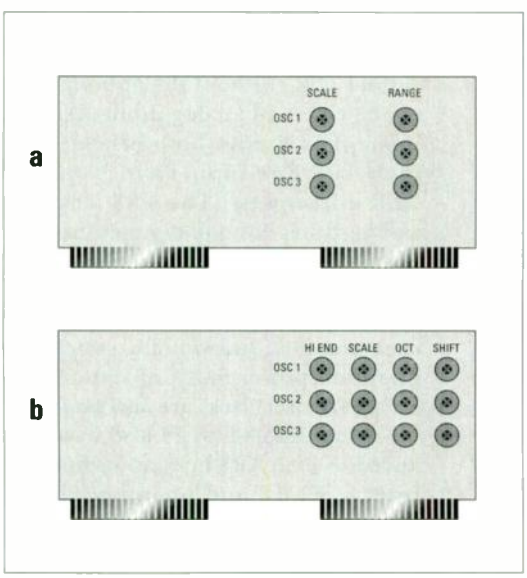

FIG. 2: The original Minimoog oscillator card (a) provides only Range and Scale trims, but the updated oscillator card (b) includes additional adjustments.

MOOG FILTER ERRATA

In the March 1996 "Service Clinic," the VCA control-voltage input subcircuit was inadvertently omitted from the upper right section of the Moog filter schematic, and there were several minor typographical errors.

You should note the CV input connection to the 3080, IC 4 (see **Fig. 3**). As with the filter CV input, the 2N3906 transistor provides the exponential voltage-to-current conversion, and the input is scaled for a 5V range. On the original figure, the 3080 is indicated as a 3080A, but it should be a 3080E. The A package is a metal can; the E package is the standard, 8-pin, plastic DIP.

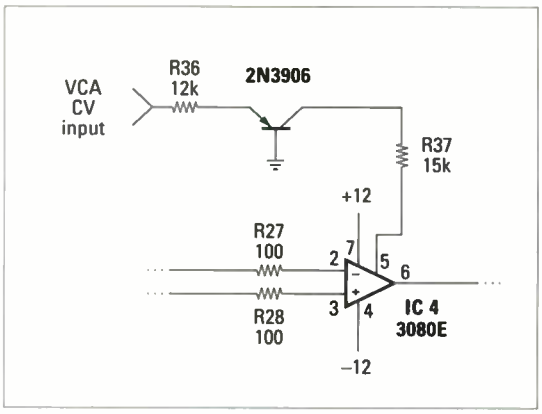

FIG. 3: This section was accidentally omitted from the Moog filter schematic in the March 1996 "Service Clinic." The VCA CV input subcircuit connects to the 3080 via pin 5.

Either will work, but the A type is more expensive and harder to find. Also, the identifier for the E section of the 3046 IC Transistor Array is given as IC 1E but should be IC 2E, and the legend that reads "IC 1 and IC 2 = TL074" should read "IC 1 and IC 3 = TL074."

Several readers have inquired about parts sources for the Moog filter. All of the components are available from Mouser Electronics; the principal catalog numbers are as follows: the TL074 Quad Op Amp IC is Mouser catalog number 511-TL074CN; the CA3046 Transistor Array is number 570-CA3046; the CA3080E Operational Transconductance Amp (OTA) is number 570-CA3080E; the 2N3904 NPN transistor is number 592-2N3904; and the 2N3906 PNP transistor is number 592-2N3906. For a catalog and ordering information, contact Mouser Electronics; tel. (800) 346-6873 or (817) 483-4422; fax (817) 483-0931; e-mail sales@mouser.com; Web http://www.mouser.com.

EM *Contributing Editor* **Alan Gary Campbell** *is the editor and publisher of the* New Music Journal *and owner of Musitech, a consulting firm specializing in electronic musical-instrument design, modification, and service.*

Reviews

Yamaha 02R

By Michael Cooper

A price-busting, automated, digital mixer for the masses.

Another revolution has begun. Only this time, Paul Revere is galloping down the streets of the world with a Yamaha 02R digital recording console under his arm. The astounding 02R is every bit as revolutionary as the Alesis ADAT was, and it will change forever the way the masses record and mix audio on this planet.

Yamaha's 8-bus, fully automated, digital recording and mixing console is brimming with professional features. Each of its 40 inputs features 4-band parametric EQ, quality dynamics processing (compression, gating, etc.), eight aux sends (six external, two internal), and two internal effects processors.

Virtually all console functions are automated. Snapshot and dynamic automation (including moving faders) are brilliantly implemented. Best of all, the settings and moves are stored in onboard memory, so you don't need an external sequencer. Comprehensive monitoring and synchronization facilities complement a thoughtfully designed user interface. An 8-pin mini-DIN jack (labeled To Host) lets you connect the 02R to a Macintosh computer so you can run the free 02R *Project Manager* editor/librarian software. All this power comes at the unprecedented price of $8,699 for the base configuration.

I performed my real-world tests of the 02R's abilities and sound quality in my 24-track, ADAT-based, commercial studio. After replacing my old mixer with the 02R, I used the new console to record overdubs and mix the Haines Kanter Project, a talented new age/jazz ensemble from Eugene, Oregon.

Yamaha's 02R digital console is probably the most revolutionary recording product for project studios since the Alesis ADAT. This fully automated mixer features extensive digital I/O and oodles of onboard effects, dynamics processing, and parametric EQ.

BASIC CONNECTIONS

A stock 02R (without the optional I/O cards) offers 24 analog inputs. Analog inputs 1 to 8 offer both balanced, ¼-inch TRS line inputs and balanced XLR mic inputs. (The TRS jacks are standard headphone-type phone connectors, not military connectors.) A/B switches let you choose between the two types of inputs independently for each channel. Individually switchable phantom power and unbalanced, ¼-inch TRS insert jacks are also provided.

Analog inputs 9 to 24 also have balanced, ¼-inch TRS line inputs but lack inserts, XLRs, and phantom power. However, the sensitivity of the mic preamps for inputs 9 through 16 is sufficient to accept either mic or line levels. Inputs 17 through 24 can accept only line-level signals.

The insert jacks are in the analog

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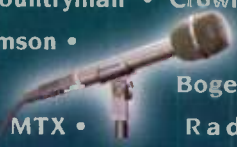

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domain, placed between the preamp and A/D converter. This lets you insert your favorite tube compressor or EQ while tracking or mixing analog sources. The digital tape returns *cannot* access these inserts, but of course, once you're in the pristine digital domain, you'll want to stay there, anyway.

Six unbalanced, ¼-inch (+4 dB) aux-send jacks allow you to patch in external effects boxes. You also get two internal stereo returns from the onboard effects processors.

Two pairs of L/R jacks service analog 2-track returns. One pair uses balanced (+4 dB) TRS phone jacks; the other pair is on unbalanced, -10 dBV, RCA jacks. Two pairs of analog stereo outputs (for connection to the 2-track decks) are also provided. These are wired the same as the 2-track inputs except that the balanced outs are on XLRs instead of TRS connectors.

Separate L/R pairs of control-room and monitor outputs (the latter for connection to a headphone amp or reference speakers) are provided on balanced (+4 dB) TRS phone jacks. I had no trouble using any of the balanced, TRS inputs and outputs with unbalanced, -10 dBV signals on TS connectors.

The Yamaha 02R also provides AES/EBU 2-channel I/O and two stereo S/PDIF coaxial inputs and outputs. The AES/EBU stereo input can also be routed to channels 17 and 18, replacing the analog line inputs. One of the S/PDIF inputs can be routed to channels 19 and 20, again replacing the analog line inputs. The other S/PDIF input can only be routed to the control-room outputs.

The AES/EBU and S/PDIF outputs are primarily intended for use with DATs and the like. The 02R can be synched to an external clock frequency between 32 kHz and 48 kHz using the 75Ω, BNC word-clock input and output connectors.

EXPANSION SLOTS

Most of the 02R's audio inputs and outputs are provided via the four optional card slots on the console's rear panel. With no cards installed, the 02R is limited to 24 analog inputs and two stereo internal effects returns. But when loaded with the appropriate card, each slot provides eight additional inputs and eight outputs. However, when you add inputs via card slots 3 and 4, the new inputs replace stock analog inputs 1 through 16. Each slot is hard-wired to specific groups of eight faders or knobs on the 02R.

There are six types of expansion cards (see the table "02R Card-Slot Options"), four of which provide various flavors of 8-channel digital I/O. I used three CD8-AT cards to digitally connect the 02R to my three ADATs. Digital interface cards are also available in TASCAM DA-88 (TDIF-1), AES/EBU, and Yamaha's proprietary digital I/O formats. Alternatively, you can plug in up to two 8-channel analog I/O cards. You can also buy a card kit that lets you cascade two or more 02Rs.

Most cards take up just one slot, so you can add up to four of them. However, due to the size of their connectors, the AES/EBU and analog I/O cards take up two slots each. You can install up to two double-size cards (providing sixteen channels of I/O), but that will fill all four slots.

All eight bus outputs are routed via the card slots. The mic, line, and tape inputs can be simultaneously routed to any or all of the console's eight tape-output buses and the stereo bus. A multiple-busing scheme is employed whereby bus 1 feeds tracks 1, 9, 17, and 25; bus 2 feeds tracks 2, 10, 18, and 26; and so on. Because tape returns can be sent back out the tape buses, owners of original ADATs can now bounce (via the 02R) from one track to another on the same ADAT in the digital domain, which is an excellent bonus.

Sixteen direct outputs are also provided on the card slots. These can be assigned (globally) either pre- or post-fader. Only the mic and line inputs can be routed to a direct out. You also cannot send a channel simultaneously to a direct out and a bus out; the direct out always takes priority.

ON THE LEVEL

Levels for 24 of the 02R's 40 inputs are controlled via twenty 100 mm motorized faders. The other sixteen inputs are controlled using a row of rotary encoders located above the faders. Because the 02R uses a digital control surface, you get a lot more fader-assignment flexibility than you would with an analog console. For example, 32 of the 02R's faders and knobs are not hard-wired to specific I/O and can be assigned to various groups of eight inputs.

The last four channel faders are stereo and are dedicated to analog, line-level inputs 17 to 24. Mono faders 1 through 16 can control either analog mic/line inputs 1 to 16 or the sixteen digital inputs from card slots 1 and 2

02R Specifications

THD	<0.2%, 20 Hz–20 kHz (analog output) @ +14 dB into 600Ω
Frequency Response (@ 48 kHz, internal)	+1/-3 dB, 20 Hz–20 kHz @ +4 dB into 600Ω
Dynamic Range (@ 48 kHz, internal)	110 dB typical, D-A converter (stereo out); 105 dB typical, A-D + D-A (mic/line in to stereo out)
Equivalent Input Noise*	-128 dB (20 Hz–20 kHz)
Crosstalk (@ 1 kHz)	70 dB adjacent input channels; 70 dB input to input
A-D Conversion	20-bit linear, 64× oversampling (inputs 1–24)
D-A Conversion (stereo out, control-room monitor out)	20-bit linear, 8× oversampling
D-A Conversion (studio monitor out, aux sends 1–8)	18-bit linear, 8× oversampling
Sampling Frequency	internal 44.1/48 kHz; external 32 kHz–48 kHz
Weight	66 lbs.
Dimensions	26 × 27 × 8.7 inches

* sampled @ 48 kHz, internal; R_S = 150Ω; input gain max.; input pad = 0 dB; input sensitivity = -60 dB; measured with a 6 dB/octave filter @ 12.7 kHz

or 3 and 4. Because these faders are switched between the digital and analog inputs in groups of eight channels, you can't mix digital and analog inputs within fader groups 1 to 8 or 9 to 16.

For example, let's say you have three tracks recorded on ADAT, and you bring them into the 02R via an ADAT digital I/O card. The other five channels in the group are also dedicated to the ADAT and can't be used for anything else. If you need the other inputs for analog sources, you have to route the ADAT's analog outputs to the 02R's analog inputs rather than use the digital I/O card.

The sixteen rotary encoder knobs adjust the levels for the 02R's remaining sixteen inputs, which typically are tape returns derived from the first two card slots, though you can use slots 3 and 4. (In the former case, slot 1 is controlled by knobs 1 to 8, and slot 2 is handled by knobs 9 to 16.)

A Flip button swaps fader/rotary-encoder assignments. This does *not* affect the signal path. All EQ, compression, panning, effects, etc., remain the same for the flipped channels. The Flip button merely trades a moving fader for a nonmotorized, rotary-encoder knob (or vice versa) so you can make manual level adjustments.

When you select any of the eight aux sends, the twenty channel faders serve as channel effects sends for the selected aux. Each channel's send can be independently set to pre- or post-fader for each aux.

A master L/R fader is provided for the stereo output bus. Two additional rotary encoders adjust the levels for the two internal effects returns.

The 02R provides gain pots for mic/line inputs 1 to 24 and 20 dB pad switches for the first sixteen channels. The gain pots provide 44 dB of gain from full counterclockwise to full clockwise positions. With the pad switched in and the gain knob full counterclockwise (at minimum), there's a net gain drop of 4 dB. With the pad out and the gain knob full clockwise (at maximum), you get 60 dB of net gain, more than sufficient for most tasks.

Although the 02R's automation cannot store the positions of these analog controls, the gain knobs offer 30 detents across their range, which is a crucial feature. By noting how many clicks from minimum each knob is set and whether each pad is in or out, you can completely reconstruct all the mixdown parameters that aren't stored.

A pair of LEDs graces each of the 24 mic/line inputs. A green LED lights when the input signal exceeds 10 dB below nominal, and a red Peak LED lights when it exceeds 3 dB below clipping. Channel phase inversion is done in software in the digital domain and is available for any of the 40 input channels and two internal effects returns.

Above each fader and below each channel rotary encoder are an On button and a Select button. The On button doubles as a mute or solo button, depending on the mode. The Select button chooses which channel you wish to equalize, pan, compress, gate, delay, and so on.

ON DISPLAY

A huge 320 × 240-pixel, backlit, fluorescent, graphical screen at the center of the board shows an impeccably organized wealth of information. The type of info it offers depends on what menus you call up with the Display Access buttons. For example, the main View page

shows you the selected channel's phase, digital attenuation, pan, routing, delay, pair and mute status, fader and meter levels (the latter is pre- or post-EQ), individual aux levels and pre/post status, EQ and dynamics on/off status, and graphic displays of the EQ and dynamics curves for that channel.

Most of the time you'll be using the speedier Selected Channel section of the board, located to the right of the display. I could write pages of praise about this part of the console, but suffice it to say that this is where dedicated knobs, buttons, and LED metering/status indicators provide direct and instant access to routing, panning, EQ, and effects-send levels for the selected channel.

Tweaking any of the pan, EQ, or routing controls also prompts the appropriate display page to automatically appear on the 02R's graphical display screen. (There is one exception: a software bug prevents you from going *directly* from the aux page to the routing, pan, or EQ pages via the Selected Channel section of the console. This will purportedly be fixed in a software update.) Of special note is the fact that the pan knob in this section interacts with the routing buttons to position channels sent to even/odd multitrack bus outputs in the stereo field.

Master aux-send levels and bus output levels (and a few other things) are adjusted using a virtual-fader array on the display screen and the data wheel and programming buttons in the bottom right-hand corner of the board. These virtual faders are necessary to keep the aux-send and tape-output buses' signal-to-noise optimal and prevent clipping in the digital domain. Hardware faders would have been less tedious but more expensive.

METERING

The 02R's metering is comprehensive. The levels for all 40 inputs and internal effects returns 1 and 2 are displayed on the main screen. They can be pre-EQ (which is postgain for mic/line inputs 1 to 24), post-EQ, or post-fader. The levels for the eight buses, eight auxes, and stereo out can be displayed either pre- or post-fader.

Peak hold (available for all meters) can be toggled on/off and stays in effect even if you leave the meter-display pages. This allows you to visually confirm digital clipping in a mix that has already been printed. The level meters' fall time can also be adjusted to your taste. All fader/rotary-encoder positions are represented by high-resolution decibel readouts.

Although the previously mentioned meters are all virtual, the 02R also provides a pair of 21-segment LED meters to the right of the graphical display. These meters display the master L/R output levels.

A D-sub 15-pin connector lets you add the optional Yamaha MB02 Peak Meter Bridge, which shows you all the same levels (with the same choice of source points) as the 02R's graphic meter-display pages. However, the MB02 shows you up to 32 tape returns or tape 1 to 16 plus mic/line 1 to 16 simultaneously, so it offers the best way to constantly keep track of critical levels.

▼

Virtually all console functions are automated.

PARAMETRIC EQ

The master stereo output and each of the 40 input channels and two internal effects returns has its own 4-band, parametric equalizer. Separate controls for adjusting frequency, Q, and boost/cut are at your fingertips in the Selected Channel section of the board. When you tweak any EQ parameter, a graphic display of the EQ curve shows on the 02R's display screen.

Each of the four EQ bands covers the entire audible spectrum from 21 Hz to 20.1 kHz—talk about overlap! Gain for each band can be adjusted in exacting 0.5 dB steps. The low and high bands can be changed to bell-curve or shelving response. Alternatively, the low band can be configured as a highpass filter, and the high band can be a lowpass filter.

An onboard EQ Library offers 40 preset EQ programs and 88 empty user RAM slots. An Undo function allows you to return to the previous EQ program or non-Library settings.

DYNAMICS PROCESSING

The 02R features a separate dynamics processor on each of the 40 channels,

each bus, and the stereo output. You can choose between compression, downward expansion, companding (combining compression above a high threshold with downward expansion for signals below a lower threshold), gating, or ducking algorithms *independently* for each channel.

