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The Dynamic Duo

DON'T TAKE OUR WORD FOR IT

Tannoy's PBM 8 LM – we'll let the experts speak for us!

I was impressed by the whole package, both its looks and sound. Not only is working with these speakers a real pleasure, but guess what – they don't sound very different from their twice the price competitor. When I found out the price for the Tannoy PBM 8 LM's, my socks blew clear across the room!

Peter Horvath,
Professional Sound Magazine

There was something else that really appealed to me with these babies: the low end. I mean real honest to God low frequencies. PBM 8 LM's are absolutely perfect for the major project studio that can afford only one set of monitors.

Bobby Owsinski – EQ Magazine

Tannoy's PBM 8 LM's offer superior balance and frequency response at all monitoring levels, amazing low end, and excellent stereo imaging. The dark Tyner-esque midrange from the acoustic piano was so accurately reproduced and the highs from the cymbals and vibes were so clear that I was almost convinced that the "quartet" was performing in my home studio.

Steve Wilke,
Electronic Musician

Tannoy is one of the most respected manufacturers of studio monitors. After reviewing the PBM 8 LM nearfield monitor I can see why. The monitor is remarkably neutral and has a wide range, and its resolution of time and space is superb. The Tannoy PBM 8 LM is a winner as a professional monitor. With its first rate amp and neutral response, you can trust it to tell you the truth about your mixes.

Bruce and Jenny Bartlett,
Pro Audio Review

Though the Tannoy's bass response was very beefy all the way down to 50Hz, it was not overbearing in musical contexts. Its sound was very smooth across the entire spectrum. The midrange exhibited fantastic detail. We felt the Tannoys were the best of any speakers at reproducing solo piano, as a result of this definition in the midrange. Listening to these monitors gave us a feeling of being in the same room as the musicians.

Keyboard Magazine

I found the horizontal dispersion to be quite a bit wider than most. On and off axis imaging is well above average. This is where the PBM 8 LM's shine – they're absolutely trustworthy at all volume levels, and certainly among the best speakers we've ever heard in their price range.

Nick Batzdorf – Recording

TANNOY

HEAR BELIEVE

One advantage of the Limpet's monoblock approach is that there are no shared electronics. This really pays off in terms of stereo imaging, punchy, clear, bright, with well defined bass and just the right amount of midrange. Tannoy Limpets are an excellent choice, offering a formidable combination of flat, wide ranging response in a compact high power package.

George Peterson – Mix Magazine

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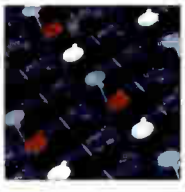

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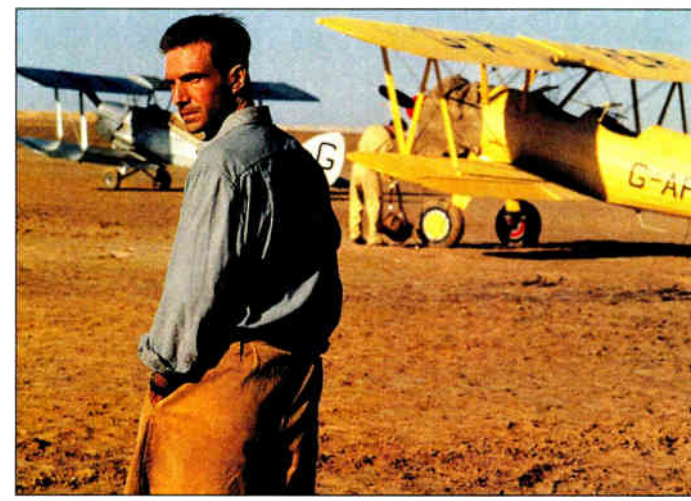

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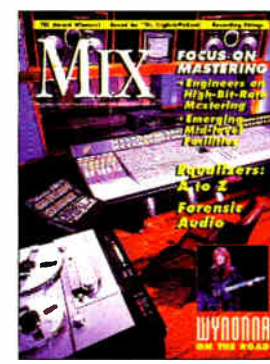
http://www.mixmag.com

Cover: Sonolux Compania Discografica in Bogota, Colombia, has installed a Solic State Logic G+ 4048 console in its Studio A. Monitoring is handled by bi-amped Westlake BBSM-15 speakers powered by Crown Macro Reference amps. Clients include RCN TV and Radio, Pepsi, Postobon, Colombiana and others. Sonolux is also the leading independent record company in Colombia, which requires extensive use of the recording and production facilities. **Photo:** Ramon Giovanni. **Inset Photo:** Photo Reserve Inc.



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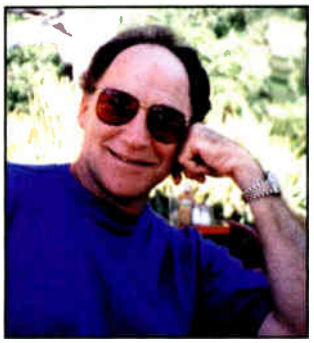
FROM THE EDITOR



LETTER FROM THE PUBLISHER

In my 17 years at *Mix*, this is the first time I've written in this space, which is normally devoted to editorial ruminations on the state of audio technology or the shifting currents of the studio biz. This month, however, George Petersen let me use this forum to share the news about some big changes here at *Mix*. Certainly, they are big for me.

On December 31, after serving eight years as publisher—and the past two as editor-in-chief, as well—I will be stepping down and handing over the publisher's reins to Jeff Turner, my right-hand man and *Mix*'s associate publisher since 1988. It will be one of the biggest transitions of my life, and in that of *Mix* as well.

How do you say goodbye to a job that has profoundly contributed to your personal growth and happiness, and at the same time (I like to believe) made a real contribution to the business and the people you love? The best way, I think, is by remembering...I recall when *Mix* was a tabloid printed on newsprint, and the ink came off on your hands; when ads in *Mix* cost almost nothing—and no one wanted to buy them; when we landed our first interviews with icons such as George Martin, Les Paul and Wally Heider; when we published my first issue as advertising director (in 1980)—all 50 pages of it; and when our first 300-page AES issue came out—followed by even larger issues. But most of all, I remember the people: studio owners, engineers, producers, manufacturers and techies of all stripes, who have told me over and over—in an increasing number of languages—how much they love *Mix*, how much they've learned from its pages and how much *Mix* has meant to their careers. I am grateful to all of you for the loyalty and affection you have bestowed on *Mix*.

At this point, I should probably mention that I'm not entirely leaving. Happily, I will continue to serve *Mix* and the industry as general manager of the *Mix* Foundation for Excellence in Audio and executive director of the TEC Awards, our tremendously successful annual benefit for hearing protection and audio education. And I'll be heading up an interesting special *Mix* project you'll be hearing about soon.

So, it's the end of one exciting chapter and the beginning of another. I'm ready.

Let's roll tape.

Hillel Resner
Editor-in-Chief/Publisher

BPA INTERNATIONAL SPARS ABP American Business Press

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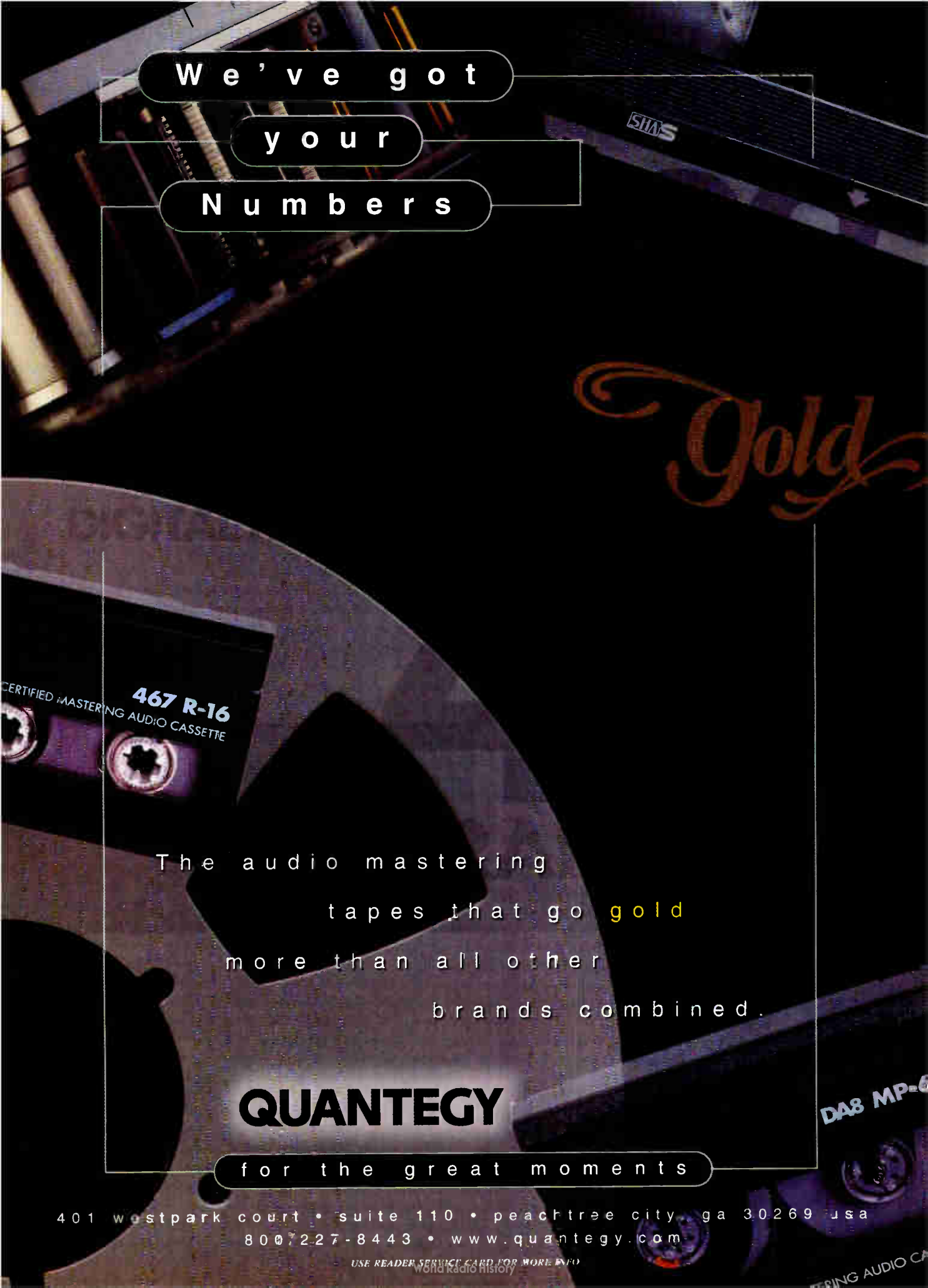
by David Schwartz and Penny Riker Jacob



7 REASONS TO BUY OUR MIXERS TO MIX MORE CREATIVELY,

1 VLZ CIRCUITRY FOR ULTRA-LOW NOISE AND CROSSTALK. *A fancy new 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, thermal noise & crosstalk are dramatically reduced. Open up all the channels, subs and masters on an 8•Bus console and compare what you hear (or rather don't hear) with any Brand X console. And because VLZ circuitry needs loads of high current, we ship a humongous, 220-Watt power supply with every 8•Bus & 24•E expander.*

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.