The number of parameters and their range of adjustment are very comprehensive. For instance, the compressors offer exacting controls for threshold, ratio, attack, release, knee, and output gain. As you tweak these parameters, the resulting dynamics curve is graphically displayed on the 02R's screen along with real-time level meters for gain reduction and output gain, an overview of linked channels, and information detailing the source of the processor's key input.

The dynamics processors can be stereo-linked with an adjacent channel or keyed off a variety of sources, including aux 1, aux 2, the left/paired channel (pre- or post-EQ), or the track to be processed (pre- or post-EQ). Using aux 1 as a key, I was able to smoothly de-ess a very sibilant lead vocal. However, doing this made it impractical to use that aux as an external effects send for the mix in progress.

As with the parametric EQ, the Dynamics programs can be stored in an onboard Dynamics Library containing 40 preset programs, 88 RAM slots for custom programs, and an Undo buffer.

The 02R's compressors are vastly improved over those found in the ProMix 01. Like many compressors, they perform a little better on isolated tracks than on mixed stereo program material. Although I still prefer my super-transparent Aphex Expressors for most applications, the 02R delivers the goods on sources as diverse as vocals and snare drum without pumping and with a bare minimum of tonal coloration (just a very slight dulling of high frequencies) when the compressors' parameters are set to moderate values.

The 02R's gates also perform well. It was easy to gate the stereo bus output to weed out a hissing guitar amp at the beginning of a mix. By raising the threshold higher still, I could even gate out the acoustic guitar intro and start the song on the opening snare hit. The gate's attack time can be set to 0 ms, a major advantage when processing percussive sounds.

INTERNAL EFFECTS

The 02R's internal effects use a similar DSP chip and algorithms to those in the ProMix 01 (reviewed in the February 1995 **EM**). The processors offer an assortment of reverbs and ambient effects, chorus, flange, delays, tremolo, auto pan, phasing, and stereo pitch change.

There are 40 preset effects programs, 88 user RAM slots, and an Undo buffer in the Effects Library. The two stereo internal effects processors are returned, in the digital domain, to the two rotary level-control knobs mentioned earlier. These effects returns can be panned, equalized, and routed to the stereo bus or to any or all of the console's eight bus outputs. External sends 1 and 2, 3 and 4, and 5 and 6 can be independently paired as stereo sends.

The plate and room reverbs are a bit ringy and fluttery but are serviceable in small amounts for drums in a dense mix. The hall and stage reverbs are smoother. The two early-reflection algorithms help add subtle ambience and spread to vocals, thickening them nicely. The gated and reverse-gated reverbs can be very coarse sounding unless you keep the room size small; kept under

02R Card-Slot Options

Type	Model	Height	Capacity	Price
ADAT	CD8-AT	Single	4 cards/32 ch. max	$299
TASCAM	CD8-TD	Single	4 cards/32 ch. max	$299
AES/EBU	CD8-AE	Double	2 cards/16 ch. max	$359
Yamaha YGDAI	CD8-Y	Single	4 cards/32 ch. max	$299
A-D/D-A analog	CD8-AD	Double	2 cards/16 ch. max	$799
Digital Cascade Kit	CD8-CS KIT	Single (2 cards plus cable)	1 slot per 02R	$999

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control, they could be useful on techno-pop drum tracks.

The echo programs can be finely tweaked to "sit" vocals and guitar solos nicely in a mix. The chorus effects sound rich and smooth, and the stereo pitch-change algorithm is just the ticket for making your guitar "gently weep."

LIBRARY ON STEROIDS

The 02R also offers a Channel Library with 64 user program slots and an undo buffer. The Channel Library allows you to store a set of custom parameter values for later reuse. For instance, you could save your finely tweaked EQ, compression, level, and pan settings for a favorite snare sound. That way, you can copy the settings to whatever channel the snare drum happens to be on in the next song.

All Library settings are independent of the Automix and can be recalled for any mix or scene memory. For obvious reasons, some parameters (e.g., compressor key-input assignments and stereo-link status) are stored as snapshot-automation scenes rather than in the Channel Library.

MONITORING

Aux 5 and 6 can be used (separately or paired together as a dual mono or stereo send) to build a separate monitor/cue mix. The cue mix can be routed directly to the studio and/or control-room monitors (or a headphone amplifier), with aux 5 supplying the left side of the mix and aux 6 the right. If you pair the two auxes, the Selected Channel's pan knob controls the stereo positioning of each channel in the cue mix. These pan positions are also shared by the control-room mix. Double-clicking on a channel send makes its pre/post-fader setting global for that aux, making the entire cue mix immune to fader changes in a flash. Nice!

Unfortunately, the virtual faders for the aux 5 and 6 master-send levels do not affect the direct cue-mix feed to the studio monitors. This means you must turn down each individual cue send if the signal is distorting the studio outputs. On a happier note, the aux 5 and 6 hardware outputs remain hot even when both auxes are also routed directly to the studio outputs. This allows you to audition external effects patched to the aux 5 and 6 jacks.

You can also send the stereo bus or control-room mixes to the studio outputs, which is useful for those situations when musicians in the studio want to hear your stereo mix or soloed channels. A dedicated (analog) studio-level control knob adjusts the overall level going to the studio monitors. A talkback-level knob controls a built-in mic and is routed directly to the studio outputs.

The control-room monitors automatically dim when you engage the talkback button, and an inset LED flashes. A separate Dim button (with inset LED) is also provided, which lowers the control-room monitors 20 dB. This is useful when, for example, an important phone call comes in and you want to preserve your monitor levels.

▼

Once you're in the pristine digital domain, you'll want to stay there.

A Slate button routes the talkback signal to the main buses and the stereo bus so you can announce the title of a song on your multitrack recorder. Alternatively, you can slate a 50 Hz tone at -34 dB, which will sound a subdued, high beep on an analog recorder in Cue mode.

The 02R also provides a stereo headphone-output jack with level control. The headphone mix is the same as the control-room mix. Besides the Dim button, the comprehensive control-room section also provides facilities for monitoring the stereo bus, auxes 5 and 6 (so you can listen in on the musician's cue mix or monitor external effects sends), two analog 2-track returns, and three digital 2-track returns (which use the AES/EBU and S/PDIF ports). The control-room section also provides the all-important Mono button and a control-room level knob.

SOLO FEATURES

The 02R offers two solo modes. In Recording mode, a separate solo bus is monitored, allowing live mic/line signals to maintain their connections to the console's various output buses. In Mixdown mode, only the soloed channels are sent to the stereo bus; all others are muted.

All 40 inputs and the two internal effects returns can be made "solo safe" in any combination so that their channels will not turn off when a nonsafe channel is soloed. Unfortunately, when you turn the Solo button off, the 02R forgets which channels were soloed, so you must re-create these settings when you turn Solo back on. All soloed channels (plus the Solo button) offer flashing LEDs to remind you that you are in Solo mode and not merely muting other tracks, which is convenient.

In Recording mode, you can monitor the pre-fader or post-pan (in-place) solo signal. The Solo bus level can be adjusted with a virtual control on the display screen. Mixdown mode is always soloed post-pan.

You also have a choice between Last Solo and Mix Solo modes. Last Solo monitors only the last-chosen channel, deselecting all previously soloed channels as you go. Mix Solo lets you add channels so they can be soloed together.

GROUPS AND PAIRS

The 02R lets you group any or all tape returns, mic/line inputs, and internal effects returns 1 and 2 into four fader groups. Move one fader (or rotary encoder) for one channel, and all others in the group follow. With this feature, complex level relationships (such as levels for an entire drum kit) can be preserved as you bring the entire group up or down in the mix.

The same channels can also be added to the 02R's four mute groups. Now you can mute umpteen background vocalists at the push of one button. By turning a channel off before adding it to a mute group (in which all other channels are currently on), you can make the channel turn on when the other channels in the group turn off and vice versa. Mute status is stored in both snapshot and dynamic automation, but it helps to have this manual control when you're initially working things out.

You can also pair the sixteen tape returns, mic/line channels 1 to 16, and aux returns 1 to 6 so that the even-numbered channels reflect the parameter values (EQ, dynamics processing, fader levels, effects-send levels, etc.) set for their paired, odd-numbered channels. That way, you only have to set the parameters for one channel of a stereo

pair. Pairing also allows you to increase/decrease the amount of panning for both channels with one knob, preserving any pan offset between the two.

Aux sends can be paired (1/2, 3/4, and 5/6) to function as stereo sends. When paired in this way, the relative left and right aux-send levels are proportional to the channel's pan position.

SCENE MEMORIES

The 02R can store 64 Mix Scenes for recall at exact SMPTE locations. Two additional Scene memories are provided; one restores the mixer to its default settings, and the other restores the last Scene memory in case you have accidentally overwritten it.

You can recall multiple Mix Scenes anywhere in a song, with SMPTE frame-accurate precision. This instantly changes EQ settings, dynamics-processor settings, effects-programs and send/return levels, panning, fader and rotary-encoder levels, phase, mutes—virtually anything digital across the entire board.

Analog controls and switches (such as phantom power, A/B input, and pad switches and controls for preamp gain, display contrast, and levels to talkback, studio, control-room and phones outputs) are not memorized in the Scene. Neither are MIDI-setup and assignment-table data, though these can be saved via SysEx.

Mix Scenes can be recalled by the 02R's internal automation system, manually, or via MIDI Program Changes. MIDI Program Changes can arrive from any source via the MIDI In port or directly from a computer via the 02R's To Host connector. Mix Scenes can also be saved directly to a computer or via the MIDI Out port, and you can name them for easy identification. Thankfully, unstored edits to Mix Scenes are retained on power down.

Scenes can be memory-protected from accidental overwrite. You can also make any of the 02R's 40 input channels, two internal effects returns, and stereo master fader exempt from any level changes that a Mix Scene would otherwise prompt on recall. This feature allows you to manually readjust levels for one or more tracks without Scene changes ripping the faders out of your hands. These Fader Recall Safe settings are stored in each Scene memory. Even if you forget to store new EQ edits before starting playback, you can undo a Scene recall and get back to your edits in progress.

But perhaps the hippest feature is the Scene Memory Fade Time. This feature allows you to set the time it takes (from 0 to 10 seconds, in 0.1-second increments) for any or all fader levels to go from the previous Scene's settings to the current Scene's settings. The fade times are very smooth, allowing gentle and seamless transitions between Scenes with radically different fader levels across the entire board. The smooth fades apparently are due to the 02R's 24-bit interpolation for fader positions. Fade times are stored as part of the Scene memory.

DYNAMIC AUTOMATION

The 02R's dynamic-automation facilities are extremely flexible and powerful. The automation system can synchronize to 30, 30 drop, 25, or 24 fps SMPTE time code, which comes in via a -10 dBV, RCA jack. Alternatively, the automation can sync to MIDI Time Code via the mixer's dedicated MTC port.

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The huge screen shows an impeccably organized wealth of information.

(The 02R also has an internal time-code generator that lets you audition your automation moves. However, it's not very useful, as it doesn't send time code outside the 02R, so you can't use it to sync to external devices.) Whenever you fast-wind forward or backward in a song, the 02R faithfully chases the last settings of all Automix parameters at the new time-code location.

As you update your mix on each successive pass, you can choose which data (faders, mutes, pan, or EQ) will be safe or overwritten. You can even punch in Automix data on the fly to replace erroneous mix moves on isolated portions of a song by simply toggling the chosen channels' Select buttons to On at the desired moment.

While you're overwriting fader moves, the 02R's Fader Edit page graphically shows you the current position of your faders relative to where they were before you punched in and instructs you (with arrows) to fade up or down in order to return to the old values. If your faders aren't nulled at the punch-out point, the 02R's Fader Edit Out Return function returns all affected faders to their nulls in 0 to 3 seconds (user-programmable in 0.1-second increments). The faders' motors can be turned off in case you find this makes trimming their values easier.

OTHER AUTOMIX FEATURES

As with Scene memories, you can recall individual programs from the EQ, Dynamics, Effects, and Channel Libraries at specific time-code locations, inserting or deleting these events just as you would MIDI events in a software sequencer's event list. (Because the 02R's real-time dynamic automation does not include the dynamics-processing programs, triggering the dynamics processors with snapshot memories is the way to go.)

You can edit channel-mute events in a separate event-list screen. I would like to see an Undo function, time-code readout, and scrolling arrow (to show the current event) in these event-list pages.

Finally, in yet another edit screen, you can extract all level, mute, pan, EQ, and/or aux-send level events from any or all of the console's 40 inputs, two internal effects returns, and stereo bus. You can even do this between user-specified time-code locations. Thankfully, this screen has an Undo function.

When you're completely happy with your final mix, you can name it and store the whole enchilada to any of sixteen Automix program locations. The 02R can store 512 KB of automation data. Onboard memory can be expanded to a maximum of 2.5 MB with the installation of ME4M memory expansion kits. (Each kit adds 1 MB of memory.)

MIDI IMPLEMENTATION

In addition to its MIDI In, Out, and Thru ports, the 02R has a separate input for MIDI Time Code. The console can send and receive MIDI Program Changes to change Scene memories and supports real-time System Exclusive control of most parameters. Unlike the ProMix, the 02R neither transmits nor receives MIDI Control Change messages.

SysEx bulk-data transmissions include the Scene and Automix memories, all

Library programs, system setup, and the MIDI Program Change Assign Table (maps). Partial data transfers are possible, and you can specify what data you wish to import or export.

The 02R can transmit and receive Program Changes and/or SysEx parameter changes on any MIDI channel and can receive Program Changes in Omni mode. A switchable MIDI Echo function enables the 02R to retransmit Program Changes even if it is set to ignore them locally.

BEYOND 32 TRACKS

Major leaguers will want to consider buying a CD8-CS cascade kit, which allows multiple 02Rs to be linked via a 25-pin, D-sub connector. Cascaded consoles share the same bus outs, stereo outs, solo bus, and four aux sends of your choosing. Each board retains four exclusive aux sends. The last console in the chain provides the master L/R output for the entire system.

If you connect four or fewer 02Rs together, the cascade kit will automatically set the correct channel delay to compensate for processor delay time, keeping all 02Rs in phase with each other. The 02R also allows you to independently delay the two internal effects returns and each of its 40 inputs—the stereo inputs are delayed as a group—by up to 59 ms (at 44.1 kHz) or as little as a single sample.

SOUND QUALITY

The mic preamps sound pretty good overall. They are fairly quiet and offer good transient response, as expected from a board in this price range. And except for being just a bit veiled in the mids, they impart minimal coloration.

The 02R's 20-bit A/D and D/A converters sound outstanding. Furthermore, the internal signal path uses 32-bit processing, yielding a 192 dB internal dynamic range. The console can handle a 24-bit word at its digital inputs and outputs, making it ready for high-resolution mastering. To prevent your 16-bit MDMs and DATs from truncating this high-resolution audio data, the 02R offers defeatable dither on its eight bus outputs and stereo output bus.

Some digital mixing consoles of the past have caused so much processing delay on the cue mix that musicians would hear the cue mix as a short, slapback echo to their live performance, throwing off their groove. For the 02R,

● 02R

Yamaha quotes a worst-case processing delay of less than 2 ms, analog in to analog out. To test this, I applied ridiculous amounts of the console's processing to sixteen tracks, which were patched to the analog inputs. Then I overdubbed woodblocks to the tortured mess. I heard no audible delay while overdubbing. When I listened to the results, I was pleased to discover that the woodblocks were in the groove regardless of whether processing was applied to the backing tracks. I'm convinced!

Even more amazing, considering all the processing applied in the previous test (including broadband, cumulative EQ boosts of more than 600 dB), the noise level of the board was much quieter than I would have expected. With a normal setup, the 02R is *extremely* quiet. And its EQ sounds clean, smooth, musical, and very forgiving of excess use.

OMISSIONS AND LIMITATIONS

Nothing is perfect, and the 02R is no exception. It's loaded, but it doesn't have every conceivable feature. For example, I would like to see channel inputs 9 through 16 equipped with XLR connectors, phantom power, and inserts. Of course, you can use XLR-to-TRS adapters and reserve dynamic mics for these unpowered inputs, but using adapters is a second-rate solution. And

Product Summary

PRODUCT:
02R digital mixer
PRICE:
02R: $8,699
MB02 meter bridge: $1,299
ME4M 1 MB memory upgrade: $499
W02SP Wood side panels: $199
MANUFACTURER:
Yamaha Corp. of America
tel. (714) 522-9011
fax (714) 739-2680
e-mail info@yamaha.com
Web http://www.yamaha.com
CIRCLE #437 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ● ◐
EASE OF USE	● ● ● ●
AUDIO QUALITY	● ● ● ●
VALUE	● ● ● ● ●

if you want to use phantom-powered condensers and feed outboard gear on the way to tape, you'll have to use outboard mic preamps, which can be expensive.

Dedicated buttons for soloing aux sends 1 to 4 or muting individual aux sends would also have been nice. Also missing are mutes and solos for the bus outputs.

One drawback of the 02R's design is that when you use a digital I/O card, the console's inputs are dedicated to the card in 8-channel blocks. You cannot use a few of the eight channels with digital sources and use the remaining channels for analog sources. For example, if you load two card slots with ADAT cards, those sixteen inputs can only be fed by ADAT digital tape returns. If your mixdown includes, say, twenty virtual analog tracks (e.g., MIDI synths), that leaves you with only four channels for external effects returns. You'd be hard-pressed to commit some of those virtual tracks to tape, precluding last-minute patch edits and such.

Most users will find the learning curve to be steep (especially those new to digital mixing), but once you've learned this console, you will fly around with ease, speed, and joy. The comprehensive and well-written owner's manual (not to mention Yamaha's technical-support team) is outstanding and features a 93-page tutorial.

Do these limitations deter me? Not one bit! Most of the 02R's shortcomings have workarounds. And, in my mind, the incredible and numerous benefits you get from working in the digital domain with a fully automated console far outweigh any negatives.

CONCLUSIONS

I simply cannot use enough superlatives to describe my praise, my awe, and my passion for the Yamaha 02R. Given the 02R's quality, unbelievably low price, and jam-packed feature set, any criticisms become pedantic.

But perhaps the ultimate endorsement I can give is that I immediately bought one. What choice did I have? Once I had mixed on the 02R, I could never go back to mixing in the analog Stone Age!

Michael Cooper *is a producer, engineer, and owner of Michael Cooper Recording in Eugene, Oregon.* *He thanks the Haines Kanter Project for being his willing guinea pigs.*

Korg Trinity

By Scott Wilkinson

Korg's latest brainchild makes its progenitors proud.

Korg has manufactured some important synth families over the years. These families —M1, 01/W, X series, i series—have included many excellent products, and each generation has improved on previous designs with ever more features and better user interfaces. Nevertheless, they all display striking similarities due to their common heritage.

Trinity is the latest offspring of this lineage; you can see the family resemblance in many respects, which will become evident as we progress. It is available in four models. The base Trinity has a 61-note, synth-action keyboard, and the Trinity Plus adds a Solo Synth board, which is essentially a Prophecy synth on an expansion board. The Trinity Pro offers a 76-note keyboard with the same synth action, and the Pro X includes an 88-note, weighted-action keyboard. Both the Plus and Pro versions include the Solo Synth board. I reviewed the Trinity Plus.

FIRST GLANCE

All Trinity keyboards are sensitive to Velocity and Channel Aftertouch, but unfortunately, they don't transmit Release Velocity. The synth action is quite light; I prefer it to the original Alesis QuadraSynth and Kurzweil K2000 keyboards, but I don't like it as well as the Technics WSA1 or the Kurzweil K2500. There seems to be almost no "give" in the keys for Aftertouch, but it can be invoked well enough by bearing down. Eight global Velocity and Aftertouch curves help you tailor the feel.

Unlike most keyboard synths, the Trinity is housed in a brushed-aluminum case, which is very attractive. The controls are laid out in a clean, uncluttered array. The front panel is dominated by a huge, backlit LCD, which I'll discuss in detail shortly. As usual, the Korg joystick replaces traditional mod and pitch wheels. Two assignable Panel Switches appear above the joystick. Below the joystick is a small ribbon controller, floppy drive, and headphone output.

Six mode buttons are joined by dedicated Compare and Bank Select buttons. Directly beneath these are eight Page buttons, which select onscreen pages in the Edit, Sequencer, and Global modes. A value slider provides one way to change the value of a parameter, which can also be done with the inc/dec buttons. The slider can also be assigned to control various parameters in real time. To the right of the LCD are an alpha dial and a numeric 10-key pad (both of which can be used to change parameter values) and six dedicated sequencer buttons.

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Perhaps the most important innovation is the Touch View LCD.

The rear panel holds four audio outputs on ¼-inch jacks, a dedicated sustain-pedal input, and two programmable foot-controller inputs (one for a continuous pedal and one for a switch). Happily, there is a dedicated contrast control for the LCD; all synths with large LCDs should have such a control. MIDI In, Out, and Thru ports round out the currently available connections.

Blank spaces are provided for upcoming expansion options, which I'll discuss later. These include an optical digital output, 48 kHz word-clock in, and SCSI. In addition, a section of the rear panel labeled HD Recorder includes space for two ¼-inch, analog audio inputs (unbalanced, I hear), and S/PDIF in and out.

FAMILIAR ARCHITECTURE

The Trinity provides 32-voice polyphony and 16-part multitimbral operation from its onboard sequencer or an external sequencer. The principle synthesis technology is good ol' PCM-based subtractive. Korg is great at coming up with techno buzz words and acronyms; the synthesis technology in the Trinity is called Advanced Control Combined Synthesis System (ACCESS).

ACCESS expands the synthesis capabilities found in previous generations of Korg synths. One or two oscillators constitute a Program, the basic playable entity. Each oscillator plays an assigned multisample from ROM and includes two resonant, multimode filters (lowpass, highpass, bandpass, band reject) and an amplifier, all with dedicated LFOs, EGs, and assignable modulation sources (see **Fig. 1**). The oscillators share a single pitch EG, but the pitch of each one can also be controlled by many other sources. Happily, Korg is now using the familiar term LFO instead of Modulation Generator (MG).

The filters can be configured in various serial and parallel combinations (see **Fig. 2**), and the resonance can be modulated by various sources, including Velocity. These are among the best-sounding filters I've heard in a synth; they produce a fat, punchy sound that's hard to beat.

Among the new architectural features in the Trinity are the abilities to Velocity-switch between two multisamples within each oscillator and to delay each oscillator by up to five seconds in 2 ms increments. You can also trigger any oscillator when you release a key, which is great for such fine points as a harpsichord's characteristic key-off noise.

A random detuning function simulates the drift of analog circuits and the vagaries of acoustic instruments, which is useful when emulating these

The Korg Trinity represents the next generation of Korg synths. It sports a huge, backlit, graphic, touchscreen LCD, which provides the primary user interface.

available as modulation sources, but the Trinity offers plenty of modulators for most applications.

THE SOUNDS

The Trinity provides 375 multisamples and 258 drum samples in 24 MB of ROM. All of the samples were recorded at 48 kHz, which is great. These samples provide an extensive selection with several variations of many different types of sounds. A few of these variations include looped versions without attack transients, which are useful in building synthetic textures. You can also bypass the attack transient of any multisample with the Start Offset parameter, which tells the oscillator to use the alternative start point that was fixed at the factory.

Samples are used to create Programs, of which there are 256 in two Banks of nonvolatile RAM. (The Solo Synth board adds 64 more.) I like seeing all Programs in RAM rather than having factory presets in ROM because you can always restore the factory sounds from the included disk. In addition, it's nice to see that Korg has finally accepted the logic of base 2 instead of base 10; previous instruments organized sounds into Banks of 100, not 128, which always seemed like a waste of good numbers to me. In addition, you can't assemble a complete General MIDI Bank with only 100 locations.

Each Program uses one or two oscillators playing samples through a subtractive signal path. If two oscillators are used (Double mode), the polyphony is cut in half. Some Programs use a special Drum mode in which an oscillator is assigned to play an entire drum kit across the keyboard. All Korg synths since the M1 have included this Drum mode, but the Trinity offers more extensive effects routing and the ability to Velocity-switch between two drum samples per key. Drum mode Programs can use one of the factory kits, or you can create your own kits in Global mode.

Up to eight Programs can be assigned to Timbres within a multitimbral Combi, and up to 256 Combis are stored in two Banks of nonvolatile RAM. To recover some polyphony, you can "hide" (disable) oscillator 2 in any Combi Timbre. Each Timbre can address internal Programs or external MIDI channels but not both. (Tracks can address both in Sequencer mode—more in a moment.) The upper and lower key and Velocity boundaries of each Timbre can include their own slopes, which lets you crossfade them to taste.

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I applaud the emergence of ribbon controllers.

Programs and Combis can be assigned one or two user-defined categories, such as strings, synth pads, brass, and guitars. In fact, there are two sets of categories for Programs and two more sets for Combis. You can search for all Programs or Combis associated with a particular category.

This is excellent, especially considering that the factory Banks are organized in that maddening fashion in which similar sounds are found in every sixteenth location. For example, there are brass Programs in locations 012, 028, 044, and so on. This provides a variety of sounds in each group of sixteen Programs, which is great for music-store demos, but I'd prefer to see similar sounds grouped together.

Fortunately, one of the included floppy disks provides the factory Banks reorganized by instrument family and as a GM Bank. The category-search function also mitigates the organizational problem to a large degree, but I wish that selecting a sound during a search activated it to play. As it is, you must exit the search function before you can hear the sound.

Overall, the Trinity has a clean, crisp sound. The audio output is very hot, the high end is much more present than in previous Korg synths, and the bottom end rocks. Most of my favorite factory Programs are the synth sounds, in which the resonant filter is often put to good use (e.g., "Ultra Rez. Sweep" and "Rezpad"). There are several excellent wave-sequence sounds, such as "Frozen Crystals," "Shape Shifter," and "Out of the myst."

Of the emulative sounds, the electric pianos, organs, vibes, and marimbas are good, as are the electric and acoustic guitars. The pedal steel is especially good: it's a sample of a real Sho-Bud rather than a tweaked version of an electric guitar. I also like the fretless basses and some of the string ensembles. Many of the ethnic sounds are excellent, and the drum sounds are quite good, with nice, long decays on the cymbals.

However, many emulative sounds are pretty thin and unconvincing. In particular, the acoustic piano and most of the woodwinds and brasses are disappointing, and the harpsichord doesn't cut it at all. This may be due in part to the programming, but many of the emulative samples sound weak when auditioned by themselves with minimal programming and no effects.

The sounds in the Solo Synth Bank use a variety of techniques, including physical modeling. However, I just don't like many of these sounds. Some of the analog synth sounds are pretty good, such as "Studio Mog 1," "Anafuz," "Maxisync," and "The Big One," which is so powerful it nearly toppled my monitors from their shelves.

ANIMATED EFFECTS

The Trinity includes an extensive collection of effects, which are divided into two types: insert and master. Up to three insert effects can be configured serially and applied to a standard Program, and up to four insert effects can be combined in one of several configurations for Drum Programs. This lets you process different drum sounds individually. Up to eight insert effects can be applied to separate Timbres in a Combi or tracks in a song, and Timbres and tracks can be grouped to use the same effects.

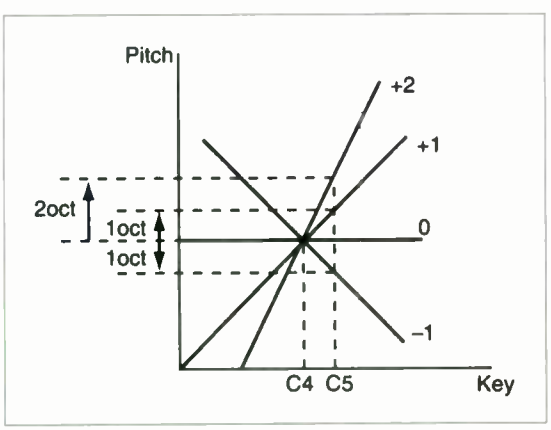


FIG. 3: The Pitch Slope determines the number of keys that encompass an octave. (Courtesy Korg USA)

sounds. In addition, the Pitch Slope parameter sets the number of keys that encompass one octave and determines whether the pitch rises or drops as you progress up the keyboard (see **Fig. 3**).

The LFOs offer nineteen waveforms, including six random varieties and several phase-shifted variations of the standard waveforms, which is considerably more than those found in previous Korg generations. The LFOs can be triggered at key on, key off, or both. You can also program each EG segment to track the keys and Velocity independently, which is extremely flexible.

The Trinity Plus and other models with the Solo Synth board include the Multi Oscillator Synthesis System (MOSS) technology from the Prophecy Solo Synth (see the review in the February 1996 **EM**). This system uses several synthesis techniques, including physical modeling, variable phase modulation (VPM), and analog simulation. The sounds are basically monophonic.

Many manufacturers offer expansion boards with new samples and patches, but Korg is the first company to offer an entire synthesizer on a board, complete with its own dynamic effects. This synth is fully integrated with ACCESS, so it can use the insert and master effects, as well. The only difference between the Solo Synth board and the Prophecy is the absence of the third "barrel" wheel, arpeggiator, and Performance Edit knobs.

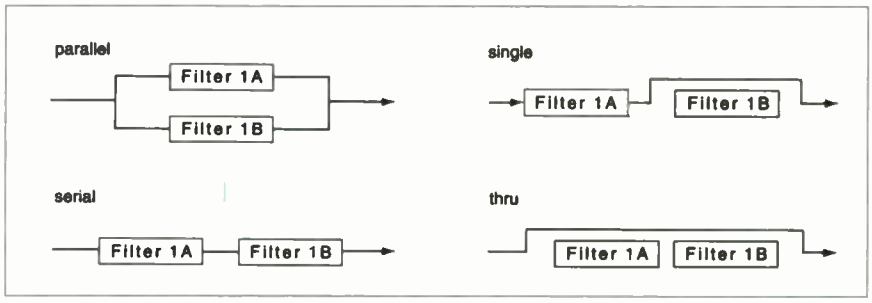


FIG. 2: The multimode filters can be configured in serial or in parallel, and the resonance can be modulated by various sources. (Courtesy Korg USA)

MODERN MODULATION

As with most modern synthesizers, you can assign many different modulation sources to control many different synthesis and effects parameters. (This is the "Control" part of ACCESS.) Modulation of synth parameters is called Alternate Modulation, and the sources are called Alternate Modulation Sources (AMS). This is important to know because the onscreen label used to select a modulation source is AMS, the meaning of which is not intuitive.

Modulation of effects parameters is called Dynamic Modulation, and modulation sources are simply called Src; I would have preferred some consistency in nomenclature here. Nevertheless, to my knowledge, this degree of effects-parameter modulation is unavailable in any other synth.

Internal modulation sources include the LFOs, EGs, note number, even the sequencer tempo. Of course, the physical controllers—joystick, ribbon, Panel Switches, slider, Aftertouch, Velocity—can also be used for this purpose. The joystick's four directions are independently assignable, and the ribbon controller is sensitive to both direction and pressure.

I applaud the emergence of ribbon controllers; they can produce very expressive vibratos and other effects. However, this ribbon always snaps back to its nominal (center) value when you remove your finger. In addition, the center point is both fixed and poorly marked. I would like to see a Snap On/Off control and a Relative mode as found in the Kurzweil K2500.

You can assign different messages to be sent by the footpedals but not the joystick, ribbon, or slider. The joystick's *x* axis (right/left) sends Pitch Bend as expected. Interestingly, you can specify different pitch-bend ranges for right and left directions, and you can quantize the pitch bend of each direction to different intervals, from small microtones all the way up to octaves. The joystick's +*y* axis (up) sends Control Change 1 (Modulation), and its -*y* axis (down) sends CC 2 (Breath Controller). The ribbon's *x* axis sends CC 16, and its *z* axis (pressure) sends CC 17. The slider sends CC 18.

The two Panel Switches can be assigned to perform various functions. However, there are only eleven items you can assign to these switches. For example, you can freeze the joystick and ribbon values, which lets you override the ribbon snap and joystick spring and play variations of a Program with both hands. This is well and good, but I found it a bit awkward to push one of the switches while holding the ribbon, all with one hand. I'd prefer to turn Snap off and use the switches to reset the ribbon to its nominal value.

As with previous generations of Korg synths, eight Performance Edit parameters are available in Program Play mode. This lets you instantly change the sound in the heat of performance.

Only a few MIDI messages can be used as direct modulation sources. I'm pleased to report that among these MIDI messages is Polyphonic Aftertouch from an external source. Of course, I prefer to have all MIDI CC messages

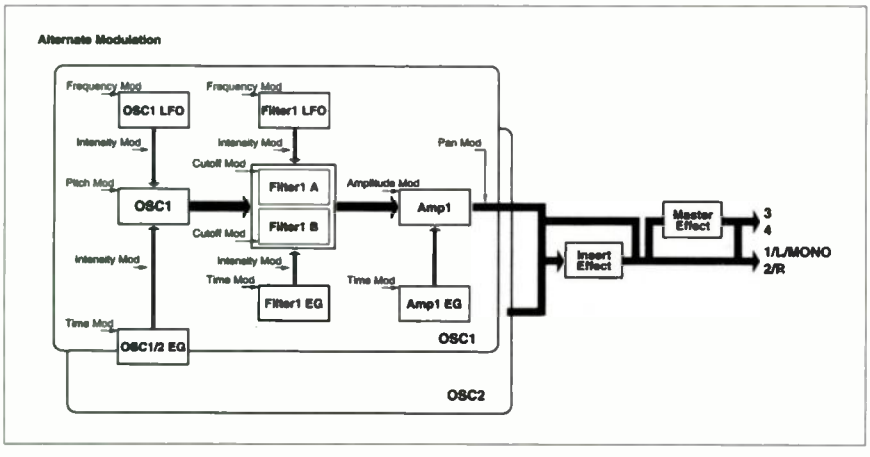


FIG. 1: Each Program consists of one or two oscillators, each with two resonant, multimode filters, an amplifier, and extensive modulation potential. (Courtesy Korg USA)

NICE TOUCH

Perhaps the most important innovation on the Trinity is the Touch View LCD. This display measures 320 × 240 pixels, and it approaches the utility of a computer screen by showing you most of the relevant parameters and values in each mode without having to scroll through endless pages (see **Fig. 4**).

Most parameters are selected and edited directly on the screen: you simply touch the desired item with your finger. In many cases, you then move your finger to edit the item; sometimes, you must enter a number with the 10-key pad, alpha dial, or value slider. Happily, you don't need to include leading 0s when entering 1- and 2-digit numbers with the 10-key pad.

The onscreen items are logically organized and labeled. Graphic elements include envelopes, graphic EQ, and effects routings. Eight page buttons to the left of the display select the desired page in Edit, Sequencer, and Global modes; the current mode and page are displayed in the upper left corner of the screen. Many pages include "tabs" that resemble file-folder tabs along the bottom of the screen. Touching these tabs brings different stacked subpages to the "top."