Above: 32•8 with optional MB•32 meter bridge and stand.

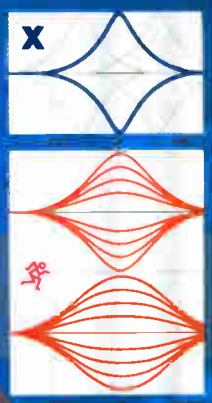
7 MAC® & WINDOWS® 95-BASED AUTOMATION THAT'S RELIABLE, PROVEN AND AFFORDABLE. *Along with affordable digital multi-track recorders, the Mackie 8•Bus has made it possible to do world-class productions on a modest budget. But until now, Big Studios have still had one remaining and unattainable creative "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, up to eight 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.

8-BUS CONSOLE... AND 2 TIPS ON HOW EFFICIENTLY AND, WELL, MORE FUNLY.*

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 setup with 102 channels of UltraMix™ automation. In the studios of artists as diverse as k.d. lang[1], Yes, Queensryche, Aerosmith, Lee Roy Parnell, Bryan Adams, Carlos Santana, Whitney Houston, Eric Clapton & U2, our consoles really are used to make great music.*

6 **WIDE MID RANGE EQ.** *Whether you're tracking or mixing, equalization is one of your most important creative tools. Mackie's 8•Bus consoles feature extremely-wide-bandwidth peaking EQ 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 at 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 band-width out to as much as 3 octaves (red curves above). That extra octave of "width" gives you a whole new creative palett

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

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

8 **WHAT ULTRAMIX AUTOMATION CAN DO FOR YOU:**

- *Hone a complicated mix one track at a time with every fader move recorded*
- *Clone your best fader moves and use them in other places in the mix*
- *Automute unused sections of your tape tracks or noisy MIDI sound modules*
- *Via automated mute or fader cuts, make a composite mix ("comp track") from the best moments of several tracks of the same vocal or instrument*
- *Save mixes for recall and editing at any time (great for mixes with music beds or "donuts")*
- *Make six voice-over versions of a jingle mix – and then easily make the inevitable nitpicky client changes three days later*
- *Step up to big-league automation without breaking the bank!*

9 **LEGENDARY RELIABILITY.** *One of those factors you probably don't think much about – until your console goes down in the middle of a critical late-night session. Built with pride in Woodinville, WA USA, Mackie 8•Bus consoles have an enviable three-year track record for enduring continuous, round-the-clock use and abuse.*

* Poetic licenee applied for.

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

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CURRENT

REWRITABLE CDs ANNOUNCED

On October 22, five leading high-technology companies jointly announced a new CD format: CD-ReWritable. Hewlett-Packard, Mitsubishi/Verbatim, Philips Electronics, Ricoh and Sony have jointly developed and are now promoting the technology to support the CD-RW format, which will allow users to read, write and rewrite computer data on compact disc. CD-RW discs can each store up to 650 MB of data, and the technology is initially targeted at backup, archiving and database applications; the audio industry is not currently seen as a significant potential market.

The new CD-RW standard is based on Orange Book III and incorporates the UDF 1.5 file format, which allows for drag-and-drop copying of data to and from CD-RW drives; and a new multiplatform capability called MultiRead. In the future, CD-ROM drives incorporating MultiRead will be able to read CD-ROM, CD-R and DVD media, in addition to CD-RW discs. At present, CD-RW discs are not readable by the installed base of CD-ROM systems, so the future success of CD-RW depends in part on the wide scale adoption of MultiRead by CD-ROM manufacturers. MultiRead's promoters say that its implementation cost is trivial. Ricoh plans to release a 2x/6x CD-RW drive in 1Q 1997 and at least seven CD-ROM drive manufacturers have committed to supporting the new standard. Ricoh and Mitsubishi have committed manufacturing resources to producing blank CD-RW media, and introductory prices are projected to be less than $25 per disc.

—Chris Michie

AUDIO MANUFACTURERS SWEEP EMMYS

This year's Emmy Awards ceremony was notable for the audio industry. At the black-tie gala, held October 2, 1996, at the Marriott Marquis Hotel in New York City, awards were presented to Vega Wireless (Buchanan, Mich.), Sonic Solutions (Novato, Calif.), Sennheiser (Old Lyme, Conn.) and John Nady of Nady Systems (Emeryville, Calif.).

John Nady and Vega Wireless were presented with Emmys for Outstanding Achievement for Pioneering Development and Technical/Engineering Development, respectively, for their progress in wireless technologies.

An Emmy for Outstanding Technical Achievement was presented to NoNOISE by Sonic Solutions, in recognition of its use in restoring tens of thousands of recordings and movie and television soundtracks worldwide.

Sennheiser was awarded an Emmy for Pioneering Development in Broadcast Technology. Sennheiser has been manufacturing products used by the television and broadcast industry for more than 40 years.

(L-R): Bob Doris, Mary Sauer and Andy Moorer of Sonic Solutions hold their 1996 Emmy Award for Outstanding Technical Achievement.

SONY/PHILIPS DEVELOP JOINT TECHNOLOGY

Sony Corp. (Montvale, N.J.) and Philips Electronics (Bohemia, N.Y.) announced plans to jointly develop a next-generation, high-quality audio technology using Direct Stream Digital (DSD), or "bitstream" technology.

Philips and Sony have been separately developing DSD signal processing, DSD recording and other DSD technologies; with production soon to commence. In addition, Philips and Sony agreed that, given the overwhelm-

—CONTINUED ON PAGE 16

MIX ANNOUNCES MANAGEMENT CHANGES

Mix has announced that Editor-in-Chief/Publisher Hillel Resner will be leaving his post effective January 1. Resner, who joined the magazine in 1979 and has been publisher since 1988, will continue to serve as vice president/general manager of the Mix Foundation for Excellence in Audio and executive producer of the TEC Awards. In addition, he will assume the position of special projects director for *Mix*. Jeffrey Turner, *Mix* associate publisher, will become publisher of *Mix* and its related products, including *Mix Edicion en Español*, *Mix Online* and the *Mix Master Directory*.

"After 17 years with *Mix* and eight as publisher, the time has come for me to move on to some other things," Resner said in announcing the transition. "I'm looking forward to serving the magazine and its readers in a different capacity, and I know I'm leaving *Mix* in capable hands under Jeff Turner."

No other positions will be affected by the transition, according to Resner. ■

TEC AWARDS SCHOLARSHIP WINNERS ANNOUNCED

The Mix Foundation for Excellence in Audio has announced the names of the winners of the second annual TEC Awards Scholarship Grant at the Twelfth Annual Technical Excellence & Creativity Awards, held November 9, 1996, in Los Angeles.

Grants were awarded to Daniel J. Overholt, a senior studying computer engineering and music at California State University, Chico; and to Erik Todd Lutkins, a senior in the recording industry program at Middle Tennessee State University.

Applications for 1997 will be available in January. For more information, call the TEC Awards office at 510/939-6149. ■

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DN-951 FA CD Cart Player
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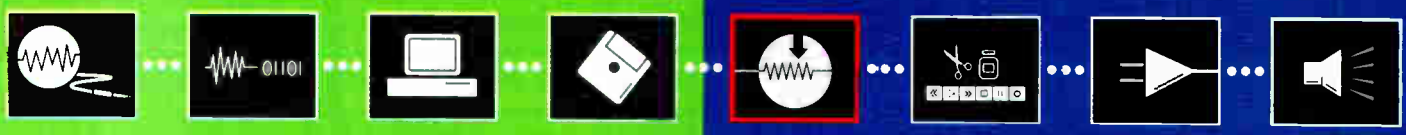


The 168RC is the first truly affordable, fully digital, 8 bus recording console. Use it with your ADAT or other digital recorder equipped with the ADAT optical interface to create the best sounding recordings you've ever made.

168RC Digital Recording Console

The heart of a new, component-based Digital Recording System from Soundlink

SoundLink DRS brings the reality of all digital, fully automated, component based recording to everyone working on the next great recording. For more information about the 168RC Recording Console or any of the SoundLink DRS components, just call ***(516) 333-8737.***

The 168RC is the first digital console to feature two ADAT optical interfaces (yielding 16 channels of digital input) and eight analog inputs as standard equipment. It makes the creative control and sound quality of an all digital, fully automated recording system an affordable reality.

Powered by Korg's proprietary MSP processor, our SoundLink DRS 168RC offers instantaneous control, processing and routing of all 24 inputs, 16 channels of mixing and 8 bus outputs.

With its combination of analog, ADAT optical and S/PDIF I/Os, the 168RC easily functions as the heart of a fully digital recording system while interfacing with any of your existing analog gear.

The 168RC is equipped with three-band EQs featuring semi-parametric high and low bands, fully parametric mid bands and 30 memories for EQ setups.

The 168RC also boasts two internal effects processors that run some of the finest algorithms available. Choose from 32 effects types and 50 preset programs.

The 168RC even provides automation functionality that lets you save and recall console settings or record and playback dynamic parameter changes.

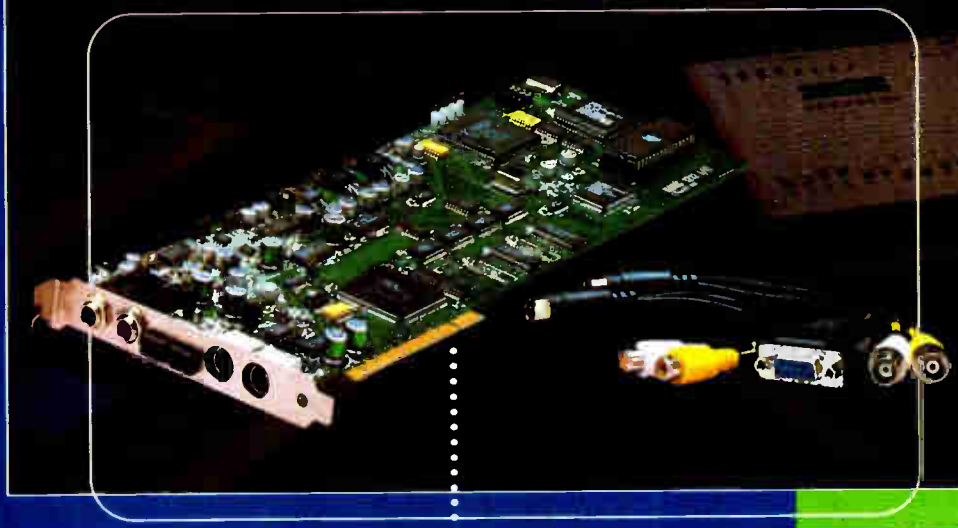
Affordable, fully integrated digital recording is finally here. So check out SoundLink DRS and the 168RC today. You can't beat this system.

SoundLink DRS
Digital Recording Systems

Affordable, fully integrated digital recording
Down to a System.

KORG

SoundLink DRS 1212 I/O
Multi-Channel Audio Interface



The SoundLink DRS 1212 I/O, along with Deck II software, brings the price of full-function, multi-channel computer based recording to a point that just about anyone can afford. And since the 1212 I/O conforms to the new PCI format, your investment will last longer than just a few months!

With the power of advanced personal computers, full-function multi-channel recording and editing is possible without the addition of costly, specialized hardware. The only true limitation has been in the area of multi-channel I/O. With the introduction of the SoundLink DRS 1212 I/O Multi-Channel Audio Interface, that limitation no longer exists.

The 1212 I/O features 12 inputs and 12 outputs configured as two analog I/Os, an S/PDIF I/O and an eight channel ADAT optical I/O. All the I/Os can be used simultaneously. For even more control and flexibility, the 1212 I/O connects to Korg's 168RC Recording Console, or to the Korg 880A/D and 880D/A interfaces.

The new 1212 I/O even offers a Word Clock input and output, plus an ADAT time code input, for system synchronization. Between the 1212 I/O with Deck II software, the 168RC Recording Console, an ADAT and a Trinity Music Workstation DRS, the combinations and configurations can meet the needs of just about any music production application.

All of the devices will interface with your existing analog equipment and form the basis for a completely digital system that will give you sound and creative control that simply isn't possible in the analog world.

Affordable, fully integrated digital recording
Down to a System.

SoundLink DRS
Digital Recording Systems

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INDUSTRY NOTES

Mark IV Audio (Buchanan, MI) appointed **Joel Motel** as director of sales and marketing for Mark IV Pro Audio Group North America...**Lee Stein** was named western market development manager and **Eric Mayer** named eastern market development manager at **Sennheiser Electronic Corp.** in Old Lyme, CT... Surrey, UK-based **Soundtracs** announced the appointment of **Akai Electronic Company Ltd.** as exclusive distributor in Japan...**Chrissie McDaniel** was promoted to the post of sales and marketing manager at **Aphex Systems** in Sun Valley, CA... **Korg USA** (Los Angeles, CA) named **Robert McCullar** as national sales manager...**Julie Tan** was promoted to international marketing manager at **Alesis Corp.**, based in Los Angeles...**Chris Hollebone** joined **Digital Theatre Systems** (DTS) in Westlake, CA, as director of operations of its European branch, DTS SA...After two years at Euphonix, **Greg Laney** returned to **Apogee Electronics** (Santa Monica, CA) to handle hardware and MasterTools sales...Edmonton, Alberta-based **AirWorks** brought onboard **Benjamin Trust** as vice president of business development...**AKG Acoustics** in Vienna announced the appointment of **Erikson Pro Audio** as exclusive Canadian distributor of AKG microphones, wireless microphones and headphones...**Gordon Moore** was promoted to vice president of sales at **Lectrosonics**, headquartered in Rio Rancho, NM...**Penny & Giles** (U.S. headquarters in Santa Monica, CA) announced a factory move to new premises in Cwmfelinfach, UK. Call 44 1495 202024 for more information...**Lucasfilm Ltd.** in San Rafael, CA, promoted **Monica Dashwood** to general manager of the THX Division and **Tim Holmes** to manager of engineering for THX Theatres; customer relations and certifications manager **Patrick Artiaga** will incorporate sales for THX Theatres, a role previously held by Dashwood...**HHB Communications Inc.**, in Portland ME, was named exclusive U.S. distributor for UK-based **Motionworks**...In a move to expand operations in Southeast Asia, **Audio Processing Technology** (U.S. offices in Hollywood) appointed **Patrick Cullen** as sales manager for the Southeast Asia region, announced plans to open a regional office in Kuala Lumpur and established a new distributor, **Transtel Technology** of Malaysia...Kidderminster, UK-based **Klark Teknik**'s DN 4000 was one of the five winners of the PLASA 96 Awards for Product Excellence, presented at the September exhibition in London...**Dynaudio Acoustics** (London) appointed **Amber Technology** as its distributor in Australia and **Kamol Sukosol Electric Co. Ltd.** as distributor for Thailand...**Dunmore Vintage Audio** has a new address: 5126 Vineland Ave., North Hollywood, CA 91601. Phone 818/508-2540; fax 818/508-2549...**Marian Sandberg** joined **Group One Ltd.** (Farmingdale, NY) as marketing/communications assistant...**Grace Design** of Boulder, CO, named **Westlake Audio** (Los Angeles), **David Carroll Electronics** (San Francisco), **E.A.R.S.** (Nashville), **Wind Over the Earth** (Boulder) and **Steve Strassberg & Associates** (NY) as reps for the company's Model 201 and 801 mic preamps...**Peavey Electronics** (Meridian, MS) hired **John Conway** as its newest advertising writer... Metallica producer **Bob Rock** is the first recipient of **BASF Magnetics' Master Award** honoring recordings made on BASF media that reach Number One on the music charts... **CDK International Inc.** (Seatac, WA) appointed **Adam Johnson** as chief of speaker design and engineering, and **Bryce Bogue Sales** (Rodeo, CA), **Burcaw Company** (Madison Heights, MI), **W.B. Pray Sales** (Northboro, MA) and **GVT Marketing Services** (Rowland Heights, CA) as new sales representative firms. ■

—FROM PAGE 12, CURRENT

ing popularity of the CD format, future enhancements to the CD system can be implemented while protecting the investment that consumers have made in their current discs and equipment. Availability of products for professional and studio use will be announced shortly.

SYNCLAVIER ACQUISITION ADDENDUM

Last month's "Current" section reported an acquisition of Synclavier by AirWorks Media. In addition to AirWorks purchasing numerous Synclavier intellectual properties (including various multiplatform software rights) and maintaining parts of the Synclavier research and design staff, DEMAS Inc. (Enfield, N.H.) acquired Synclavier's hardware assets and physical hardware inventories, in addition to part of the Synclavier design team, including NED co-founder Cameron Jones. For more information, customers can call DEMAS at 603/632-4159 and AirWorks at 403/424-9922.

NEW WEB SITES

Aardvark: www.aardvark-pro.com
Aphex Systems: www.aphexsys.com
Apres midi: www.apresmidi.com
Garwood: www.garwood-radio.com
Puerto Rico's Jam Music Productions: www.tld.net/users/freky/jam.htm
Opcode: www.opcode.com
Promusic: www.promusic-inc.com
Sascom Marketing Group: www.sascom.com
Sound Art Productions: www.magic.mb.ca/~soundart/
Soundcraft: www.soundcraft.com
SPL: www.proaudio.de/spl/

CORRECTIONS

The October preamp comparison listed an incorrect address/phone number for Night Technologies International. NTI is located at 1680 West 820 North, Provo, UT 84601. Phone 801/375-9288; fax 801/375-9286.

The *Rent* feature in October's *Mix* incorrectly listed the Valvotronics Gain Ryder 3 as "Valvetronics Gain Rider." For information on the Gain Ryder 3, visit www.masque-sound.com.

The November "Current" column listed AirWorks executive Harland Kirby as moving from Synclavier. Mr. Kirby is a veteran of Xerox. ■

RØDE. A Mic For All Seasons.

A great mic can make your track come alive. The wrong one can put it to sleep forever. You've heard that every mic has its day. But you haven't the time or money to try every one. What you really want is a great mic that shines in multiple situations. A mic you can trust.

You want the NT2.

Hand made in Australia, it's just right for your lead and background vocals. Fabulous on your acoustic guitar. Perfect on the drum overheads. Great on those wind instrument overdubs. In fact, this mic will deliver the results you need on just about any source material you throw at it.

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Finally an affordable, multipurpose, professional recording microphone that provides outstanding performance in a variety of uses.

Get the NT2 and discover how comforting it is to have a great mic at hand whenever you call on it.

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ORIGINAL AUDIO ARCHIVES

GONE WITH THE WIND?

Audio restoration. An idea whose time has come. Actually, you probably remember that it has come a few times before. Maybe you have even noticed that it keeps on showing up as a hot topic once a year or two. Like that damned pink bunny—just when you forget about it, it's back. And it will keep coming back again and again and again.

Audio restoration and extreme forensic audio recovery are areas that I am somewhat familiar with, so when *Mix* told me that restoration was one of this month's themes, I jumped on it. Just like I always do, because I am A Real Team Player. Oh, wait—that's somebody else. Well, anyway, I jumped on it; and here is why.

HOW I GOT INVOLVED

At some point in the faded, distant past, I was approached to tackle a significant problem in the audio reconstruction of MGM's *Gone With the Wind*. The person who contacted me was a longtime friend and extremely good engineer, Bob Bradford. In fact, he was good enough that I was a bit concerned that the problem might be unsolvable if he couldn't do it alone. As it turned out, *nobody* had what it took to do it at that time—the technology simply didn't yet exist.

I had been casually toying around with a somewhat unusual concept for removing noise and distortion for some time but hadn't found a big enough project to get me to put in the work to test the theory. *Gone With the Wind* was big enough. Bob knew about my concepts for noise removal and thought that this project might be the perfect test. I accepted the restoration contract and finished the hardware, and I went out to Los Angeles to try it on the film. It worked very well, and I ended up doing the restoration and repairs, with Bob doing the engineering.

Shortly afterward, my company struck a long term deal with MGM to work on all of the properties that they felt they could recover the cost of and generate a reasonable profit. MGM moved the work directly into my studio facilities. I did *The Wizard of Oz*, *Singin' in the Rain*, *Meet Me in St. Louis*, *Yan-*

—CONTINUED ON PAGE 214

BY STEPHEN ST.CROIX

ILLUSTRATION: ANDREW SHACHAT

No Compromise CD Recording

Think about it. You spend hours tracking, editing, and mixdown on your projects. And, you've spent a small fortune on your mixing console, mikes, tape recorders, and all that outboard gear. So why settle for just any CD recorder when you can get the best—the new, very affordable Ricoh RS-1420C?