Radio buttons and check boxes follow standard Macintosh and Windows conventions. Pop-up buttons open a window containing a menu of choices, such as a list of Programs, Combis, or parameter values. Once you open a pop-up window, you select an item in the list by touching it with your finger.

The pop-up windows include a safety-pin icon in the upper left corner, which determines when the window closes. In its default state (pin open), the window closes as soon as you select an item in the list. Touch the pin once to "close" it, and the window remains open as you select different items. The latter approach is great for trying different things in the list just to see what happens.

These windows also include horizontal and/or vertical scroll bars that behave just like their computer counterparts. You can even move the window around on the screen by touching the upper boundary and moving your finger.

A text-edit button appears next to all text fields. This button opens a text-entry window, complete with an onscreen QWERTY keyboard, space bar, and Shift key as well as cursor, Delete, Cancel, Clear, and OK buttons. This is among the most elegant text-entry methods I've seen on a synth, although it's unreasonable to expect that anyone could touch-type on the virtual keyboard.

A page menu button in the upper right corner of the screen pulls down a menu of basic functions, such as copy and write. The specific menu items depend on the mode. You can also hold Enter and press the page buttons to invoke the menu items directly.

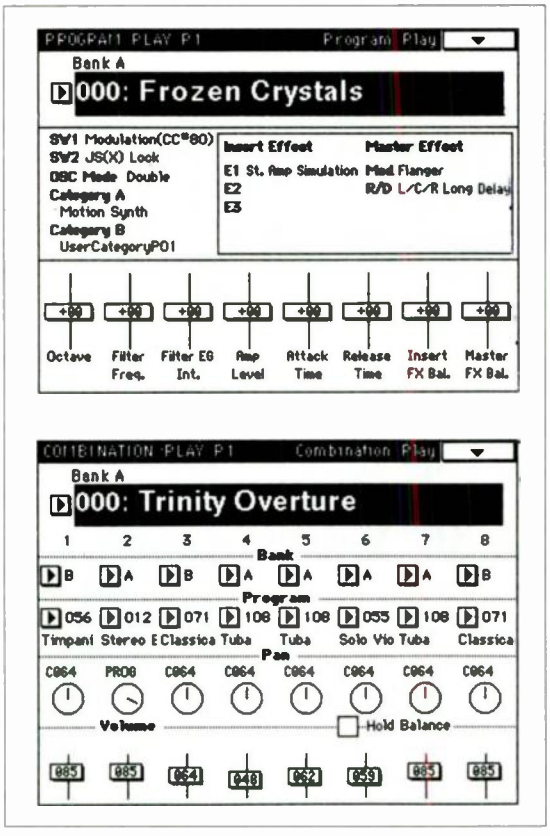


FIG. 4: In Program Play mode (top), the screen displays many relevant parameters at once, including various controller and effect assignments as well as eight parameters you can edit without entering Edit mode. In Combi Play mode (bottom), you can see the Programs assigned to Timbres and adjust the panning and volume of each one. (Courtesy Korg USA)

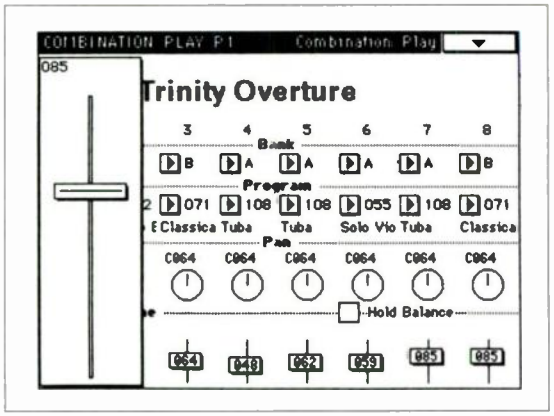


FIG. 5: When you touch an onscreen slider, it enlarges, which lets you adjust its value as you move your finger to the slider icon. (Courtesy Korg USA)

Many parameters are specified with onscreen sliders. Touching the slider enlarges it on the screen (see **Fig. 5**). To change the value, hold your finger on the screen, drag it to the slider icon, and then move the slider with your finger. The numerical value is displayed in the upper left corner of the slider area, and the enlarged slider shrinks to normal size when you remove your finger. There are also a number of onscreen knobs that work in a similar manner.

Unfortunately, it takes a long moment for the slider or knob to enlarge and longer still to drag your finger to the correct location for editing. I found it much faster to select the item and change its value with the alpha dial or value slider. In addition, I sometimes missed the spot I was aiming for with my finger, which is wider than the scroll bars and some other items. Using a fingernail or touching more lightly to create a smaller area of contact helps.

The screen-redraw time is very slow, especially if a sequence is playing. This was particularly annoying when changing Programs or Combis, which are slow to change even in response to MIDI Program Change messages. Finally, there is no indication that a Program or Combi has been edited when you leave Edit mode.

Despite these problems, I like this display a lot. It beats physical soft buttons around the display hands down.

SOPHISTICATED SEQUENCER

As is the trend these days, the onboard sequencer is quite comprehensive. It

A total of 100 insert effects are organized into three groups according to their "size," which indicates the amount of processing horsepower they require. For example, size 1 effects include compressor, limiter, 4-band parametric EQ, 7-band graphic EQ, wah, exciter, various choruses, flangers, phasers, ring modulator, amplifier simulator, rotary speaker simulator, and delays.

Size 2 effects include stereo versions of many size 1 effects, plus Doppler, pitch shifter, and various reverbs. Also in this group is a Talking Modulator that applies vocal formants to the sound. The effect is reminiscent of the classic "talk box" made famous by Peter Frampton. You can specify the vocal vowels that are applied in the middle and at either end of a controller's range, which is pretty cool.

Size 4 effects include long delays, a vocoder, and various stereo effects. One interesting effect is called Piano Body/Damper, which simulates the acoustic effect of these objects quite well. Effects of size 2 and 4 can maintain a discrete stereo signal throughout, which is great.

The combined size of these effects in Program mode cannot exceed 4. For example, you can have two effects of size 1 and one effect of size 2. The combined size in Combi or Sequence mode cannot exceed 8. This whole size scheme lets you allocate your effects resources efficiently. Each insert effect also includes a wet/dry control. The output from the insert effects is routed directly to the main audio outputs and to the inputs of the master effects.

Two master effects modules are provided. One module supplies modulation effects (flanger, phaser, and various choruses and delays); the other takes care of reverbs and a few more delays. Two sets of send/return controls let you establish the wet/dry mix. A 2-band shelving EQ follows the master effects just before the final output.

The entire effects section is extremely flexible and offers a great variety of processing potential. The effects sound quite good in general, and they can be made very pronounced; I like lots of "headroom" in the effects depth. Korg has always relied on the effects as an integral part of the overall sound, and the Trinity does not disappoint. It offers some of the best, and certainly the most extensive, onboard effects I've seen in a synthesizer.

provides sixteen tracks plus a master track for time-signature and tempo changes. There is enough memory for 80,000 notes distributed among twenty songs, with up to 999 measures per song. Trinity also offers pattern-based sequencing, with up to 100 patterns per song. Of course, the sequencer can save and load Standard MIDI Files to and from disk. The upcoming hard-disk recording option will add four audio tracks to the sequencer, which will be a big plus.

The onboard sequencers in previous Korg synths used a recording resolution of 96 ppqn; the Trinity doubles it to 192 ppqn, which is a big improvement. In addition, you can specify lower resolutions in units of rhythmic value (quarter note, eighth note, etc.), which provides input quantization.

When recording in real time, Trinity plays the metronome as long as you want before recording begins, which lets you get into the groove. The metronome changes pitch and the LED in the Start/Stop button changes color on the downbeat, which is very nice. The large screen also displays the measure, beat, and tick in large characters. You can elect to overwrite or overdub data in any track, and you can automatically or manually punch in and out. In addition, you can perform loop and step-time recording. Patterns can be recorded in real time or step time, as well.

In Track Edit mode, the display reveals which tracks include data or patterns, which is impossible in smaller displays. You can also name songs, tracks, and patterns, which is great. The editing functions are relatively complete, and all of them allow you to specify the track and measure boundaries to edit.

▼

The Trinity has a very clean, crisp sound.

An event list lets you edit individual events, and you can filter the list to see just those events you want to work on. This window also includes insert, delete, and copy buttons. Unfortunately, you can't play the sequence while the event list is open.

You can copy, erase, and bounce tracks as well as erase, delete, insert, copy, and move measures. You can also create and erase controller data. Creating this data inserts the specified controller data from the start point to the specified end point, starting with the existing value at the start point and ending with a specified end value.

Quantization resolution ranges from quarter note to 32nd-note triplet. A Hi resolution setting is also available: this is the sequencer's maximum resolution of 192 ppqn. If you select this resolution, events are not quantized, but they are still shifted in time according to the Offset parameter, which shifts notes backward or forward by clock ticks after quantization. The Intensity parameter determines how completely quantization is applied. There is no groove quantization, sensitivity parameter, or swing function.

Notes can be transposed up or down

by as much as two octaves, and you can modify the selected Velocities with one of six curves. Like Combi Timbres, each track can have its own key and Velocity zones with crossfade slopes. Each track can address internal sounds, external MIDI channels, or both, and insert effects can be applied to separate tracks.

Other cool tricks include audible fast-forward and rewind, which plays the song forward or backward at four times normal speed. You can also enter any desired measure number while the song is playing and hit Enter at the moment you want to jump. Perhaps coolest of all, the sequencer chases controller data; if you start playing in the middle of the song, any controller data prior to the start point is updated automatically. This is unique among keyboard-workstation sequencers, as far as I know.

I like the Trinity sequencer very much, but I had a few problems with saving and loading songs to disk. For one thing, you can load individual songs, tracks, and patterns from disk, but you can only save the entire sequencer memory, including all songs, to a single folder; you can't save individual songs, tracks, or patterns separately. In addition, this folder must be saved in the topmost level of the directory structure.

BITS AND PIECES

Changing Programs and Combis takes an inordinately long time. (This problem is mitigated somewhat by opening the selection window and closing the safety-pin icon, which keeps the window open as you select different items.) In addition, changing Programs or Combis cuts off any lingering sound from the previous one; this does not occur in Sequencer mode, but it shouldn't occur at all. The Trinity always powers up in Combi Play mode with Combi A000 selected. I would prefer to have it power up to where you left it when you last powered down, as with almost every other synth on the market.

The documentation consists of no fewer than five books: *Basic Guide, Effects Guide, Parameter Reference, Solo Synth Guide,* and *Voice Name List.* This is a reasonable organization, but there is no index, making it difficult to find things. In addition, the English is rather awkward, revealing the documentation's Japanese origin.

On the plus side, the Trinity includes a number of preset alternate tunings and two user tuning tables. One user table is octave-based, and the other table lets you tune every note in the MIDI range independently. This is fantastic; few synths offer this capability. However, I wish Korg's engineers had implemented the MIDI Tuning Standard while they were at it.

In what I hope will become a trend, the Trinity's operating system is stored in Flash ROM and can be updated from floppy disk rather than requiring a chip swap. However, you must still take the instrument to an authorized service center or dealer to load new software because the procedure is not idiot proof, which defeats the main purpose of disk-based software updates. Even so, this makes it much easier for Korg to release updates.

STORAGE AND EXPANSION

The disk-file system is fully hierarchical, complete with folders and meaningful icons. It's also easy to navigate thanks to the Touch View display. However, it doesn't automatically scan a newly inserted disk if it's already in Disk mode.

One of the nicest aspects of the Trinity is its expansion opportunities, which let it grow as your needs (and budget) dictate. A Flash ROM board ($650), which should be available by the time you read this, includes 8 MB of Flash memory with two more Banks of Programs and Combis (including twelve new drum kits) and another 64 Programs for the Solo Synth option. The

Product Summary

PRODUCT:
Trinity keyboard workstation
PRICE:
Trinity: $3,599
Trinity Plus: $3,999
Trinity Pro: $4,799
Trinity Pro X: $5,999
MANUFACTURER:
Korg USA, Inc.
tel. (516) 333-9100
fax (516) 333-9108
CIRCLE #438 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ●
EASE OF USE	● ● ● ● ◖
QUALITY OF SOUNDS	● ● ● ◖
VALUE	● ● ● ◖

Flash ROM can also hold user samples; it will read Korg, Akai, and AIFF files, but Korg hasn't announced whether it will support the MIDI Sample Dump Standard.

Other expansion options include the Solo Synth board ($500, available now), ADAT I/O ($150, promised for sometime after April 1996), SCSI ($450, available in June), internal hard disk (Pro X only), and a hard-disk recorder ($660, available in June), which also includes the SCSI option. I hope they implement SMDI with SCSI. The hard-disk recorder/SCSI option lets you back up the internal memory and hard disk to data DAT. There are no plans to offer a sampling option.

CONCLUSIONS

The Trinity is among the most expensive keyboard workstations on the market today, so I expected a lot from it. Fortunately, it delivers in many respects. In particular, many of the synth sounds are splendid, thanks in no small part to the resonant filters, which are among the best I've heard. The effects are also excellent, both in quality and quantity. The sequencer is superb, and the expansion potential is exceptional. The Touch View LCD provides a mostly wonderful user interface with one prominent exception: the screen-redraw time is too darn slow.

In addition, this is clearly the most expressive synth Korg has ever made. There are more modulation sources and destinations than ever before, which provide wide-ranging control over the entire sound of the instrument. Programmers and players will love this aspect of the Trinity.

On the down side, many of the acoustic-instrument emulations are not very good, and I found few sounds I like in the Solo Synth board. In addition, Programs and Combis are slow to change, which is very annoying. Although the ribbon controller is a good idea, the lack of a Relative mode and a Snap On/Off switch is unfortunate.

The synthesizer workstation market is getting a bit crowded these days, and the Trinity is right in the thick of it. It's a particularly good choice if your music leans toward rock, pop, rap, or new age. This is by far the deepest synth Korg has produced, building on the strengths of its forebears and exceeding their limitations, as all children should. ●

Crown CM-700

By Lori Bolender and Mike Cutter

A quality condenser microphone for a song.

We're big fans of Crown's Phase Coherent Cardioid (PCC) boundary microphones, so we were delighted to review the company's new cardioid condenser, the CM-700. But we had reservations. After all, does the world really need another cardioid condenser mic? After we got acquainted with the high-quality but low-priced CM-700, the answer was clearly positive. Many engineers will find it hard to pass up this new, cost-effective transducer.

The CM-700 is part of a series of Crown condenser mics designed for both studio and stage. A petite mic with a sleek, satiny black finish, its low weight and mass make it ideal for tight setups. But don't let its small profile fool you: the CM-700 is a robust little unit, built with the ruggedness for which Crown is famous. Further enhancing the mic's versatility is a bass-attenuation switch with three positions: flat, low-cut, and low-frequency rolloff.

SUCH A DEAL!

Crown incorporates several quality components into the CM-700, including an ultralight diaphragm, a humbucking transformer, polycarbonate capacitors, and a gold-plated XLR connector. Like most condenser mics, it requires 12 to 48 volts of phantom power.

Standard accessories include a swivel mount, a protective canvas carrying case, and two foam windscreens. One of the windscreens is a pop filter for minimizing plosives, and the other is designed to reduce wind noise when the mic is used outdoors. The CM-700 also comes with an unconditional 3-year warranty. But what's really remarkable is the price: the CM-700 lists for only $289!

THE WORLD'S A STAGE

We used the mic primarily in sound-reinforcement settings. Of course, when it comes to stage applications, the subtle criteria that can decide a mic's fate in the pristine environment of a recording studio don't apply. In their place are bottom-line considerations: functionality, reliability, and sound. The CM-700 did very well on all three counts.

First we tested the mic on a lectern. The literature that comes with the mic mentions this application last, which, as it turns out, is appropriate. Compared to the slender, gooseneck microphones designed specifically for miking a lectern (such as Crown's LM-300), the looser cardioid pattern and physical size of the CM-700 make it a definite second choice for this application.

CM-700 Specifications

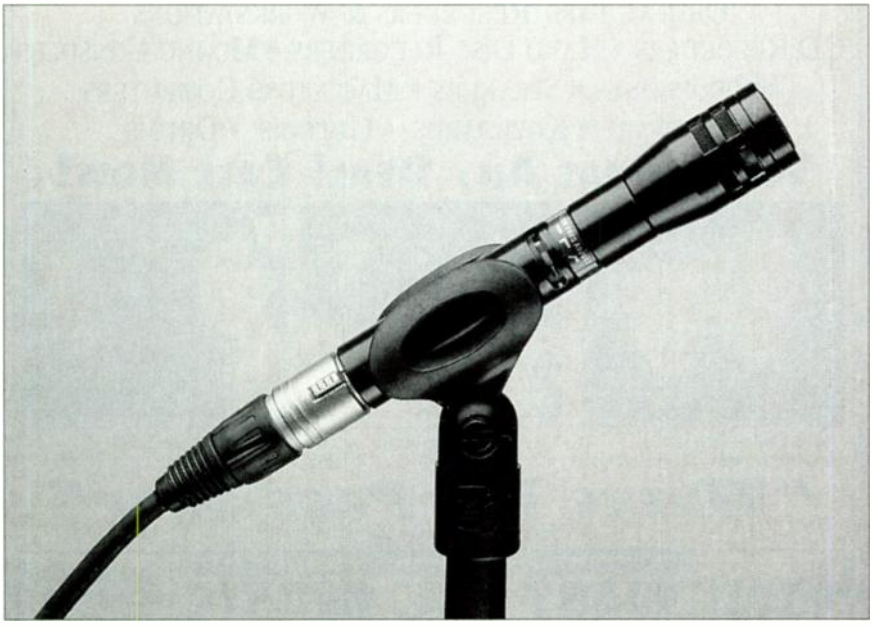
Type	condenser
Polar Pattern	cardioid
Frequency Response	30 Hz–20 kHz
Maximum SPL	151 dB
Impedance	190Ω
Weight	4 oz.