A third generation CD-R recorder and player, the Ricoh RS-1420C is the true choice for music professionals. The RS-1420C can write a CD at double speed (2X) or single speed (1X). It sports a generous 2MB buffer to ensure reliable recording across a wide range of systems.

Making a one-off Compact Disc is easy when the RS-1420C is mated with a Digidesign® Inc. system* such as Pro Tools®, Sound Tools®, or Audiomedia® along with Digidesign's MasterList CD™ software. Whether your application is creating a master for replication, or just burning a few demo discs to pass around, the Ricoh RS-1420C is an ideal addition to your studio.

The RS-1420C can also do double duty as a CD-ROM recorder/reader. It can read CD-ROMs at quad speed (4X) and record them at 2X/1X. Ideal for backing up sound files when a project is done, the RS-1420C frees up your hard disk for the next job. What's more, the RS-1420C can be used to digitally bounce tracks from a music CD to your hard disc in several different file formats.

The RS-1420C, an external model of the RO-1420C, is compatible with both Intel- and Macintosh- based systems. It is very easy to use and affordably priced. Internal models are also available at lower prices.

Photo shows the internal version, the RO-1420C

Want to know more? Call us or one of our distributors. The phone numbers are listed below.

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CONSAN STORAGE SOLUTIONS 1-800-229-DISK

OPTICAL LASER STORAGE SYSTEMS AND SUPPLIES 1-800-776-9215

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SHORT CYCLES

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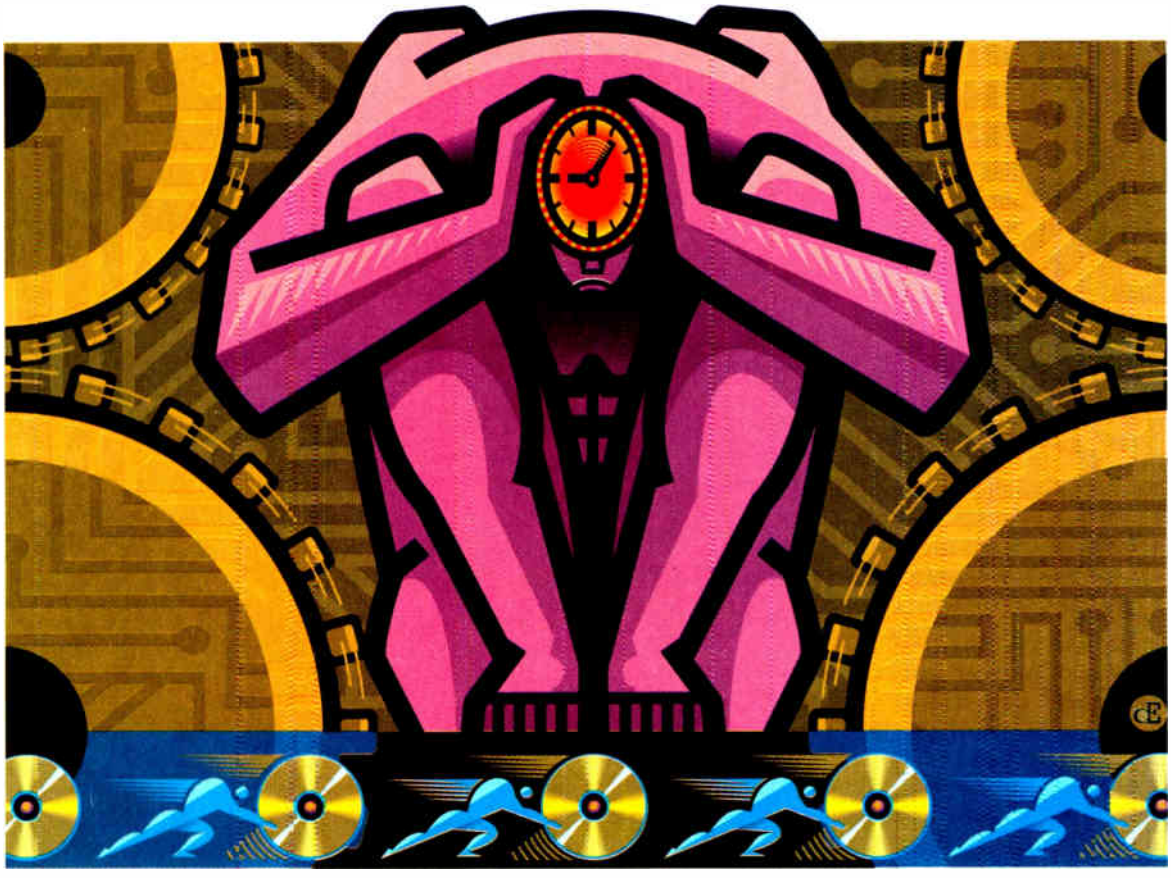

ILLUSTRATION DAVE EMBER

Michael Crichton and I nearly share a birthday. We were born exactly ten years and six days apart. On top of that, we grew up in the same town. I think I knew him. Though I'm not certain, I'm told it's likely that the tall, pleasant library aide at my elementary school, whose name was Michael and who would get the Dr. Seuss books down from the top shelf for me during those afternoons in the first grade when I was so bored that my teacher threw me out of the classroom, was indeed the soon-to-be-famous novelist and Hollywood honcho.

In high school, he was a basketball star; I played the bassoon and rhythm guitar. We had the same senior English teacher, whom Crichton cites as one of his chief inspirations as a writer. I considered the guy a pompous jerk. But what did I know? Last year, Crichton's literary properties brought him $22 million, according to *Forbes*. Mine didn't, according to anybody.

Crichton and I even lived on the same block in Cambridge, perhaps in the same building—he in the late '60s while he was attending Harvard Medical School and learning why he didn't want to be a doctor, but getting the inspiration for *ER*; I in the mid-'80s when I was working in software development and learning that I would never be a great programmer, but finding inspiration to write computerized Celtic folk music.

Why do I bring this up? Well, I've been thinking about Crichton a lot recently, as I find myself increasingly disquieted over the ever-accelerating march of technology. At the heart of a lot of Crichton's books is a warning that over-reliance on technology, especially that which is so new that we haven't had a chance to assimilate it and weigh its costs and benefits, is extremely dangerous. Would that I could say it as eloquently as he does—and make nearly as much money at it.

I am thinking particularly of an early Crichton book, *The Terminal Man*. A computer scientist by the name of Harry Benson hates computers and has a nasty (and utterly fictional) form of epilepsy that causes him to kill people when he is in the throes of a seizure. A group of doctors implant under his skin a computerized device that reads his brain waves. It recognizes the pattern that precedes an attack, and when it detects that pattern, it sends a little jolt of electricity to a pleasure-stimulating site in the brain, breaking the cycle and preventing the seizure.

BY PAUL D. LEHRMAN

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The trouble starts when the computer that is monitoring the man-machine interface reports that the jolts of pleasure are starting to come closer and closer together. Crichton likens the process to someone's learning through biofeedback how to lower his blood pressure—the autonomic nervous system, responsible for things like respiration, heart rate and body temperature, can be taught in the same manner as the conscious mind. In this case the patient's brain is learning to generate seizure patterns with increasing frequency, so that it can get the resulting pleasure hits. The curve described by the events over time is a hyperbola, and its asymptote, the point at which the time between the events diminishes to zero, Crichton calls "tipover." When that occurs, as you can imagine, all hell breaks loose, and there's guns, women in peril, chases through dark airplane hangars and death.

What does this have to do with audio? Well, the story popped into my consciousness recently during a conference I attended. The subject was DVD, the Digital Video (or is it Versatile?) Disc that promises to be the Next Big Thing ("NBT"?) in delivering audio, video and data. Whether you know anything about it or not, there will be DVD hardware (if not software) in the stores by the time you read this. DVD is supposed to replace VHS videotape, audio CDs and CD-ROMs with a medium that is trivially more expensive to produce than today's CDs but can hold about eight times as much data. There are dozens of issues surrounding DVD's launch: how movies are going to be compressed, how copyrights will be protected (not that again!), whether players will be backward-compatible with conventional CDs, and how multiple platforms will be supported on one disc, just to name a few. On the audio side, there are questions of how many channels will be delivered, what sampling rate(s) and word length(s) will be supported, and what kind of digital compression will be used, if any. These problems are doubly complex because they have to be decided both for audio-only discs and for audio accompanying picture.

Now, understand that I'm not averse to the idea of DVD. Certainly, there's a lot to be said for a video delivery system superior to VHS (although we've had one for years—laserdiscs—but never mind that for now). The 600MB limit on CD-ROM capacity, which seemed so generous not very long ago, is now looking pretty skimpy, so a 5-gigabyte medium would be welcome. As to whether the market will support 560-minute record albums, or people will pay premium prices for 6-channel surround versions of Steely Dan greatest-hits collections, remains to be seen.

But I see trouble ahead. For one thing, DVD seems to be designed from the get-go to be all things to all people, and history says that may not be such a great idea. Look at any successful entertainment technology introduced in the last couple of decades, and you'll see that when it first came out, while it had a definite market niche and solved a specific problem and was easily understood by the buying public, as time went on it grew and developed in ways unforseen to its originators. Maybe that's not the ideal way to develop technology. If you don't at least try to predict all the uses of a new technology from the beginning, then you'll never see what limitations you'll bump up against down the road. But it has worked surprisingly well, especially in

an industry as dependent on consumer acceptance as ours.

For example, when the first FM stations went on the air, no one dreamed of being able to broadcast in stereo. FM worked just fine as it was, and when stereo came along, it was an added bonus, helping to keep the medium vital for more than 50 years. When half-inch home video came out, its use as a high-fidelity video (S-VHS) or audio (VHS Hi-Fi, PCM-F1) medium was not on anybody's mind. Audio CDs gave birth to CD-ROM and Enhanced CDs, and it was that birth that triggered the explosion in CD manufacturing capacity that today makes the cost of making a CD less than that of making a cassette (now if only someone would tell this to the record companies). If the proponents of MIDI proclaimed in 1983 that this clever little scheme for hitting a key *here* and hearing a synth play over *there* would become a major factor in console automation, synchronization and signal processing, they would have been laughed out of town. The Compact Cassette begat the portable multitracker; 2-inch videotape transports were transmogrified into 16-track audio decks; and the personal computer—the accountant's best friend—somehow evolved into the predominant tool for artists in every medium.

So is the rush to cover all the bases on DVD before it comes out really a wise move? Will those who would predetermine *everything* about DVD before it even exists kill the goose before it gets to lay the golden egg? And the corollary question that all this begs: Are all of the companies who want to make sure their patented technologies and existing markets are protected when the new medium appears going to make things so confusing and so closed-ended that consumers will never go for it?

DVD seems to be designed from the get-go to be all things to all people, and history says that may not be such a great idea.

But that's not even the most important question. What's really going to make or break DVD is the time factor—whether there's enough time for consumers to absorb yet another new technology. Has it been long enough since the last time we made them buy into something altogether new that we can get away with convincing them to do it *again*? In an age when technology development is not only accelerating rapidly, but the pace of acceleration itself is accelerating, I wonder whether we're approaching a point where our next move is going to leave behind a whole lot of people—the very people whom we ultimately need to pay for it.

Already we're seeing races being run among competing technology companies that are approaching comic proportions. Generations of new products are blurring into each other. One major computer manufacturer that last summer announced screamingly fast machines is not only not delivering them yet, they aren't even delivering the line of hardware they announced *before* that. Meanwhile, their competition has announced similarly-spec'd products and is representing them to the public

—CONTINUED ON PAGE 214

Jacks Belo

And Other Truths About 8-Bus Recording Consoles

Get Back Jack. Get Real.

Have you ever seen a pro-studio recording engineer mess with the cables on a console? Of course not. That's why true recording consoles have their jacks in back. Look at any console in any serious studio. Truth is, once the console is installed there's no need to change the setup. Like the TASCAM M2600MKII — the next-generation 8-bus. Available in 16, 24 and 32 input models, it looks clean, sounds sweet and works the way you want it to.

All Your AUXes. All The Time.

With 6 AUXes *(2 are stereo)*, the TASCAM M2600MKII has more AUXes than any other console in its class. But the best part is — you can use all six — all the time. No other console in its price range can make that claim. That means you can use more effects, set up multiple independent stereo headphone mixes and have more flexibility. No limitations. And no repatching.

Get Out! Direct or With The Group.

A true sign of a recording console is direct/group switching. That's what makes recording with the TASCAM M2600MKII so smooth. Think about it. Send any signal direct to tape or disk by pressing one button. Or, send a group of signals direct to tape or disk just as easily — no patching here! You'll never have to crawl around or mess with your cables again. Spend more time recording and less time figuring out how.

The Features Demanded by Pros.

The M2600MKII has everything a great recording console should have — and more. It's an In Line configuration with flip switches. And you get your choice of balanced (+4dBm) and unbalanced tape ins and outs. Phantom power (48V) switchable in banks of 8 channels. And an optional multi-process meter bridge so you can keep your eyes on the board — and not your recorder. Plus, a semi-parametric split EQ on every channel and it's ready for automation using any of a number of third party packages.

Watch it. Do Those Switches and Knobs Wiggle?

Before you buy an 8-bus console check out the quality. Knobs and switches that wiggle are going to be a problem. For example, check out the controls and faders of the M2600MKII. No play, no wiggling. You can feel the quality. Feel those smooth long throw 100mm faders. Clean. And check out the ergonomics. Even the largest fingers will fit between the knobs. Try that on others!

Use A Solid Heavyweight.

TASCAM has built more recording consoles than any other manufacturer in the world. We know how to build a quality product that will last. The M2600MKII is a solid console. You can feel the difference just trying to lift it. Just compare it to the less serious lightweights on the market. Plus it comes with an extra heavy external power supply that delivers more headroom than anything else in its class. Just what you expect from the leader in multitrack recording.

Get Smart. SmartSwitches.™

The difference is in the design. This is a serious console. Take a look and you'll notice the design touches that distinguish the M2600MKII as the next-generation 8-bus console. Like TASCAM's exclusive self canceling and two-tone SmartSwitches — for protection from redundant operations and visual confirmation of all button positions at a glance. Quite a hassle on others!

Great Sound. The Next-Generation 8-Bus.

The real truth about a recording console is sound. With Absolute Sound Transparency™, high-end mic pre-amps, ultra low-noise circuitry, and high-output op amps, the M2600MKII is amazingly quiet, absolutely transparent and perhaps the best sounding console under $20,000. And starting at only $3,199, it's truly the sound decision for a next-generation 8-bus recording console. Put it on your shopping list today.

Maximum Headroom

Increased range of mic amp trim control down to 0dB accommodates +4 signals without using the pad– improves signal to noise ratio.

Double Reinforced Dual-Ground System

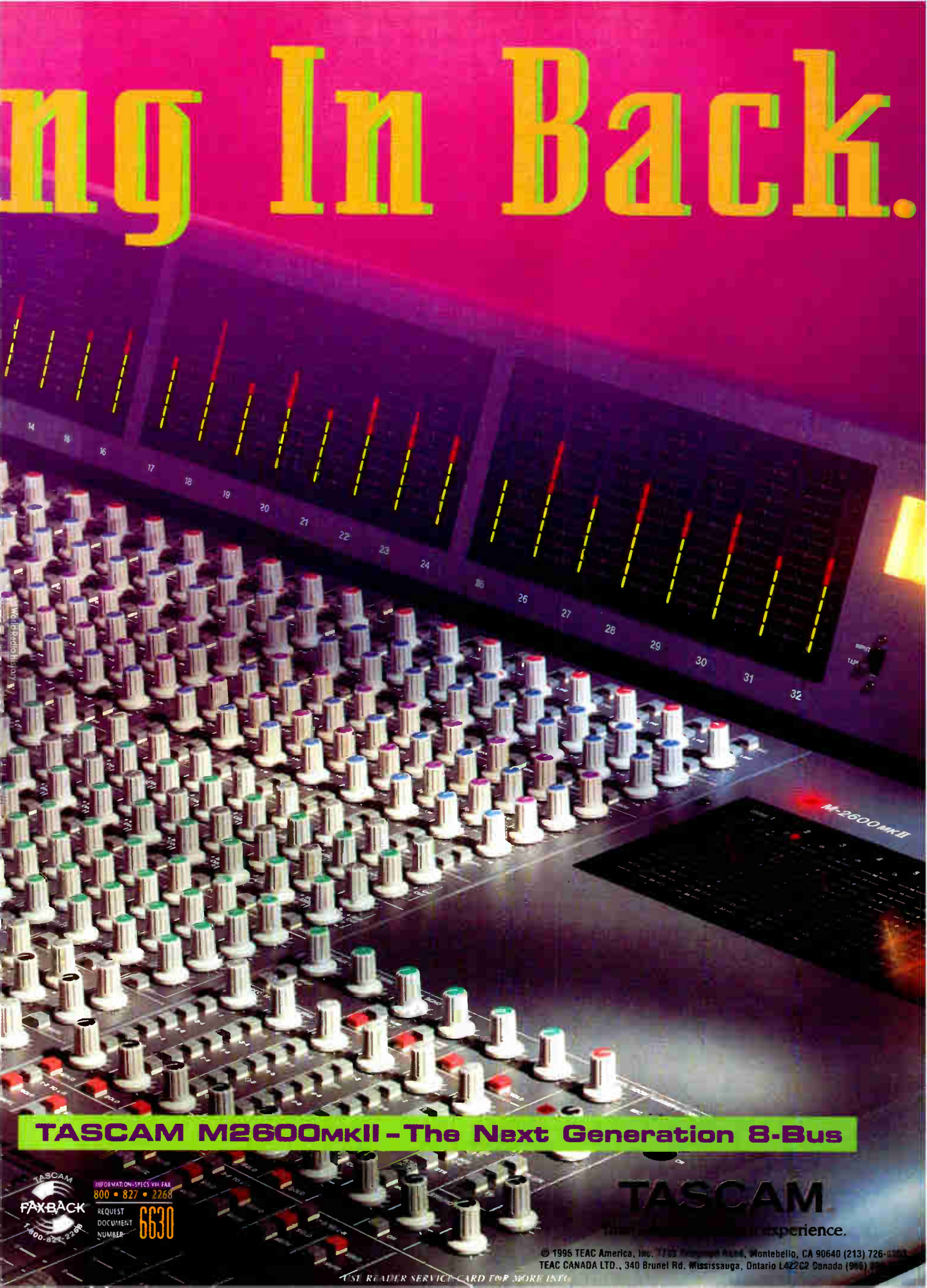
Wider ground line patterns on the PCB, extremely heavy gauge wiring, and enhanced electronics yields greater headroom and improved sound quality.

Dedicated Indicator Lights

Each SOLO and MUTE switch includes individual indicator lights so you are assured of their postion at all times. No second guessing.

Semi Modular Component Construction

A more expensive, higher quality semi-modular design with 8-channel modular sections makes the M-2600MKII easier to service.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RECORDING Strings

BY RICK CLARK

THERE IS NOTHING QUITE LIKE THE SOUND of a great string section or orchestra. A magic performance of a great symphony, or a concerto or chamber piece can be every bit as powerful as any inspired rock, R&B or jazz tune. Additionally, since the advent of popular recorded music, orchestras and string sections have been used to elevate the emotional delivery of untold numbers of pop recordings and live performances. In some cases, the integration of symphonic or chamber elements to a band track has been little more than sweetening. In other cases, like The Beatles' "A Day in the Life," for example, it has been an essential part of the composition's integrity.

For this *Mix* applications feature, we talked to experts who have recorded orchestras and chamber groups for classical music projects as well as those who have primarily worked within popular music contexts, and given them space to share some important ideas on how to do it right. Our thanks to all of the participants.

MILAN BOGDAN

Milan Bogdan is one of Nashville's finest engineers. He is also owner of the Emerald Studios, one of Music City's premier recording facilities. Both of these statements are quite significant in a city loaded with hundreds of studios and engineers. Besides recording many TV and film orchestral dates, Bogdan has done string sessions for many of country music's finest artists, as well as many great R&B dates for Motown artists like Marvin Gaye, Diana Ross, The Temptations and others.

"There is a lot to cutting strings," he says, "it isn't just setting up the microphones. If you want to do it right, it takes a lot of time, and the setup is critical. You have to know the room you are in and its characteristics. 'Is it heavy at 400 cycles and should you turn that down?' If so, then you don't want to put the lower strings in that area of the room, because it will muddy the whole thing up. It is the technique of listening to the whole room and then knowing where to stick the microphones and the instruments in that room.