While doing sound for a dance band, we used the CM-700 on the hi-hat. The microphone proved perfectly suited for the task. Its relatively small size made it easy to position and left plenty of clearance for the cymbal directly above the hats. With the bass-tilt switch set at maximum rolloff, the microphone delivered a bright, crisp sound. We are confident that the CM-700 would perform equally well as an overhead drum mic.

On the other end of the spectrum, we had an ideal opportunity to check out the mic on an acoustic instrument while doing sound for Tony Bennett, who was accompanied by a full orchestra. In this case, we used the CM-700 on the cello. The sound was warm and full, yet brilliant at the top. It especially shone during the ballads and solo passages. Altogether we were really pleased with the response and dynamic range of the CM-700 in this setting. We wouldn't hesitate to use it on any number of acoustic stringed instruments, including guitar and mandolin.

Our final test for the CM-700 was a bit unorthodox in more ways than one. The band was a group of Japanese taiko drummers. Rather than close-mike each instrument, we attempted to capture the ensemble feel of the group with stereo miking. The only problem was that we didn't have two CM-700s. So we paired the Crown mic with a Shure SM81 in the classic *xy* configuration. (Hey, whatever works, right?)

On top of that, we were capturing the performance with a digital multitrack recorder as well as feeding the group through the sound system. Compromises aside, the CM-700 performed beautifully. We obtained great-sounding tracks, and thanks to the excellent rejection characteristics of the CM-700's cardioid pattern, we had enough



Equally at home onstage or in the studio, Crown's rugged, lightweight CM-700 cardioid condenser mic delivers great sound at an attractive price.

gain before feedback to pump it up in the room. The CM-700 would definitely perform well as a choir mic.

THE UPSHOT

Clearly, none of us is too keen on putting expensive condenser mics near flailing drum sticks or the occasional airborne beer can. Nor is it any fun if you accidentally drop a nice overhead condenser as you scramble onstage while trying to carry ten drum mics. But knowing that you're dealing with a good mic that costs less than $300 lowers the pressure considerably and ultimately makes the job go smoother.

The CM-700 is a superb, extremely versatile mic, sensitive enough to capture acoustic performances, yet rugged enough to handle the SPLs delivered by a drum kit or powerful vocalist. It is an extremely flat and quiet microphone with very low off-axis coloration. The cardioid pattern provides sufficient gain before feedback, and the bass-tilt switch lets you handle a multitude of situations.

Whether your gig is in the studio or on a stage, if you're in the market for a condenser mic, the CM-700 would be a wise choice. Your pleasure in its fine performance will be doubled when you consider that most of its competitors cost at least twice as much.

Lori Bolender *and* **Mike Cutter** *have been residing as sound engineers/technical directors at the San Francisco Hilton for more than seven years. After a banner year engineering and technical-directing back-to-back shows, they are enjoying a much needed breather.*

Product Summary

PRODUCT:
CM-700 condenser mic
PRICE:
$289
MANUFACTURER:
Crown International, Inc.
tel. (800) 342-6939
or (219) 294-8000
fax (219) 294-8301
e-mail 1ponder@crownintl.com
Web http://www.crownintl.com

CIRCLE #439 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
AUDIO QUALITY	● ● ● ●
VALUE	● ● ● ● ●

Yamaha Visual Arranger 1.0 (Win)

By Allan Metts

Drag and drop a colorful, creative composition.

Some people say auto-accompaniment programs sacrifice creativity and emotion and replace them with sterile, computer-generated rhythms. But I've always been fond of programs that create their own music. Whenever I feel that one of my songs sounds just like everything else I've ever written, I try changing its feel by putting it into Blue Ribbon SoundWork's *SuperJam!* or PG Music's *Band-in-a-Box*. Often, hearing the same song in several different styles is just what I need to get me out of a creative rut.

Yamaha's *Visual Arranger* is the newest of these programs that create music. The program caters more to the musical novice than the professional, but it still provides enough power to throw good-sounding ideas together in a hurry. *Visual Arranger* runs on Macintosh and Windows systems (including Windows 95) with a GM synth or sound card. I tested the program mostly on a Windows 3.1 system with 8 MB of RAM, but I also checked it out under Windows 95.

VISUALIZE THIS

When you first start *Visual Arranger*, the opening screen is rather different from the typical Windows program (see **Fig. 1**). You see no menus, buttons, or dialog boxes. Instead, you see a bitmapped graphic of an animated inner-city scene with "hot spots" that take you to different parts of the program. For example, clicking on the left turntable loads and plays a program demo, and clicking on the right turntable lets you work on a new song. You can also display a quick-reference guide and the Mixer screen from here.

Once you've heard the demo, the opening screen doesn't add much value. I disabled it with a preferences setting and had the program open directly to the Song window (see **Fig. 2**). In this window, you select the Styles for your masterpiece and set up its structural elements. Appearing with the Song window (and every other window except the opening screen) is a Control Box, complete with tape-style transport controls and settings for song location, tempo, and transposition. The Control Box also includes handy buttons for moving between the program's five windows.

In the Song window, you have access to the real asset of *Visual Arranger:* 160 built-in Styles, which are quite good. Each Style is represented by its own icon and grouped into one of eight "folders." The folders represent musical genres (jazz, rock, dance, etc.), so finding the Style you want is not a problem. Just click on the appropriate folder tab, and then click on a Style icon to audition it.

Two additional folders are labeled Favorite and Disk. You can assemble your own collection of twenty Styles in the Favorite folder or load additional Styles into the Disk folder. *Visual Arranger* installs more than 40 extra Styles on your hard disk, and you can load any of these into the Disk folder.

▼

The program caters more to the musical novice than the professional.

Among my favorite Styles are "Rozza," "Guitar Shuffle," "Swing 2," and "'40s Jazz." I had little use for some of the Styles in the World folder, but that's probably because I don't write much bluegrass or Viennese waltz music.

It was interesting to associate *Visual Arranger*'s Style names with sounds I've heard on the radio. "Rock Classical" reminds me of disco-classical remakes from the '70s, and "'80s Rock Pop" sounds suspiciously like Prince's "1999." If nothing else, *Visual Arranger* represents a pretty decent anthology of popular music styles.

Each Style offers eight Variations, which are selected with a set of radio buttons to the right of the Style icons. These Variations include Main A and Main B, which are used for most of the song. (Typically, Main B adds a little punch by playing an additional instrument or adding more notes to Main A.) You also get an Intro, an Ending, and four 1-bar Fills.

The Fills are designed for each of the four possible transitions between the two Main Variations (A to A, A to B, B to A, and B to B). They can also replace the last measure of whatever came before them in the sequence. This lets you play seven bars of the Main A Variation followed by a 1-bar fill that takes you into eight bars of Main B.

BUILDING A VISION

You build a song by dragging icons out of the Style folders onto the Sequence Display in the bottom half of the screen

FIG. 1: *Visual Arranger* opens differently than most music programs, making you click in the picture to get where you want to go. I disabled this screen once it got old.

(see **Fig. 2**). As you do, arrows connect the icons to show the sequence in which they will play. You must select the Style's Variation before you drag, but you can easily combine different Variations of the same Style in the Sequence Display. For example, a simple song might consist of an Intro, a Main A section, and an Ending (all in the same style). This example would use three icons in the Sequence Display. The three icons would be identical except for their color, which indicates the Variation.

I was disappointed when I realized that the Variations always play exactly the same music, with no random elements thrown in to make the song sound human. Programs such as *Band-in-a-Box* and *SuperJam!* are quite good at spicing things up automatically; my *Visual Arranger* compositions sounded monotonous by comparison. Your best defense against a sterile sequence is to switch between Main A and Main B often and use lots of Fills.

You are free to change Styles as much as you want in a sequence (something you can't do in *Band-in-a-Box*), but I occasionally experienced a slight hiccup when I did this. Apparently, *Visual Arranger* sends Program Change messages too close to the downbeat of the new Style, and my GM synth didn't have enough time to change patches before it was time to play the downbeat. A new DLL file from Yamaha improved things considerably, but I could still hear subtle glitches every once in a while.

You can do some rudimentary editing in the Sequence Display. For example, the Quill tool lets you redraw the connecting lines between the Style icons, which changes their playing order. You can also erase icons or connecting lines with the Eraser tool and audition Styles with the Speaker tool. Although its sequence-editing features are minimal at best, *Visual Arranger* can export (though not import) Standard MIDI Files, so you can edit your new piece in your favorite sequencer.

I tried to make a loop by connecting the last icon to another one earlier in the sequence, but *Visual Arranger* doesn't allow this. However, you can duplicate sections of your music by dragging icons or using the cut/copy/paste menu items. Another menu item lets you continuously loop the entire sequence. Finally, an Undo button is close at hand to fix your last blunder.

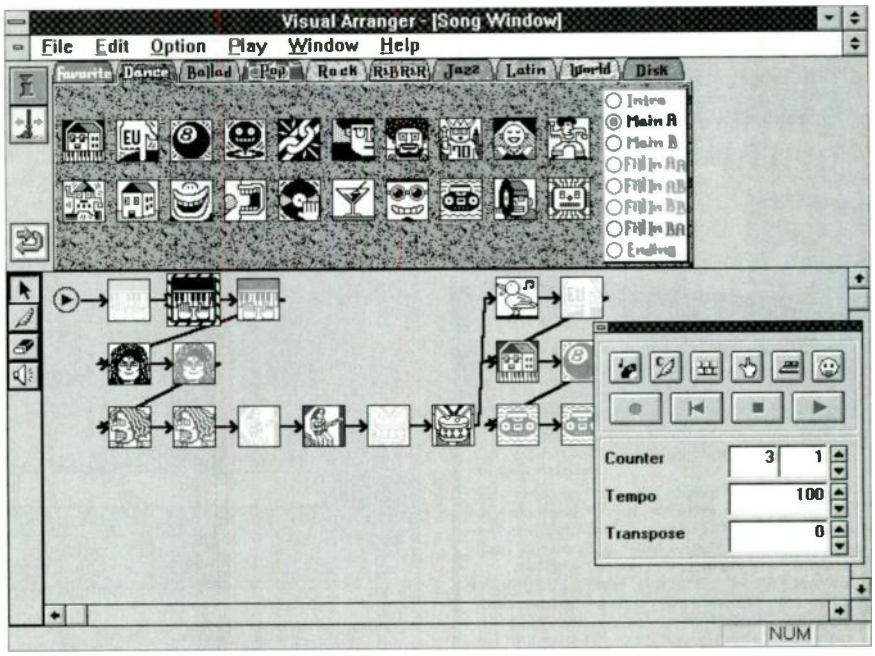


FIG. 2: *Visual Arranger*'s Song window lets you drag Style icons out of their folders and assemble them in any order you choose. The icon color indicates its Variation.

FUN WITH CHORDS

There's only one problem with the song so far: *Visual Arranger* is only playing one chord! To input chord changes, double-click on an icon in the sequence. This opens the Chord window (see **Fig. 3**), in which various tools let you establish the chord structure of the song.

Unfortunately, you must enter the chords separately for each Style in the song. I tend to think about the chords for an entire song section (verse, chorus, etc.) at once. With *Visual Arranger*, I typically used a Fill every four bars or so, which meant I had to input three bars of chords in the Main A icon, one bar in the Fill AA icon, and so on. I wanted to select several icons at once, open the Chord window, and enter all the chords for a 16-bar verse or 8-bar chorus.

Aside from this limitation, the Chord window is slick and powerful. A palette containing twelve chords and four 2-bar progressions appears at the top of the window. The contents of this palette depend on the song's key (which can be major or minor), so you always have a selection of chords that won't stick out like a sore thumb. The folder tabs that appear in the Song window are also found here, providing a different chord palette in each Style folder. You can even use a Style from one folder with chords from another folder.

If you don't like *Visual Arranger*'s chord suggestions, use the Quill tool to input any chord you like. There are 30 chord options for every note in the scale, ranging in complexity from a plain ol' major chord to a minor (major 7/9). You can specify any bass note with any chord or request no chord at all (in which case the program plays only the drums). You can also use the Quill tool to shift the next chord change ahead of the beat by a sixteenth note, eighth note, or eighth-note triplet.

When the chords are in place, you can erase, cut, copy, and paste them or simply drag them around. A handy Transpose tool changes all the chords to a new key, and a Cleanup tool helps you remove redundant chord symbols.

In the Chord window, you can also change the number of measures in a Style. (Each icon can represent up to sixteen measures.) You can insert or delete individual bars, but I usually highlighted four bars at once and used the program's Duplicate function. The Song window includes a field that indicates the number of measures in each Style icon, so I wonder why you can't set the number of measures there, too. After all, you define the basic structure of your song in the Song window.

One button in the Chord window opens an Information Bar, which lets you set the tempo, volume, and Program Changes separately for each Style

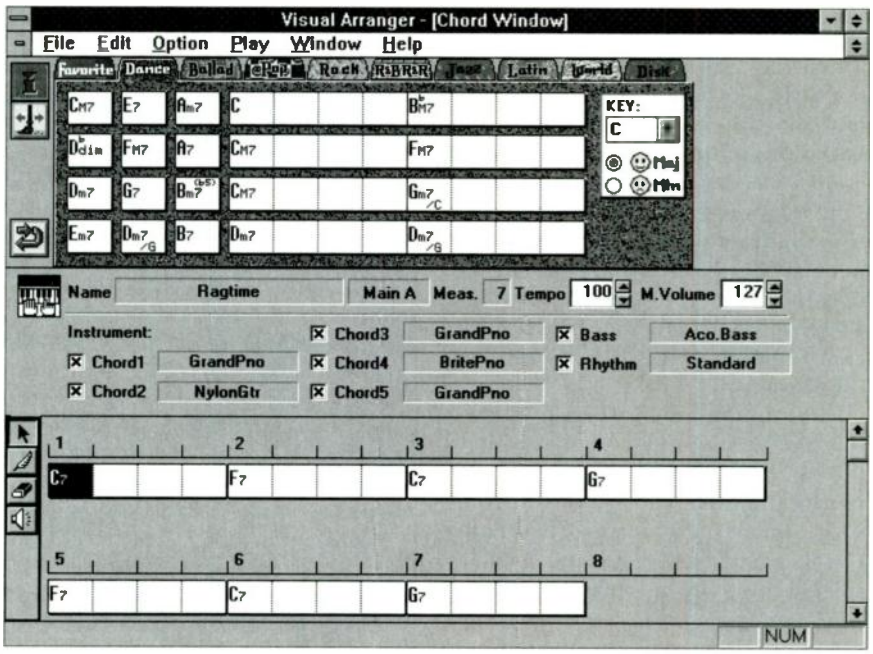


FIG. 3: Use the Chord window to put chords into your song. You can use *Visual Arranger*'s suggestions or input any chord of your choice.

icon. Each Style can include up to seven different instruments, which *Visual Arranger* labels as "Chord1" through "Chord5," "Bass," and "Rhythm." These instruments correspond to MIDI channels 4 through 10. You can also disable any instrument in the Information Bar.

TODAY'S PHRASE

Once you get the rhythm section jamming, it's time to add some spice to the mix. The Phrase Keys window maps a different musical phrase or note to each key on the computer keyboard. The bottom row (Z, X, C, V, and so on) plays drum fills, the "ASDFGH" and "QWERTY" rows play fixed musical phrases, and the row of numbers along the top plays the notes in the appropriate scale. The drum fills and phrases are preset and cannot be changed by the user.

The Phrase Keys window adds three more channels of MIDI information to the picture. The Drum Fills row uses channel 10, the same drum channel as the Style. But the two rows that play musical phrases (Phrases 1 and 2) get their own channels. Finally, the top row (Melody) shares a MIDI channel with a recording from an external keyboard (described later).

The Style folder tabs are also present in this window, which means you get a different set of phrase-to-key mappings for each group of Styles. For example, the "t" key can play either a swing-time, muted trumpet riff from the Jazz folder or a sequenced synth fill from the Dance folder. And as in the Chords window, you can mix and match phrases and Styles from different folders.

The Phrase Keys play different notes in accord with the chords and change tempo when the song changes tempo. In addition, Program Change messages are sent with each keystroke. However, most synths require a short time to change patches, so the first note of each phrase is usually played with the wrong sound. The Phrase Keys were fun to play around with for a few minutes, but they were not useful for my purposes. It's impossible to play precisely with the computer keyboard, and the preprogrammed riffs and special effects made the music sound rather cheesy.

However, I did find the Mixer window quite useful (see **Fig. 4**). This window displays all ten MIDI channels (Melody, Phrases 1 and 2, Bass, Chords 1 through 5, and Rhythm). Each part includes a fader, mute and solo buttons, Program Change capability, pan, reverb send, and a level meter that lights up when MIDI data is playing in that track.

From the Mixer window, you also specify what is recorded when you press the Record button in the Control Box.

The Phrase option records whatever you play in the Phrase Keys window, including the Melody keys. The Melody option records what you play on an external MIDI keyboard, and Fader records any fader movements you make in the Mixer window. You can record in any window, but you must go to the Mixer window to select what is recorded.