"Sometimes we will dampen the room down. We might put carpet down on the floor if it's too live. My preference, however, is for a live-er kind of room. Even though I like a live room, phasing can be more of a problem. You may encounter reflections coming back from a wall that may be almost as loud as the original source signal. You can get an echo effect that causes the strings to lose their presence. That now comes into the microphone

PHOTO BY BILL SCHWOB

technique of where and how far away it is from the instrument.

"Omni microphones are always the flattest and the best-sounding and more preferable than a cardioid pattern. In some instances, I would have to switch to a cardioid pattern to knock out some of the reflections in the back, if they get too loud.

There's more to cutting strings than just setting up the microphones.

"To me, the high-voltage mics always sound better than just the phantom-powered mics. That's why I like the Neumanns—the 47s, 67s and 87s, and the high-voltage B&Ks and Schoeps mics with the power supply on the floor. The 4000 Series high-voltage B&Ks, especially for violins, are magnificent. They are mind-boggling. They are probably my favorite for miking the room and miking the strings.

"For smaller sections, it obviously is a smaller, more intimate sound right away. Usually, I will mike each instrument by itself and get a closer, more up-front, present kind of sound. I will usually use a couple of B&Ks in the room. I'm paying more attention to each individual instrument than I am to the overall room sound. When there is less of a phasing problem, then it is easier to make the whole thing work.

"For solo cello, I like to use an Audio-Technica 4041A. I would mic it fairly close, but that would depend on the room and how live it is. I would mic it fairly close to the large part of

the body of the instrument, because that mic is so bright.

"For bass fiddle, I would use a 47 tube and put it toward the body in front of the instrument, either slightly below or slightly above where the bow is actually touching the strings.

"For violin, I usually mike overhead, but there is also certain amount of sound that comes from under the instrument itself. It depends on what you're trying to get. You get a fuller sound underneath. If you are miking from both sides, the producer might say, 'I don't like that [bow-side sound]. It's too scratchy.' A lot of times, it isn't that it is too scratchy—you're just getting too much of the bow. So I just turn that mic down and bring the other one up. All of a sudden the producer likes it, and I didn't change the EQ and I didn't have to change the mic.

"I very seldom EQ strings as I record. There is no way to duplicate that. I would rather put some on later. I am so busy dealing with the mix and the blend and the phasing that I don't have time to screw with the EQ. That's why I pick good mics and just do it right that way."

RICHARD DODD

Since the early '70s, when he was recording hits like Carl Douglas' "Kung Foo Fighting," Richard Dodd has worked with music luminaries like George Harrison, Roy Orbison, Boz Scaggs, Wilco, Robert Plant, Traveling Wilburys, and Tom Petty & The Heartbreakers. Dodd won a Grammy for his work on Petty's solo album *Wildflowers*. He has also garnered extensive string date experience on both sides of the Atlantic. Dodd's favorite string recording environments are Landsdowne, CBS I and Abbey Road 2, all of which are in England. During the interview, Dodd shared many thoughts on mic selection and placement; but in the end he felt that his contribution to this feature should address the psychological aspects of string sessions.

"There are so many factors, other than the technical side, that make for a good string sound or recording. To focus on the method of recording strings and just talk about microphones and that sort of stuff would be very remiss. If there's an art for me, it's in encouraging the people to be at their best, which gives me an opportunity to be at mine. That's the only art involved really. The rest of it is a series of choices, very few of them wrong. The microphone is almost irrelevant. In fact, if mics were invisible, it would be the best thing in the world.

"Nevertheless, if you have a pretty good quality microphone, used in a pretty conventional, orthodox manner, it is hard to mess things up, if all the other factors are right. Sometimes people can drop into a session while you are recording a big 60-piece orchestra, and it will sound amazing, and they think you're great; but truthfully it is sometimes easier to record that orchestra than recording a solo guitar and voice. It really is.

"You have 30-odd string players out there, and it doesn't matter if three of them don't play all of the time. The spectacle and what they produce can be quite amazing. It really comes down to the caliber of musician—I can't emphasize that enough—and that musician having something worth playing, and the person next to him doing his job, too. If they respect the leader, and if they respect the arranger, and they don't mind the music—it's very rare they are going to like it in a pop commercial world—then you're on to a good thing. Give them some fun, and compliment them. Everybody likes that. After all, they're human and there's a lot of them in an orchestra.

"Here's one little tip to make things better. I used to go around the studio, especially in the summer in England, when it was dry, and spray the room with a spray gun like the kind you use for plants, before the musicians would come in. I would go around and soak the cloth walls, and the humidity would gradually leak into the room. It just made things better. I found that I preferred the sound of a wet, humid environment to a dry environment. I think it makes the sound more sonorous. I learned that, from the fact that when it was raining it sounded better than when it wasn't. It just obviously permeated the whole air-conditioning system. Not having air-conditioning helped, because it wasn't de-humidifying.

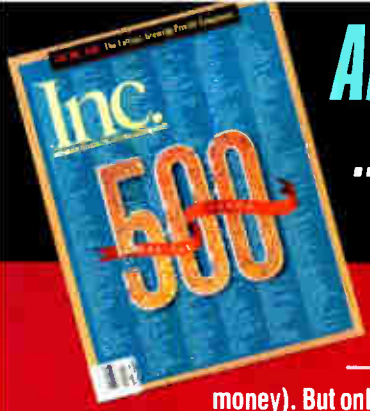
"I also think it adds more of a psychological effect than anything. If you see someone taking care, it impresses you; just as much as if someone doesn't care, it impresses you in a negative fashion. There is a comfort factor as well. If someone isn't comfortable, then they aren't going to play well. So imposing the humidity was a good thing; it made people think that you cared and in turn would give you an edge.

"There are numerous string recording tips, in terms of indoctrination, I could share. My first session around string players happened when I had been assisting about two weeks. Unbeknownst to me, the engineer had arranged for the lead violinist to teach me a lesson that I wouldn't forget. He told me that you must walk carefully when you walk around the players and the instruments. Make your presence felt. Speak firmly and clearly so people will know you are there; and don't creep up on anyone, because some of the instruments they are holding are worth thousands and thousands of dollars. You don't want to have an accident. So the engineer set me up to adjust a mic on the first fiddle at the leader's desk, and I had done everything he had told me to do. As I stepped back to make my final tweak on the microphone, he slipped an empty wooden match box under my foot. The sound of crushing wood under my foot is something you never forget! It was very clever and a good education. You can tell people all you like about being careful, but there is nothing like that adrenaline rush of 'Oh My God, there went my career, before it's started.' You remember things like that."

If there's an art for me, it's in encouraging people to be at their best, which gives me an opportunity to be at mine. —Richard Dodd

ELLEN FITTON

Ellen Fitton's recording career has ranged from R&B (Chaka Khan, Dionne Warwick, Bee Gees), jazz (Wynton Marsalis) to rock (Firehouse),



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but her most extensive credits are in the classical world. Fitton has recorded the Chicago Symphony, the Philadelphia Orchestra and the New York Philharmonic, as well as artists such as Jessye Norman, Yo-Yo Ma and Kathleen Battle. Among Fitton's favorite places to record strings are Royce Hall in L.A., Myer Hoff in Baltimore and Symphony Hall in Boston. For the past five years, she has been working as an editing and recording engineer at Sony Studios in New York. On the day we interviewed her, Fitton was wrapping up editing work on a project with violinist Isaac Stern.

"Classic music is all editing. It involves hundreds of takes and hundreds of splices. That's how classical records get made. You usually are talking about maybe 200 takes for the average record, but we just did 15 Christmas songs for a Kathleen Battle record and there were 2,000 takes. When I say 'take,' it's not complete start to finish recordings of all of the material. It's little inserts and sections. There might only be several complete takes. Then they record a section at a time, or a movement at a time, or there might be a series of bars that they play eight or nine times till they get it right. It's that sort of thing.

"The function of the producer in a classical record is kind of different than a pop record, because they're really sitting with the score, listening to each take and making sure that each bar is covered completely by the end of the session or series of sessions. They have to make sure they have all the right notes that they need, and then they have to come up with an edit plan to put it all together. There's no drum machine or sequencers. So that's how classical gets it right.

"The producer has to keep track of tempo, pitch, and how loudly or softly the orchestra played each section. The producer also has to know that if the orchestra plays the piece with a different intensity, then the hall reacts differently. When that happens, the takes don't match.

"It is important to familiarize oneself with the piece of music being recorded, so you will know instrumentation-wise what you have, how much percussion there is, and are there any little solo bits by the principals in the orchestra. Then you start laying out microphones. We prepare a whole mic list before we go wherever it is we're going. We take specific microphones, specific mic pre's out with us when we go. All the recording is done on location, in whatever hall we choose, and we take all of our own gear with us. Tape machines, patchbays, consoles, everything gets put in a case and packed up and taken with us.

"For the most part, you want a fairly reverberant hall, but you don't want it so reverberant that it starts to become mush. A good hall should have at least a couple of seconds of reverb time.

"Normally what we have is a main pick-up, which is usually what we call a tree. It contains three microphones set up in sort of a triangular form and they are usually just behind the conductor, about 10 feet up in the air. Some are 8 feet, some are 12; it depends on the hall. We use B&K's 4006s or 4009s because they're nice omnis that are real clear and clean. They have a nice high end and give you a good blend.

"The goal with classical recording is

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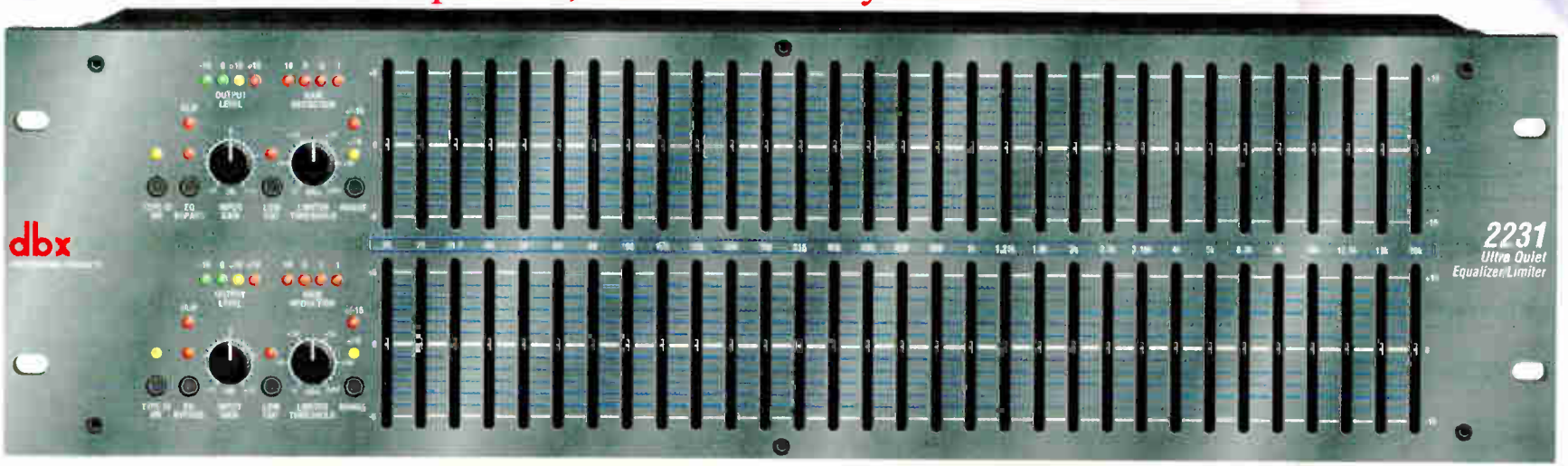

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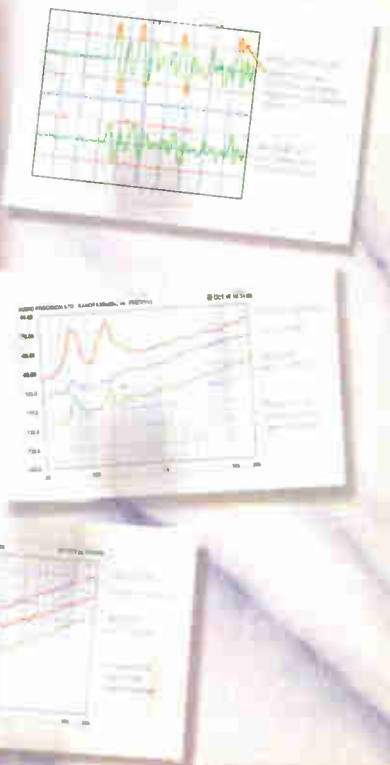

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to try to get it with that main pick-up, and the input from all the other mics is just icing on the cake. If you end up in a really bad hall or a hall you don't know, then you end up using much more of the other mics.

"Our primary machine is the Sony 3348. It is a great machine and it takes a lot of abuse. It's nice to have all of those tracks there if you need them. We also do a lot of 20-bit stuff that requires additional tracks. Twenty-bit material takes up more than a single channel. It takes two tracks, because of the way the bits are broken up.

"We have also been using PCM 800s of late, more for cost reasons than anything else. They are great for the small chamber dates, when we just need six or eight tracks. If we need 12 tracks, we will then take two machines and lock them up. It is easier cartage-wise, and the tape stock is cheaper. They are a nice alternate to the 3348."

BUD GRAHAM

Over the past 30 years, one of the most highly regarded engineers for symphonic recording has been Bud "Buddy" Graham. Graham has recorded many renowned orchestras (Philadelphia, New York, Cleveland, Boston) in a number of the world's greatest concert halls. Graham, who is now retired, has earned six Grammys.

"My feeling about string miking is that it's quite different than normal 'pop' miking. I like to mic from much more of a distance. It's a question of taste. My feeling is that if everything is miked close, the strings are kind of piercing and sharp. I prefer a mellower string sound. Again, it's a classical sound as opposed to a pop sound.

"I like the natural room ambience, but I am more constrained by a good or bad hall. If you are miking close, and it is not a good hall, you're not really hurt by it. If I'm miking at a distance and it's a bad hall, it's going to sound bad. It has to be a good hall for my type of miking to work. It has to have ambience, and it has to have a high ceiling.

"Some of the great halls—Carnegie, the Princeton University Hall, the Concertgebow in Holland—are hard to get, because they're booked well in advance. You have to book many months in advance to get a good hall."

When Graham uses close mics, he favors B&K 4006s for violin to cello. For bass, timpani, French horn, tuba and other brass, he likes TLM170s, which he feels are great mics for darker sounding instruments. For vocal chorus and harp, Graham chooses MK4s. KM140s, he believes, work well for percussion.

Though Graham has done many projects that involved a combination of many close and distant mics, he feels that the proper application of a minimal number—like a couple of omnidirectional mics placed out front—can achieve the most ideal results.

"On occasion, it sometimes works very well to work with two microphones, usually placed at 7 or 8 feet behind the conductor with the two microphones placed at 7 or 8 feet apart. Depending on the hall though, it might

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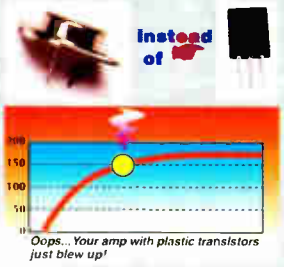

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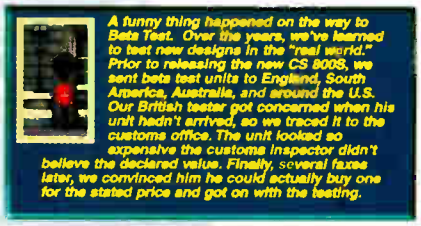

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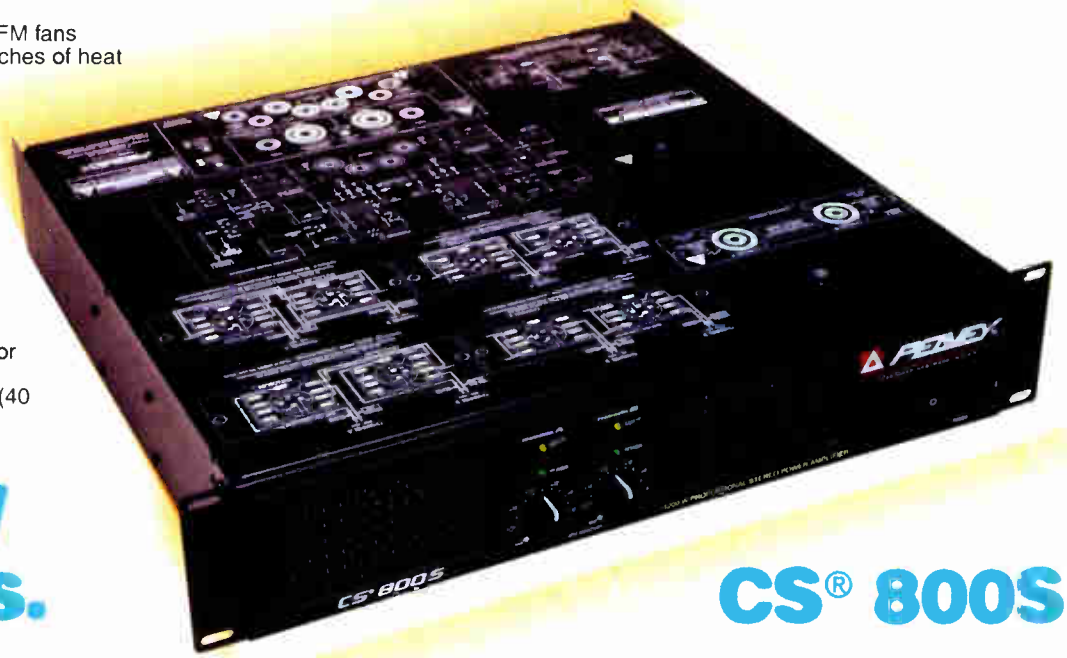

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be 12 to 15 feet high.

"The placement and focusing of the microphones is important. At one time, an engineer said to me, 'What difference does it make, because you're using omnidirectional microphones.' I said, 'Well yeah, but it may be only omnidirectional at certain frequencies. The focusing is extremely important. It isn't just something that you put up and aim in the general direction of the orchestra. It has to be properly focused, or you will get too dark of a sound.

"In order to focus, I would focus between where the first and second violins meet on the left side. I would try to aim it down so it was kind of cutting the strings in half, between the first and second violin. The one on the right side would be doing the same thing, aimed where the violas and celli would come together. The leakage from the brass would come in and give it distance and provide a nice depth view. If I aimed too far back, then the strings would get dull and they would lose their clarity. It may also get more brass than you wanted. By focusing the mics at the strings, with the brass coming in, it gives the recording a lovely depth of field.

"I found that when the two mics work, you can hear the difference between where the first horn and the second and the third is, with the first one being slightly left of center. The second one would be left of that, and the third one being left of the second. It gives a wonderful depth and spread.

"I once heard a CD where the horns sounded like they were not playing together at all with the orchestra. It was a recording where all these multiple microphones were used. Every one of them came at a different time factor, so that what actually happened was that it sounded like a badly performing orchestra. Actually, it was because of the lack of clarity that was created by all of this leakage. You were hearing the instruments coming to the picture all at different times. The problem wasn't the orchestra. It was the miking process."

Though many engineers still favor analog for recording, Graham feels that digital is more than fine and just requires a little re-thinking as concerns mic placement to achieve a warm sound. "Digital is a cleaner medium than analog, and now that we're using 20-bit, there is a noticeable difference. Analog is like a window that has a little bit of haze on it. When you put it to digital, you clean up that window and it gets to be a little too crisp and sharp. We then learned that we had to change our techniques a little bit. What we had to do, when we started moving from analog to digital, was to not mic as close. As a result, the air did some of the softening or mellowing that analog would do."

TONY VISCONTI

A record producer for nearly three decades, Tony Visconti was born in New York City, but his career was nurtured in the UK beginning in 1967. Visconti is the rare studio person who is equally at ease producing or engineering, arranging for orchestral instruments or even working as a back-up singer.

His credits include ten David Bowie albums, ten T. Rex records, three Thin Lizzy discs and three by the Moody Blues. He's written orchestrations for many of the groups he's produced, as well as for others—Paul McCartney's *Band on the Run* is just one example.

"Recording strings is a huge subject. It must be looked at as both a recording technique and a writing technique. I heard a string quintet sound enormous at Landsdowne Studios in London in the late '60s. I asked Harry the engineer how he managed to make them sound so big and he humbly replied, 'It's in the writing, mate!' That was probably the biggest lesson I've ever learned about recording and writing for strings. I've also heard big-budget string sections sound small and MIDI-like due to the unimaginative writing of the novice arranger. I also must stay with strings in the pop/rock context because there are certain things that apply here only and not in the classical world, of which I have very little experience.