Finally, the program offers an Arrange window, in which you can select different bands by clicking on one of twenty icons. The bands don't have names, and I'm not sure what all the icons represent (one band is represented by a donkey, another by a lion), but there seems to be some sort of correlation between the pictures and the sound. The weird-looking guy represents a hard-rock band, and the band represented by four guys has a Beatle-esque feel to it.

In addition, you can double the tempo or cut it in half with dedicated buttons in the Arrange window. You can also initiate accelerandos, ritardandos, and fadeouts. You can't control the rate of change for these events, but you can control the start and stop points by toggling the button on and off. All events in the Arrange window, including band changes, can be recorded.

FIG. 4: *Visual Arranger*'s Mixer window ties everything together, letting you control the rhythm section, phrases, and melody.

WRAP IT UP

The program's visual nature makes it easy to learn and use. In fact, Yamaha doesn't even provide a detailed manual; you only get a quick-start guide. You must use the online help if you want an answer to a detailed question. Fortunately, the help screens contain all the details you need.

I had some problems early on with stuck notes and external MIDI recording, but a new DLL file from Yamaha fixed all but a few of these problems. (The remaining problems were either cosmetic or trivial in nature.) I never experienced a program crash.

I like *Visual Arranger*. It's easy enough for a kid to use as a learning tool, yet powerful enough to serve as a rough sketch pad for the professional. Some might find it too simplistic, however. There's no way to create your own Styles, no control over time signature (other than selecting Styles with the signature you want), and no editing of recorded MIDI data. But if you want a well-organized anthology of popular music styles or a quick way to throw together a rough arrangement, then *Visual Arranger* may be what you're looking for.

Allan Metts *is an Atlanta-based musician, MIDI consultant, and systems designer. No, he doesn't have any extra Olympics tickets.*

Product Summary

PRODUCT:
Visual Arranger 1.0
PRICE:
$59.95
SYSTEM REQUIREMENTS:
PC: 80386 or better CPU, 4 MB of RAM, Windows 3.1 or higher

Mac: 68020 or better CPU, 8 MB of RAM, System 7.1 or higher
MANUFACTURER:
Yamaha Corp. of America
tel. (800) 823-6414, ext. 299 or (714) 522-9011
fax (714) 228-3913
e-mail info@yamaha.com
Web http://www.yamaha.com
CIRCLE #440 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ●
EASE OF USE	● ● ● ● ◖
DOCUMENTATION	● ● ● ◖
VALUE	● ● ● ◖

Sony DPS-V77

By Peter Freeman

Sony's mighty morphing effects processor expands a winning series.

A few years back, Sony decided to buck the trend toward generalized multi-effects processors, releasing its DPS-series effects processors. Each of the four DPS boxes covers a specific type of high-quality, good-sounding effects. The DPS-R7 handles reverbs, the DPS-D7 offers delay effects (albeit with no modulation), the DPS-M7 covers pitch-modulation effects, and the DPS-F7 produces a variety of filtering effects. (The DPS-R7, D7, and M7 were reviewed in the December 1992 issue of **EM**. The DPS-F7 was reviewed in the January 1994 issue.)

These devices offer impressive sonic quality and musicality. However, they are a bit on the expensive side considering their narrow range of capabilities. Clearly, what was needed was a single unit that combined the most important features of each DPS-Series effects processor into a low-calorie, fat-free package.

Sony's new DPS-V77 multi-effects processor goes a significant way toward achieving this goal, combining the best of the rest. In addition, it has several new features not found in the other DPS processors, the most noteworthy of which is preset morphing.

The V77 is not a budget device, but for the most part, it delivers the goods. It offers discrete stereo operation, that is, it has independent left and right signal paths and maintains the input signal's stereo image. Independent, dual-mono algorithms are applied to the left and right channels.

CONTROLS AND CONNECTORS

The DPS-V77 manages to cram quite a few features into its 1U rack-mount enclosure. Concentric, stereo input-level controls and a single output-level pot allow you to optimize your gain structure. A large, backlit, yellow LCD main display is accompanied by a 2-digit, red LED that displays the current program number. To the right of the LCD is a numeric keypad including ten number keys, a decimal key, and a +/- key.

Beneath the displays are the Bypass, Bank, Edit/Page, and Edit keys as well as five soft keys labeled A to F. A pair of bar-graph LED meters shows input levels for both V77 channels. Finally, there are Save, System, and Enter keys and a concentric rotary knob for scrolling through programs at high or normal speed.

The rear panel is densely packed. In addition to the MIDI In, Out, and Thru jacks, the unit offers both unbalanced, ¼-inch and balanced, XLR analog inputs and outputs. AES/EBU and S/PDIF digital I/O is provided via a 9-pin mini-DIN digital I/O connector.

▼

Sony made good use of the entire display area of the LCD.

Although I was extremely happy to see digital I/O, I was puzzled by Sony's choice of a mini-DIN connector. The cable required to connect to the DIN jack is an expensive custom number made only by Sony and is not included with the unit. You need one cable each for AES/EBU and S/PDIF, and the pair costs $30. These cables are not easy to find or make, and I wouldn't want one of them to die during a session. Obviously, rear-panel space was at a premium, but why not just use one format or at least support both formats on a standard XLR or RCA connector? I'd even prefer using a ¼-inch TRS jack, as found on some Akai samplers, than a specialized DIN connector.

Having said this, you haven't lived until you've worked with digital effects processors using digital I/O. It's a joy; things simply sound better, and the noise floor drops significantly because much of the noise you usually hear with this type of device is a result of the A/D and D/A converters. I interfaced the V77 via AES/EBU with my Eventide DSP4000 and the S/PDIF output of my Digidesign Audiomedia II card, and I was in effects heaven.

Speaking of converters, the V77 has excellent ones. It uses 64× oversampling, Delta Sigma ADCs, and 20-bit, PCM DACs.

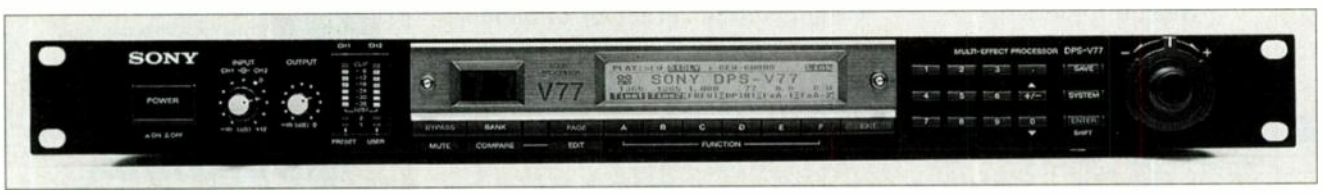
BASIC ARCHITECTURE

The DSP-V77 comes with 198 preset ROM programs and has room for 198 user programs, which are divided into two banks. It uses the same Effects Blocks architecture as the other DPS-series processors do. There are two Blocks, which represent the two effects-processing modules that make up a DPS-V77 program.

Each Block can be independently controlled and can produce one of the V77's 61 effects algorithms. The two Blocks can be arranged in any of five different configurations (see **Fig. 1**). An internal Mixer section allows you to determine the final output balance between the two Blocks and the dry input signal. This configuration is, of course, programmable for each patch.

One interesting feature of the V77 is its ability to morph (continuously crossfade) between programs. Any morph time between 0 and 10 seconds can be specified in 0.1-second increments. The morphing parameters are set globally, not per patch.

You can choose between two types of dynamic change. One is the type most musicians think of as morphing, in which the unit performs a symmetrical



Sony's DPS-V77 multi-effects processor combines many of the best features from the DPS-R7, F7, D7, and M7 effects processors. Preset morphing tops the list of new features.

parameter-value crossfade between two presets. The second variety brings in the destination effect quickly while the first is still fading out. Morphing is only available if the two programs you are switching between use only a single V77 effects Block.

Although the V77 has a solid set of programming features, I wish more of the subtle, detailed parameters from the other DPS boxes had been included. For example, on the R7, an extremely high degree of control is provided over tailoring reverb programs, down to the ability to adjust individual reflection levels, phases, and times. The reverbs in the V77 seem to be at the opposite end of the customization spectrum.

Similarly, the delay algorithms on the original DPS-D7 offered tons of precise, detailed control, which is lacking here. The delays on the DPS-V77 are much more conventionally implemented, which seems a shame. I imagine some users responded negatively to the R7's and D7's overabundance of detailed parameter control, and the V77's simpler design is an attempt to address this. But Sony went a little too far in the direction of simplicity.

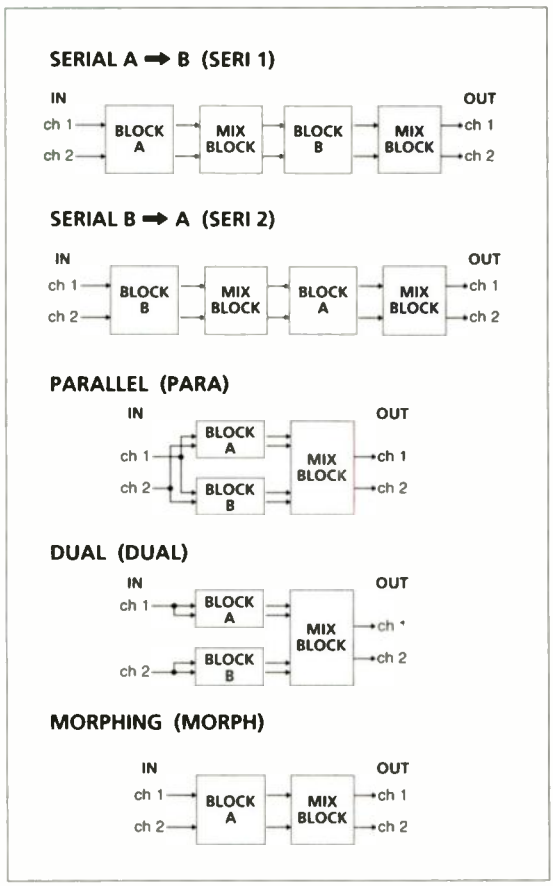


FIG. 1: The DPS-V77's two effects Blocks can be configured in parallel, in series, or as dual mono. To morph between programs, you need to use a special (Morph) configuration. (Courtesy Sony Corp.)

USER INTERFACE

In general, I found the interface on the V77 easy to use, even more so than the original DPS-series interface. Its hierarchical menus are simple to navigate, and Sony made good use of the entire display area of the LCD, so you are presented with lots of useful data at all times. It was easy to keep track of where I was and what I was doing. Sony also has added icons to the LCD wherever practical, which helps the user navigate around the system quickly. Programs can be recalled with the front-panel rotary control, numeric keypad, or MIDI Program Change commands.

An Edit/Compare mode lets you know where you are relative to the original program you are editing, and you can copy effects parameters between Blocks and programs in either the preset or the user programs. As in the DPS series, this is still a very useful feature for speeding up the effects-creation process.

One handy feature of the user interface is the ability to customize the Active parameters, a set of five effects parameters that can be edited immediately upon selecting a new program. This makes it easy to customize each program to give you instant access to your most commonly adjusted parameters. The Active parameters are quite useful in studio situations where speedy parameter changes are often required.

Anticipating the V77's use in both studio and live-performance situations, Sony included Bypass and Mute. Mute kills all output from the V77 whereas Bypass just kills the wet signal, allowing the dry signal to pass through. Mute mode is intended for studio work in which the V77 is likely to be connected to an effects send and return

on a mixing console. In this context, passing the direct signal in Bypass is undesirable, as the dry signal is likely to be present on a fader, which would create phase problems. However, if you wire the processor in-line, as in a live-performance setup, Bypass mode is the best way to defeat the effects.

THE EFFECTS

The DPS-V77's effects algorithms sound very good overall, which is no surprise considering the proven quality of the entire DPS family. Among my favorites are the rotary, flanger, wah, and reverse algorithms. I was able to use and combine these with great results.

This is not to slight the many other effects available on the unit, however. The V77 can generate a wide range of effects, from conventional delays and reverbs to bizarre, reverse-filtering sounds, triggered filters/flangers, interesting spatial-panning effects, distortion, and many others. One particularly nice combination uses a triggered wah effect (basically an envelope filter) feeding into a triggered flanger, which was extremely dynamic. It had an especially interesting character when used on guitars and basses.

Of course, it wouldn't have been practical for Sony to include all the effects from the original DPS series in the V77. I missed some of my favorite algorithms from the R7 and F7 now and then. If you are already a DPS user and are interested in the V77, don't be too quick to sell the older units when you switch to the new one.

I got excellent results with the V77 on vocals, guitars, basses, and synthesizers. I created various programs for each of these types of program material to get a feel for the unit's strengths, and I was generally pleased with the sonic results. For example, I had fun combining the Delay module with a variety of secondary processing modules (most notably the Reverse, Rotary, Pitch Change, and Wah) to achieve interesting, colorful, rhythmic effects on guitar and synths. The amp simulator and subharmonic generator modules proved their usefulness on basses. For vocals, the Chorus, Pitch Change, and Delay came in handy, as did some of the reverb algorithms, particularly the Plates.

I wasn't thrilled with the lack of realism and depth of the Hall and Room algorithms; they tended to be a bit metallic and grainy, lacking the smooth richness of Lexicon and Eventide reverbs. However, like the DPS-R7 reverbs, the V77 reverbs sound sparkly, quite the opposite of, say, the Lexicon sound. This makes the V77 a good choice for those who already have a Lexicon box, as the two sounds complement each other well.

I'm not sure I'd use the V77 as my main vocal reverb; it's not the most natural-sounding machine I've heard in this department. But it would be fine for adding ambience or as a second reverb. It also works well when combined with other reverb devices to get a vocal or guitar sound, especially when paired with darker, richer-sounding processors.

There are many more different effects algorithms in the V77 than we have space to list here, but the ring modulator, multitap delay, triggered panning, reverse shift, vocoder and vibrato/tremolo are especially good sounding and noteworthy. They're extremely useful for creating interesting and unusual effects.

MIDI IMPLEMENTATION

As I expected from a DPS-series box, the V77 has a good, solid MIDI implementation, including support for Program Change, Note On/Off, and Control Change messages. One user Program Change table is provided. Up to six simultaneous continuous controllers can be used to control different effects parameters for each V77 program.

Various front-panel operations generate System Exclusive messages, which can be recorded and played back with a sequencer. SysEx Bulk Dump/Load of individual programs and entire user banks is also supported.

MISCELLANEOUS GOODIES

The DPS-V77 has a few extra features that are welcome indeed. The first feature is a set of memory-management utilities, including Copy, Move, X-Change, Delete, and Protect functions. These utilities were present on the original DPS series, but they are now more usefully represented with icons as well as text in the System area. The Protect function is specific to each program, so make sure you don't inadvertently erase specific programs while leaving the others unprotected so you can tweak or replace them. Every device with program memory should have this feature!

Sony has wisely included an overall noise gate on the outputs of the V77 (which can be disabled), which helps keep things quiet in a studio situation. Although one might argue that a professional device such as this shouldn't need a noise gate, the reality is that engineers frequently have to gate far more expensive effects processors than the V77 during critical mix sessions. This feature gets my vote.

The unit comes with a fairly clear (though brief) manual in several languages. All features are explained adequately, if not inspiringly.

CONCLUSIONS

The DPS-V77 is a versatile, good-sounding effects box. It does many things very well, takes up little space, is easy to learn and use, and generally adds a lot to an outboard rack. It is at its best when used for specialized, colorful effects rather than as a primary reverb device in a mix situation.

I had fun with the V77 and recommend it highly, particularly if you need a versatile, good-sounding multi-effects box to round out your studio. It's at home in a tiny project room or in a high-end facility. I can see using it in live performances for a whole range of tasks, as it packs a large variety of features into a single-rack package and seems constructed well enough for the realities of live performance. It's a DPS-series box, and in my experience, that means it's a winner.

Peter Freeman *is a freelance bassist, synthesist, and composer living in New York City. He has worked with such artists as John Cale, Jon Hassell, Chris Spedding, L. Shankar, Sussan Deihim, Richard Horowitz, and Seal.*

Product Summary

PRODUCT:
DPS-V77 multi-effects processor
PRICE:
$1,775
MANUFACTURER:
Sony Corp. of America
tel. (201) 930-1000
fax (201) 930-7633
CIRCLE #441 ON READER SERVICE CARD

EM METERS	RATING PRODUCTS FROM 1 TO 5
FEATURES	● ● ● ◖
EASE OF USE	● ● ● ◖
AUDIO QUALITY	● ● ● ◖
VALUE	● ● ●

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Interactive Light Dimension Beam

By Robert Rich

This unique device provides MIDI control with a wave of your hand.

In the 1920s, the theremin conveyed an aura of futurism and technological magic by making music "out of thin air." Since then, many artists and inventors have developed systems to control music with nothing more than motions in space.

Forty years after the theremin's heyday, choreographer Merce Cunningham collaborated with John Cage and David Tudor on a composition in which the dancers created and performed to music by interrupting light beams projected across the stage. More recently, Don Buchla's Lightning controller introduced a new means of wireless control to the MIDI world, allowing a performer to map the movements of two wands that emit infrared light to a wide range of MIDI messages.

Interactive Light's Dimension Beam follows in this fine tradition. However, the theremin and the Buchla Lightning controller were conceived as complete musical instruments whereas the Dimension Beam serves best in a supporting role, adding a new MIDI expression controller to the electronic musician's arsenal. If you combine two or more Beams, they can be played as a complete instrument.

The company makes two flavors of Dimension Beam. I spent most of my time with version 2.0, which includes an analog wah filter and a relatively sparse MIDI implementation, making it best suited for guitarists. Version 3.0 has no wah filter, but it includes a slightly enhanced palate of MIDI functions. The bulk of this review deals with version 2.0. (See the sidebar "Theme and Variation" for more on the differences between versions 2.0 and 3.0.)

THE BASIC IDEA

The Dimension Beam uses infrared light to sense the position of an object, such as your hand or torso, drumsticks, or the neck of a guitar. It works by measuring the amount of light reflected by the object. An LED on the face of the device emits a pulsed stream of invisible infrared light, which bounces off any nearby reflective object and returns to an infrared sensor mounted next to the LED. As you move the object closer to the unit, more light reflects from it and hits the sensor. The Dimension Beam reacts to this change in intensity by sending user-specified MIDI Control Change (CC) or note events. (For more on this technology, see "Tech Page: Interactive Light" in the December 1995 **EM**.)

Interactive Light's Dimension Beam uses infrared light to sense movement, which it translates into user-defined MIDI messages. It can be mounted on any mic stand.

Interactive Light's marketing staff describes the product as a controller that detects movement in 3-D space. This is true in a sense, but it is also slightly misleading, as the Dimension Beam detects changes in only one parameter: light intensity. The Beam cannot tell the difference between up, down, left, or right. If you hold your palm flat toward the sensor and then rotate your hand so that it is edge-on to the sensor, the Dimension Beam will react as if you had pulled your hand farther away. Both actions decrease the amount of reflected infrared light.

The manual describes the Dimension Beam's sensing zone as being similar to an apple: the Core is the region of maximum effect, and the Skin is the region of minimum effect (see **Fig. 1**). In reality, these terms refer to the regions that have been calibrated to reflect maximum and minimum levels of light from an object.

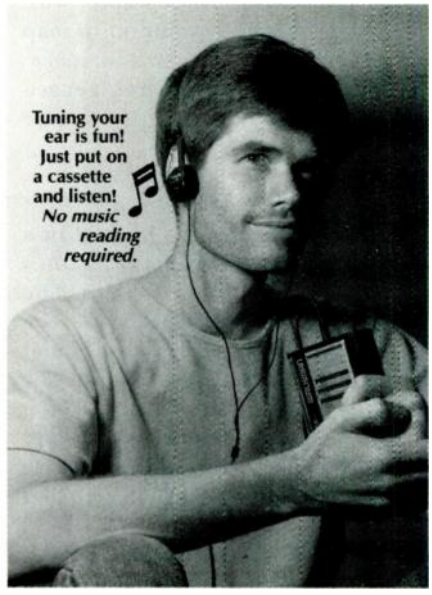
The egg-like shape of this region stems naturally from the diffusion characteristics of the LED and the sensor's angle of vision. Light reflected from an off-axis object looks the same as light reflected from an on-axis object that is farther away; in both instances, less light is reflected.

The distance over which the Beam can sense reflected light depends on the object used for gesturing. Under normal circumstances, the Beam can detect your hand moving up to three or four feet away. You can increase the distance by attaching little strips of reflective tape (which are included) to the object you use to control the Beam.

Theoretically, you could stitch large patches of this tape into your clothing and control the Dimension Beam from a distance of ten feet or more, but I couldn't get it to sense anything farther than about eight feet away using the four included strips. This isn't enough range to perform an interactive dance piece, but it should be satisfactory for most musical applications. Of course, you could use several Beams to extend the range.

Within the sensing zone, the Dimension Beam works very well indeed. Because it uses a pulsed signal, it seems virtually impervious to changes in ambient light. This is a critical factor for live situations in which strobe lights, lasers, and other intense light sources can wreak havoc with infrared detectors. The Dimension Beam's response

Does *your* ear need a tune-up?



If you're like most keyboardists, your ear is running a little rough. It needs a precision tuning—*fast!*

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Do any of these apply to you?

- ☐ I get nervous when I play in front of people.
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- ☐ I improvise poorly because I can't envision the tones I want to play.
- ☐ I try to steal "licks" from records, but the tones flash by too quickly.
- ☐ I can't figure out chord progressions without my keyboard.
- ☐ I have all these incredible musical ideas "in my head," but I can't seem to play them without a lot of bad notes.
- ☐ It's embarrassing when I get "lost" and can't find my place.
- ☐ It takes me longer than I like to learn and memorize a new tune.
- ☐ I have difficulty singing harmony.
- ☐ My friends seem to enjoy music more than me because they have a better ear.
- ☐ My playing is caught in a rut that I can't seem to climb out of.

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is also smooth and repeatable, with more than enough resolution to map out an imaginary keyboard in space. However, the virtual keys aren't exactly of equal size, as the Beam's response isn't quite linear.

HARDWARE

The Dimension Beam is housed in a flat, metal box that mounts neatly on a mic stand using a universal clip. The sensors are located on the front face along with a backlit LCD display and four buttons that form a diamond. The left and right buttons scroll through the pages of parameters; the top and bottom buttons increase or decrease the selected values. At first, I feared that such a spartan interface would prove frustrating. However, the Beam's parameters are simple enough to avoid problems.

MIDI In and Out and power connections are located on the right side of the box, and audio and footswitch connections are found on the left. The Dimension Beam merges incoming MIDI data with its own output, though it doesn't respond to incoming MIDI messages. The merging MIDI In allows you to daisy-chain multiple units, which greatly extends the unit's possibilities. The power supply is a 12V lump-in-the-line transformer, which is a welcome change from the usual space-hogging wall wart. However, it uses a nonstandard, 4-pin DIN connector, so you had better not lose it.

The audio input and output (version 2.0 only) let you insert the Dimension Beam into the signal path from a guitar to an amplifier so you can use the wah function. The input is optimized for a guitar's low-level signal, and the analog filter sounds clean and quiet. However, it distorted a bit when I tried plugging in a synth with a much hotter output. When the Beam is not in Wah mode, the filter is bypassed, and the guitar signal passes through unprocessed.

MODES AND SETUP

Speaking of modes, the Dimension Beam version 2.0 offers four. In Control mode, the unit sends a stream of user-selectable MIDI Control Change messages along with an optional Note On that is triggered whenever an object enters the sensing zone. In Notes mode, the device becomes a virtual keyboard, sending a stream of Note On/Off events as an object moves through the zone. In either of these two modes, you can instruct the Beam to send a MIDI Program Change when you select a preset.

The Beam's third mode, Wah, uses the sensing zone to control the cutoff frequency of the analog filter for processing the audio input. Lastly, qWAHntum mode ignores the infrared sensing altogether and simply modulates the cutoff of the wah filter with a sine wave. (Version 3.0 lacks the two Wah modes because it lacks the filter.)

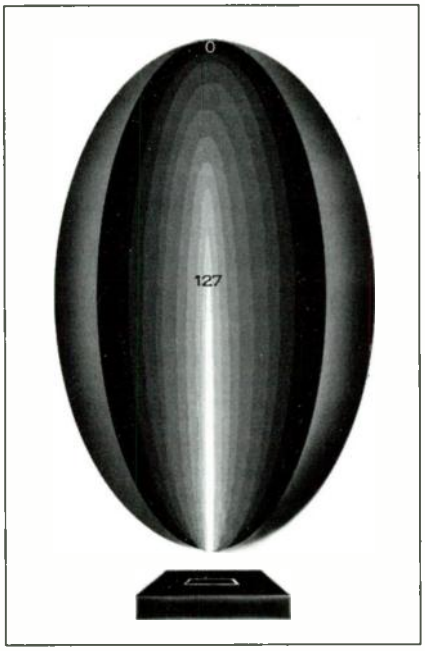

FIG. 1: An egg-shaped sensing area is divided into many layers from the outer Skin to the central Core. As you move an object through the infrared beam from one layer to the next, the device sends different values of a user-specified MIDI message.

When you create a preset, you begin by choosing a mode. Then you scroll through a few parameters, which vary according to the mode. You also define the minimum and maximum zone boundaries (the Skin and Core) for the object you plan to move in front of the beam. These parameters are saved with the preset.

Control-mode parameters include MIDI channel, CC number, triggered note number and Velocity (if desired), and minimum and maximum values for the controller. Notes-mode parameters include MIDI channel, Velocity, and minimum and maximum note number. The Wah mode lets you select the minimum and maximum cutoff range, and qWAHntum mode lets you define the rate and depth of the oscillator.

The Dimension Beam ships with a footswitch, which is necessary for setting the Skin and Core levels. To set the Skin level, you scroll to the Skin page and move your hand, body, guitar neck, or whatever else you plan to use away from the Beam to the outside range of its movement. Clicking the footswitch defines this position as the Skin (minimum) value. The menu then jumps automatically to the Core page, after which you move towards the Beam to the closest desired point and click the footswitch again to establish the Core (maximum) value.

While you're setting these levels, the display shows the strength of the signal relative to the full range of the Beam's sensitivity. After you've established the Skin and Core values, the display scales its response to the selected range. All in all, this is a well-implemented and intuitive interface.

The Dimension Beam comes with five factory presets. The PLAY preset sends notes on channel 1, with values ranging from 21 to 108. The MOD preset sends Modulation messages (CC 1) on channel 1. The TRIGR preset triggers a note upon entering the beam and applies Pitch Bend to the sustaining note. The WAH and qWAH presets apply the Wah filter to the guitar input, using the sensor or oscillator, respectively.

You can't overwrite these presets, so if you need to change the sensitivity, output range, or MIDI channel, you must save the changes to a user memory. Unfortunately, the Dimension Beam has room for only six user presets. This seems a bit stingy, but considering the simplicity of each preset, it may suffice for most people.

In normal use, the footswitch lets you freeze the Dimension Beam's output at any point. A second press gets things moving again, or you can set it up so the signal unfreezes when you match the frozen value after exiting and reentering the beam. You double-click on the footswitch to enter Memory Restore mode, in which you scroll through the user presets by waving the reflective object in the sensing zone and select the desired preset by clicking on the footswitch again.

I can imagine more uses for the footswitch. For example, it could let

you trigger a note determined by the position of your hand, or it could act as a simple bypass for the Wah mode. In general, the Dimension Beam errs on the side of simplicity.

APPLICATIONS

At the Winter 1996 NAMM show, Interactive Light provided a demonstration with eleven Dimension Beams set up as a virtual drum kit. Each Beam triggered a different sound in the kit. It looked pretty cool, but I soon realized such a setup would cost more than $5,000. This is a lot to pay for the privilege of not hitting something, especially when there's no way to affect the Velocity of the triggered notes. However, the Beam can bring a unique twist to a number of other applications.

Notes mode is well suited to creating wild, swooshing effects and zippering, chromatic note runs. For example, I was able to perform an unusually expressive "overtone drone" by tuning the notes on my keyboard to the first 60 intervals of the harmonic series and playing them with a wave of my hand. This is a cool effect that sounds like the ultimate resonant filter.

But to do more than special effects, I want several simple features that are absent in the Beam's current software. As it is, the Beam shuts off each sounding note as it triggers the next. I would love the ability to define a minimum note duration, which would allow overlapping notes and timbres with long attack times. Some sort of Velocity control, possibly linked to the rate of change in hand position, would also be nice.

Most useful of all would be a note filter, which would let you define modes and scales instead of always playing the full chromatic range. (Version 3.0 of the Dimension Beam does have note filters, but it has no wah circuit, so you must decide which feature is more important.)

You can combine a pair of Beams to create a MIDI theremin. The original theremin used the user's left hand to control volume and right hand to control pitch. To mimic this arrangement, you could set the left-hand Beam to generate MIDI Volume (CC 7) and the right-hand Beam to trigger a Note On followed by Pitch Bend. To accurately mimic a theremin, the sound should get softer as the left hand approaches the instrument. To create this effect

with the Beam, simply set the left-hand Core value to 0 and Skin value to 127. This will result in an inverted volume response, just like the original theremin.

To my mind, the most practical application for the Dimension Beam lies in the area of modulation control. Synth players no longer need to exchange their left-hand chops for manipulating the mod wheel. Now, you can literally lean into a two-handed chord or wave your head around to add extra expression. One of the most common applications uses the Dimension Beam to trigger and modulate various sampled sounds, which can produce some amazing results. You could also send the Beam's MIDI messages to an effects device, perhaps to control the rate of a Leslie or the length of a reverb.

To use the Dimension Beam in this way, simply set it up on a mic stand in front of your rig and calibrate it to your body movements. Of course, you could always use Aftertouch or a MIDI footpedal in the same way for a lot less money. However, your feet may be occupied with a sustain pedal, and Aftertouch is a lot harder to control than the Beam. In any event, the Beam looks cool on stage.

Drummers can use it to look and sound cool, too. For example, you can aim the Beam toward the hi-hat, cymbal, or drumstick and control things with the motion. You could also aim the Beam behind you and trigger events by waving the stick over your head.

THEME AND VARIATION

Version 3.0 of the Dimension Beam is a variation rather than an upgrade. It adds the ability to play different scales and removes the wah filter. Interactive Light has aimed version 3.0 at the MIDI crowd, and version 2.0 seems directed at guitarists. If you use the appropriate software (such as a pro sequencer), you can do a lot more with version 2.0 (including playing scales); but people without these tools must choose between scales and an analog filter.

Because it lacks the wah filter, version 3.0 provides only two modes of operation: Control mode and Scales mode. Control mode in version 3.0 is almost identical to Control mode in version 2.0 but with a slightly rearranged menu structure. Scales mode resembles Notes mode in version 2.0 with the addition of sixteen preset scales and three user-definable scales.

Scales mode offers major, natural minor, harmonic minor, melodic minor, Dorian, Phrygian, Lydian, Myxolydian, Locrian, whole-tone, diminished, pentatonic, pentatonic minor, enigmatic, Neopolitan minor, Hungarian minor, and chromatic scales. In addition, you can define the starting note and playing range of the selected scale. You can reverse the direction of the scale by defining a high note as the starting note and a low note as the end note of your playing range.

If you select Userset instead of one of the preset scales, a new screen displays a number and note name, which are used to define your own scale. The number, which indicates the scale position, scrolls from 1 to 12. The note name selects the MIDI note that corresponds to the selected scale position; it scrolls from C-1 to G-9. (The actual MIDI note range is normally specified as C-2 to G-8.) You can save up to three different Userset scales in the user memory locations.

When you reach the last position in your scale, you scroll through the note names until the display reads "Done." When the scale reaches this point during performance, it loops back to the first position, transposing it by an octave. Interestingly, this system lets you program scales that jump around out of sequence, which is a unique effect.

Aside from this welcome addition, version 3.0 is basically the same as version 2.0 without the Wah filter and with a few cosmetic changes to the edit screens. It still provides only six user presets, which feels even more cramped now that Scales mode offers more choices. However, it seems like a step in the right direction. I would prefer to see the features of both boxes bundled into one, more flexible unit.

The Dimension Beam can be used to control your own fade-ins and -outs in the studio as part of the expressive process. Of course, this and other data streams can be recorded from the Beam into a sequencer. With a good sequencer or specialized software such as Opcode's *MAX* and Jimmy Hotz' *MIDI Translator*, you can extend the capabilities of the Beam considerably.

Even though the wah function might seem like an afterthought to some, it should prove quite useful for guitarists with busy feet. If you've ever tried to use a volume pedal and a wah-wah pedal at the same time, you might appreciate the ability to control the filter by waggling your headstock around. You can still control volume with one foot and use the other one for standing.

CONCLUSIONS

If you're looking for a new way to generate MIDI CC messages but your hands and feet are busy with other musical tasks, check out the Dimension Beam. If your needs are simple, you may discover an expressive and novel creative tool.

But if you are hoping to find a deep and flexible alternative controller, you may be disappointed. The Dimension Beam performs the simple tasks for which it was designed very well. However, as I tried to conjure up unique applications with it, I kept wishing for features that weren't there.

The Beam tantalizes with its ability to generate note events at the wave of a hand, but version 2.0 frustrates with its lack of Velocity and its limitation to chromatic runs. Version 3.0 has added the much-needed note filters, but it lacks the cool wah, forcing a frustrating choice between the two versions. And if the Dimension Beam had more features, it would also need more user presets; six just aren't enough. Of course, you can use it in conjunction with a sequencer that supports SysEx to store all the presets you like.

Despite its few limitations, the Dimension Beam excels as an additional modulation source, it makes a great wah-wah for foot-weary guitarists, and it's guaranteed to break the ice at parties. And two of them together make a MIDI theremin. Indeed, the Dimension Beam suggests some unique expressive possibilities.

Product Summary

PRODUCT:
Dimension Beam MIDI controller

PRICE:
Version 2.0: $519
Version 3.0: $499

MANUFACTURER:
Interactive Light
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Robert Rich *has a bunch of albums out, but he still spends way too much time in the woods looking under logs. Look for his new project, Amœba, in 1997.*

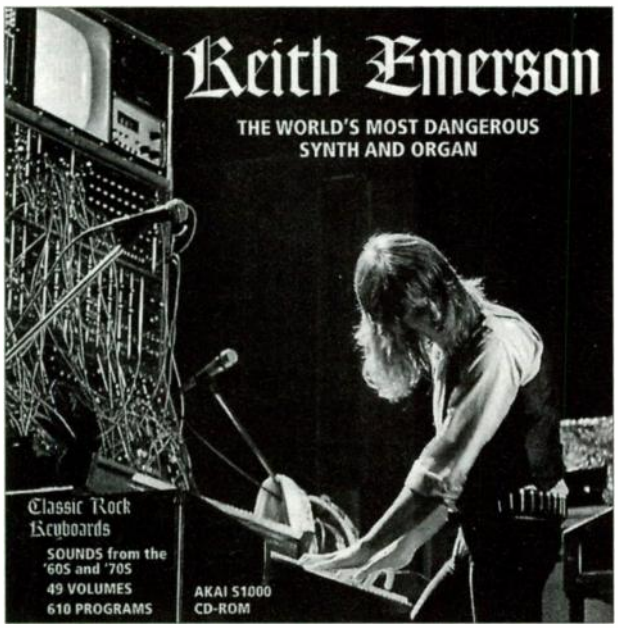
InVision Interactive Keith Emerson

By Dan Phillips

Capture the organ and synth sounds that shook the rock world.

Keith Emerson devotees, take note: your hero's sounds have just arrived on CD-ROM. InVision Interactive's *Keith Emerson: The World's Most Dangerous Synth and Organ* sample collection brings together a well-recorded assortment of the seminal keyboardist's trademark sounds. The synth samples were taken from Emerson's massive, customized Moog modular system, and the organ samples were recorded from his stage-whipped, knife-stabbed, world-traveling Hammond C3.

The project was produced by Will Alexander and InVision Interactive and formatted for the Akai S1000. Thanks to a special license agreement, a similar collection is also available from Ensoniq (and InVision) for the ASR-10, ASR-88, TS-10/12, and EPS-16 Plus. The Ensoniq disc utilizes the same source sounds but features different documentation and editing (which was supervised by Emerson and Alexander).



InVision Interactive's *Keith Emerson* sample CD-ROM is a treasure trove of vintage synth and organ sounds for ELP connoisseurs. The organs are impressive, but as a general-purpose analog-synth collection, the disc may disappoint.

SYNTH I FELL FOR YOU

I have mixed feelings about the synth samples on this disk. On the one hand, most are well executed, with well-matched samples and long, smooth loops. In many cases, there are new samples every minor third throughout the 61-note keyboard range, which minimizes transposition artifacts. Many patches include examples of Emerson playing the sound, which is sure to be appreciated by ELP fans. In addition to presenting the sounds in their more-or-less raw form, InVision's programmers have also made an effort to provide many variations using the sampler's filters, LFOs, and envelopes. Overall, I'm impressed with the attention to detail.

On the other hand, these samples seem best suited to fans of Keith Emerson's work with ELP and much less so to those simply looking for good, general-purpose synth sounds. The collection includes ten basic sounds covering a few variations on square-wave and sawtooth leads, a couple of filter-sweep sounds, and a bass. In addition, there are ten or so special-purpose sounds.

Some of these special-purpose sounds will have limited applications. In "Aquatarkus Quack Chord," for instance, the synthesizer's oscillators are tuned to a suspended-fourth triad, which severely limits its use. Another example is the disc's "Karn Evil 9 Third Impression" sequence, a 40-second stereo sample of an analog sequencer performing an extended accelerando. It's an interesting effect, to be sure, but perhaps it is better suited to playing back from an audio CD than from a keyboard.

The sound "Hoedown" provides the "Freakout" riff along with a handful of wide portamento sweeps followed by abrupt downward jumps. An air-raid siren effect is layered over repeating LFO swishes. "Tarkus Mass" and the wet and dry versions of "Abbadon's Bolero" are tuned to fifths and major thirds, respectively. "Karn Evil 9 First Impression" uses only a single pair of stereo samples to capture a long sample-and-hold effect from "Welcome Back" so that playing up and down the keyboard causes the familiar speeding up and slowing down of the LFO.

▼

The square-wave lead from "Lucky Man" may be the quintessential Keith Emerson sound.

Along with the specialty patches, there are some good, functional sounds here. "Karn Evil 9 Bass" is a fat bass with a short resonant-filter sweep. (It's also good for comping.) "Trilogy w/ Delayed Vibrato" is a cool, thick sawtooth sound with a fast LFO. As is always the case when I work with sampled synths, I wish I had access to the patch parameters. In this case, I'd like to lengthen the LFO's initial delay, which is a little brief for my taste.

The square-wave lead from "Lucky Man" may be the quintessential Keith Emerson sound. It's presented here in two versions, one with a higher filter cutoff than the other. Both versions of this sound include a couple of portamento effects, which will be helpful to those intent on re-creating Emerson's solo. I gravitated to the slow-attack, slow-release version of the higher-cutoff sample, which worked well as a hollow, synthy pad.

"From The Beginning" is one of the more unusual sounds in the set, with one oscillator creating a high, whistle-like tone that's layered with a buzzy, pulse-width oscillator several octaves below. The result can be either zany or eerie and mournful, depending on what you're playing. The sound is available in both looped and unlooped versions; the unlooped one preserves the blip at the end of the original Moog patch.

VITAL ORGANS

Only six basic organ sounds are represented on the disc, but several of them are simply killer. My favorite is the "All Stops Out w/Percussion" set, in which all the drawbars are fully out and third-harmonic percussion is on. Both slow and fast Leslie samples are included as well as a set of patches that use Velocity to switch between the two speeds. As with most of the synth sounds on this CD-ROM, samples are never stretched beyond minor thirds, which helps ensure that the Leslie speed remains constant across the keyboard. These sounds are simply beautiful; they have a glistening, shimmering tone and just enough low-level grunginess to give them soul.

The "Classic C3" patches, with the 16', 5¼', and 8' drawbars out, offer you even more variation. Samples are included with and without percussion, each with both fast and slow Leslie settings. You also get the same set of samples mapped differently so as to produce both second- and third-harmonic percussion.

"Paper Blood" is another of my favorites from this collection. Using only the 16' and 1' stops, it has a punchy, open timbre, good for percussive playing as well as for more sustained gestures. Unfortunately, "Paper Blood" was sampled only with a combination of fast Leslie and Hammond vibrato. A few slow Leslie samples, like those provided with the other organ sounds, would have been appreciated. A separate set of samples is included in which the sound is played in octaves, giving it a thicker texture.

The "Four Drawbars w/Vibrato" patch, with the 16', 8', 5¼', and 4' drawbars fully out, is available with both slow and fast Leslie settings, but it offers fewer multisamples than the other patches. I didn't find this sound as inspiring as the others.

The "Tremolo And Vibrato" patch combines a blend of eight drawbars with Hammond vibrato and fast Leslie, making it eminently suitable for use at baseball games. *(Charge!)* It would also be at home in over-the-top, soap-opera schmaltz. At first, I found its lightweight, silly character a little hard to get into, but after playing some fast I-IV-V chordal licks, I'm starting to think the world might be ready for organ-driven dance music. I'll get back to you on that one!

IN THE END

For sampling aficionados who have *Brain Salad Surgery* and *Pictures at an Exhibition* permanently rotating in their CD changers, the news is smashing: here is a well-done collection that puts the master's timbres at your fingertips. But for someone simply interested in a collection of analog samples (as opposed to a collection of Emerson's analog sounds), the collection is less compelling. The synth patches are well executed, but the scope of timbres is relatively narrow. Moreover, a good number of the patches don't lend themselves to general-purpose use in a modern context.

The organ samples, on the other hand, are impressive and eminently usable. I only wish the selection were bigger. For instance, only two sets of samples offer both multisampling at minor thirds and variations with slow and fast Leslie, and only six drawbar settings are represented in the entire collection. Of course, other organ-sample CDs that offer a wider variety of sounds may *not* give you rock sounds this thick and beefy. Overall, I'd rate this a solid, if less than brilliant, collection.

Product Summary

PRODUCT:
Keith Emerson: The World's Most Dangerous Synth and Organ sample CD-ROM
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$249
MANUFACTURER:
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fax (415) 812-7386
e-mail dennym@cybersound.com
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DOCUMENTATION	● ● ●
VALUE	● ● ●

Dan Phillips *is a singer/songwriter in the San Francisco Bay Area. He composes music for television as a principal in Touch Productions, and he is part of the team at Korg R&D.*

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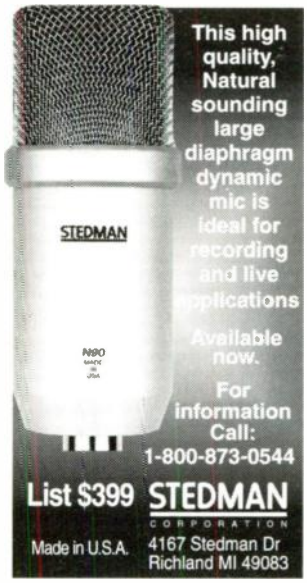

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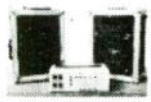

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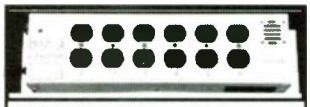

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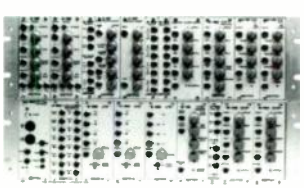

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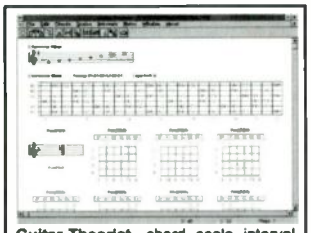
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TECH PAGE

Fire in the Wire

Yamaha's mLAN simplifies studio connections.

By Scott Wilkinson

As electronic-music systems become more sophisticated, the studios in which they reside begin to resemble an explosion at a spaghetti factory. Separate cables are required to carry audio, video, MIDI, sync, and control signals to and from the various devices in the studio. Among the companies working on this problem is Yamaha, which recently announced the development of a system called Music/MIDI Local Area Network (mLAN).

Based on the IEEE 1394 high-speed serial interface (known as FireWire in Apple's implementation), mLAN has sufficient bandwidth to carry digital audio, digital video, and MIDI signals in addition to low-level power on a single multiconductor cable. Data is sent in packets, each of which is time-stamped in order to synchronize the sender and receiver.

One of the distinguishing characteristics of 1394 is *isochronous* operation, which means that the packets are guaranteed to be delivered to their destination "just in time." Each device can send packets at fixed time increments of 125 µs, which minimizes the need for buffering and assures that real-time data arrives on time and without glitches.

Each device typically includes two identical connectors. As with SCSI, you can use one or both to connect the device to the network. Unlike working with SCSI, however, there are no termination issues to address, and you can connect as many as 63 devices to a single network.

Furthermore, new devices can be connected to and removed from the network while it's active ("hot swapped") without requiring special hardware. When this happens, the system resets the bus, which interrupts the signal for a few milliseconds. To prevent this from interfering with real-time data, mLAN's connection-management firmware prevents the bus reset until there is a natural break in the datastream.

The connector is based on the Nintendo Game Boy connector, which is simple, robust, inexpensive, and foolproof. The cable includes two twisted pairs of conductors for data (in and out) and one twisted pair for power (see **Fig. 1**). The 1394 documentation specifies a maximum cable length of 4.5 meters, but recent extensions to the spec allow greater lengths.

Each physical mLAN device can incorporate several virtual devices that perform different tasks. These virtual devices include their own virtual input and output "plugs" that send or receive data independently. The connections are managed by the firmware that resides in each device, though this function can also be performed by a central computer.

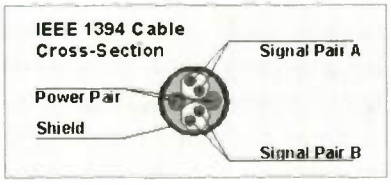

FIG. 1: The 1394 cable includes two pairs of conductors for data and one pair for low-level power. (Courtesy Skipstone, Inc.)

Current 1394 technology provides a bandwidth of 100 Mbps, which can accommodate more than 5,000 MIDI channels, 70 channels of CD-quality audio, or any combination thereof. Low-cost computer interfaces will operate at 200 Mbps. Developers hope to see 1394 chips with a bandwidth of 400 Mbps very soon, and speeds of 1 Gbps could be achieved by next year. Interestingly, devices that operate at different speeds can interact on the same network, which provides forward and backward compatibility.

The current version of mLAN supports up to 64 channels of AES/EBU or "raw" digital audio data at sample rates of 48, 44.1, 32, and 22.05 kHz with up to 32 bits of resolution. It also carries word clock, which is derived from the time stamps of each packet. In the video realm, mLAN supports MPEG and DVC, which is a digital video format for the next generation of camcorders. The extent of mLAN's MIDI support has not yet been finalized. However, virtually all mLAN parameters include undefined values that can accommodate future developments.

In addition to implementing mLAN in its professional and consumer music equipment, Yamaha is making the spec available to other manufacturers who may want to incorporate it into their products. If they do, we may have a new standard on our hands.

For more information about IEEE 1394, check out the 1394 Trade Association Web site at http://www.firewire.org.

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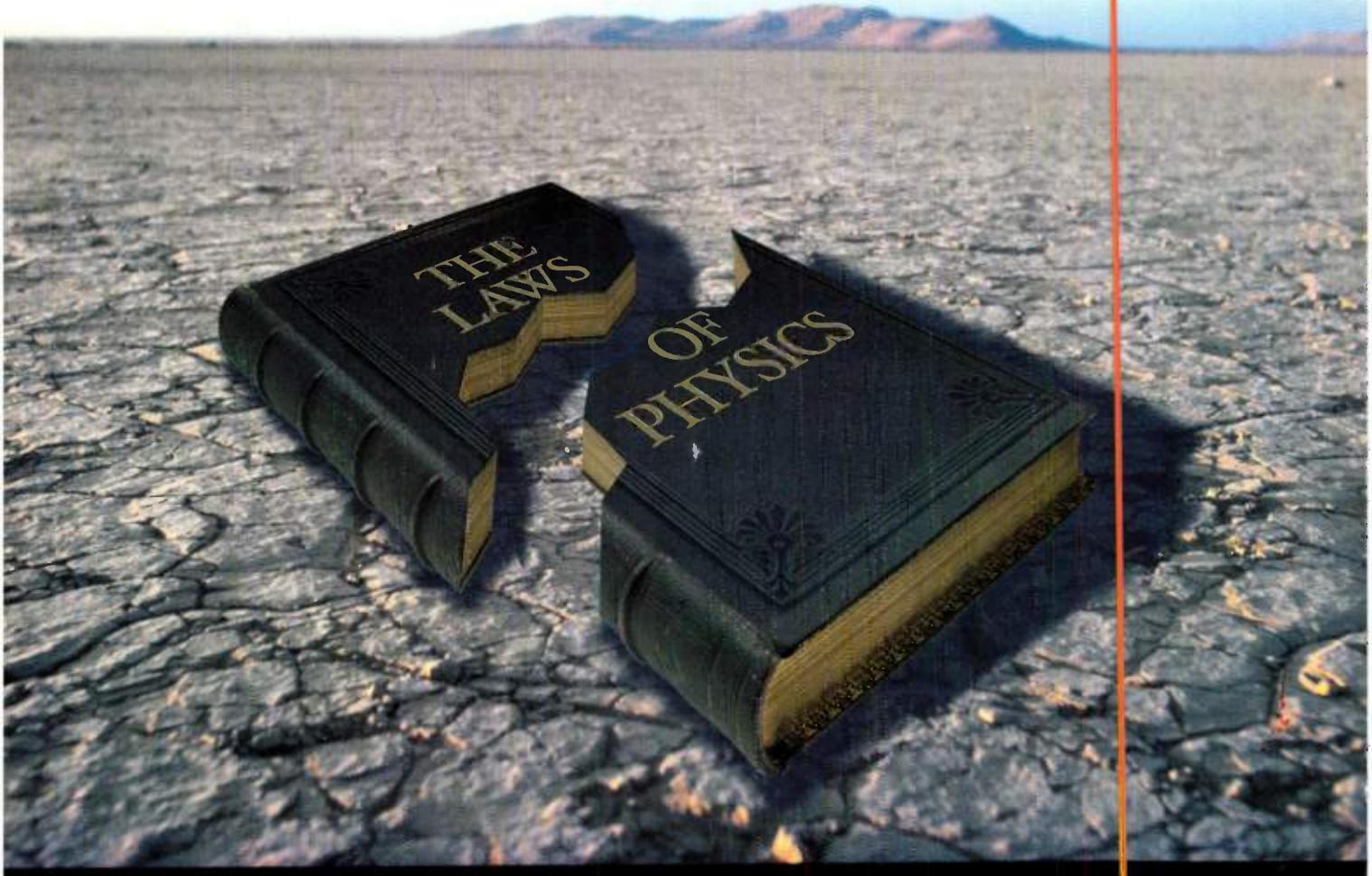

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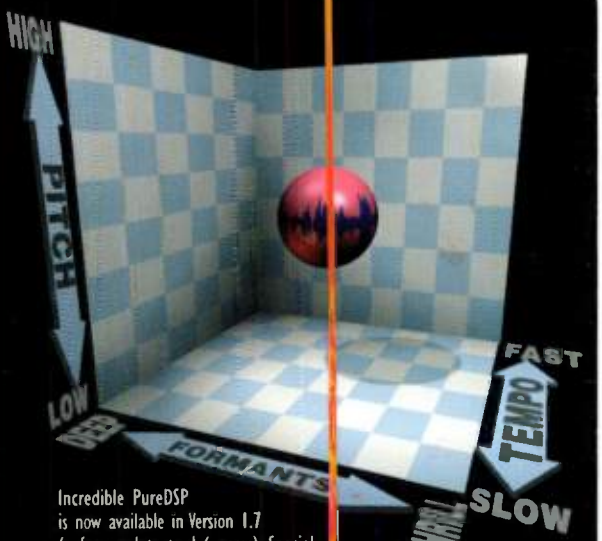

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