"The violin family—that includes the viola, cello and bass—have a rich cluster of overtones that make them sound the way they do, and there are many ways of enhancing these overtones in recording. When used in a pop context, the huge hall and sparse mic technique of the classical world won't work with the tight precision of a rock track. Especially nowadays, when we're getting fanatical if our MIDI strings are two ticks off center. The reverberation of a huge room is often anti-tightness. Recently I did some live recording in a large London room with a singer, also playing piano, accompanied by a 40-piece, scaled-down symphony orchestra. When I counted in I had to leave off the number 'four' because the reverberation of my voice leaked onto the first beat of the song. I know it's every engineer's dream to record strings in a huge room, but no matter how huge the room is, artificial reverb is added in the mix anyway. Recording pop or rock is not reality! You could never record a loud rock band and a moderate size string section in the same room anyway.

"Ideally I like to work with a small section consisting of minimally 12 violins, four violas, three celli and a double bass. I like them to be in a room that would fit about double that number of players, with a ceiling no lower than 12 feet. I have worked with the same size ensemble in smaller rooms with great results too, because the reverb is always added in the mix anyway. But the dimensions of the room help round out the lower frequencies of the instruments. I like to close-mike to get the sound of the bow on the string. If a string section is playing to a rock track you must hear that rosin! So I will have one mic per two players for violins and violas, always top-quality condenser mics. For the celli and bass, I prefer one mic each, and aimed at one 'F' hole and where the bow touches the strings. Then I place a stereo pair above the entire ensemble to catch the warmth of the ensemble, and I use these mics about 50 percent and the spot mics 50 percent in the mix. If I record a smaller group I use more or less the same mics. A string quartet gets one mic each, plus the stereo pair for the ensemble sound. If I had a larger section I'd use one mic per four violins, etc. Of course with lots of mics a phase check should be carefully made—it's the same problem as when you are miking a large drum kit.

"In a perfect world I love to record each section on a separate track, divid-

ing the violins into two sections, and the ambience on separate tracks, too. Often I have fewer tracks than that, and sometimes only two tracks are left for the entire string section. Then it's a careful balancing act with more lower strings in the balance than what appears to be normal. When using strings with a rock track, there is a lot of competition in the low end and the low strings seem to disappear.

"I don't approach strings as something from another, more aesthetic world. If strings are to go over a tough rock track then they must be recorded tough. I've seen many a cool rock engineer intimidated by the sight of a room full of middle-aged players and $30,000,000 worth of Stradavari. If the track is loud and raucous then the strings should be recorded likewise. It's also quite appropriate to record with a fair amount of compression so that the energy matches that of the guitars and bass, which are also stringed instruments.

"Headphones also changed the way strings are recorded. When I first started writing for strings in London, the players refused headphones. I had to wear them and conduct furiously to keep them in time. Often we had to play the backing track in the room through a speaker for them, which would lead to leakage problems, which was sometimes a blessing on the mix, but often not! In the early '70s, the younger string players knew that their elders were always chronically behind the beat, and so they 'invented' the technique of listening to half a headphone—the right ear is listening to the track and the left ear to the fiddle.

"A final word on professionalism when recording strings: A room full of string players is very, very expensive. Each player is being paid hundreds for three hours' work. You should set up and test all mics and headphones the night before or at least two hours before the session. String players usually start arriving an hour before the session time, and you don't want to be setting up with 20 temperamental musicians underfoot (not to mention the odd violin, which is very easy to step on). With mic stands, allow room for bowing (the right elbow). Give each two players one mic stand to share. Check for squeaky chairs and replace them! Because you have to get a sound very quickly on such an expensive section, ask every section to play the loudest section of the arrangement several times. In other words, if you are using three mics for six first violins, have each pair of players play separately from the other four. When your mic levels and EQ are achieved—EQ the first mic and match the other two with the same settings—ask them all to play at once to check that the three mics are truly capturing six musicians equally. These are mixed to one track, so get it right! Then do the same with the rest of the players. This should take about ten minutes tops, and then you can get on with the pleasures of recording 20 highly trained experts!" ■

Rick Clark is a Nashville-based writer, producer, musician and barbecue connoisseur.

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Michael Cooper, *Electronic Musician*, March 1996

Excerpted from *"Audio-Technica ATH-M40 & ATH-D40"*

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Paul White, *Sound On Sound*, August 1995

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George Petersen, *Mix*, May 1996

Excerpted from *"Audio-Technica Studiophones"*

"The D40 and M40 performed well with an excellent, clean and powerful sound, with spacious and detailed stereo imaging...The headphones are rated at a maximum input power of 1,600 mW at 1 kHz, delivering up to a brain-liquidizing SPL of 132 dB."

Christopher Holder, *Audio Media*, January 1996

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DSP engine responsible for the exceptional sonic qualities found in today's ProR3 and REV500. Costing thousands less than comparable units, the ProR3 ($1599) and the REV500 ($500) also feature 32-bit digital sound processing power coupled with high performance 20-bit A/D and D/A converters. Amazingly, both Yamaha reverberators were developed for professional use and provide tremendous digital signal processing power and flexibility at affordable price points! Could the same be true of their Atlantian prototype?

"There's no doubt that the continent was pulverized by a powerful reverberation," said Gourd. "We believe a built-in sound source like that found in the REV500's audition button was the cause of the blast. A flick of the audition button—which triggers its internal drum sounds and allows the user to preview reverb settings—coupled with an overwhelmingly-powerful setting and there was nothing left of Atlantis. However, there was a record of the event: reverberations of 'I Will Survive' echoing for centuries on dance floors across the globe." Hopefully, modern civilization will learn from the mistakes of the past and adhere to the historic teaching: "disco sucks."

Rev500

AMAZON JUNGLE TRIBE WORSHIPS YAMAHA O3D!

IQUITOS, Peru— Members of an Amazon jungle tribe have worshiped the Yamaha O3D Digital Mixing Console for centuries— even though they've never seen one and it wasn't even invented until 1996!

"This is one of the most primitive civilizations on earth, but they know more about the Yamaha O3D than the manufacturers themselves," revealed Swiss anthropologist Bettina Streudelmeister. Even more astounding, these primal tribesmen insist that their knowledge comes from the stars even before the O3D has come to America!

Streudelmeister based her findings on a recent expedition to a remote Peruvian rainforest. As she approached a village of thatched dwellings, she saw natives wearing masks, clothing and hand-drawn tattoos depicting the 03D's automated faders and digital signal processors.

"Even their pottery was emblazoned with pictographs of the digital and analog aux inputs and outputs, including 4 busses and 4 digital aux sends, direct outputs and 26 inputs that make the 03D so perfect for project studios and post-production work," said Streudelmeister. What's more, she saw half-naked savages dancing around a totem pole that represented the digital dynamics, effects, parametric 4-band EQ and surround sound panning on every channel. "They communicated to me through an elaborate dance that the 03D is identical to the Yamaha 02R Digital Recording Console in function but they prefer the 03D because it fits in their budget and in their cramped dwellings," said Streudelmeister. "What's more, they can use the 03D faders and keys to control function in their hard disk recorders, effects and MIDI systems."

"We can only guess who or what informed them about this digital mixing console long before the scientific world learned of its existence," declared Streudelmeister. In the meantime, the happy natives are mixing up their tribal music for an upcoming CD with the Yamaha O3D.

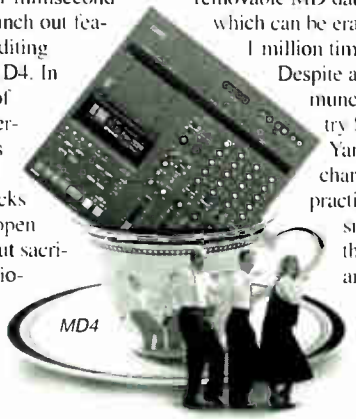
INVISIBLE MUNCHKINS INHABIT THE YAMAHA MD4

Yamaha Pro Audio technology is a total crock! That's the word from labor officials who claim the Yamaha MD4 Multitrack MD Recorder is really operated by a tiny team of invisible munchkins that live and work inside the digital four-track recorder!

Thanks to a new government X-Ray machine, the hidden truth behind this miniature sweatshop has been exposed. "These munchkins are responsible for the unit's powerful editing capabilities," states the report. "Yamaha's boast of superior audio fidelity and advanced editing/programming options is simply a scam."

According to the findings, there's no possible way that Yamaha technology could create the 11 millisecond accurate punch in/ punch out features and advanced editing components of the MD4. In reality, it's the crew of overworked and underpaid mini-menehunes that enable the MD4 to bounce all four tracks to a single track (no open track required) without sacrificing any of the studio-quality audio. In fact, no matter how much bouncing they accomplish, the perfectionist mini-men always keep the audio quality virtually indistinguishable from CD.

What's more, says a government spokesman, it's the munchkins who maintain cue-lists and a table of contents so users can instantly jump anywhere in the song for efficient locating and editing. And once again it's the munchkins, not Yamaha, that move, copy or delete parts of songs anywhere at the whim of the user. They've been known to "copy over" bad versions of a chorus with previously recorded good versions without harming the original data. And if that's not enough, these poor little creatures also assist in storing the music on small (yes, small) removable MD data optical discs, which can be erased and re-recorded 1 million times.



Despite all their work, the munchkins are paid a paltry $1199 by Yamaha. Yamaha denies any charges of unfair labor practices, stating "It's a small price to pay for the sonic performance and editing features not possible with cassette multitrack recorders."

Tips For Sending Your Teen To College

Your teen can benefit from a college survival kit that has all the essentials, including a Yamaha acoustic guitar startup package and a case of macaroni and cheese, according to the Manongahala Institute of Dining Commons Administrators. "This is a great guitar kit for aspiring folkies. It comes complete with the F310 acoustic guitar, a tuner, strings, picks, polish, cloth and a beginner's guide to playing guitar," says the Institute.

"The macaroni provides nourishment for the body, the guitar provides nourishment for the soul." says one happy, strumming freshman.

ATLANTIS DESTROYED BY POWERFUL REVERBS

The lost continent of Atlantis was blown into oblivion at the hands of its own people! So says historian Alberto Gourd, who has solved one of mankind's most fascinating mysteries— the disappearance of one of the greatest civilizations of all time.

"Atlantis was a superior culture with more technology than we'll ever see in our century," claims Gourd. "Among their greatest inventions was a powerful digital reverberator that bears a shocking resemblance to the modern Yamaha ProR3 and REV500!" "Unfortunately," says Gourd, "these sophisticated devices were used to create music of mass destruction, ultimately sinking an entire continent with a tidal wave of sound."

Pro R3

Gourd believes that a massive disco inferno raged through the Atlantian metropolis, due in part to a secret DSP chip used to create reverb of the highest-possible resolution and smooth, noise-free decay. Incredibly, this is the same

NATIONAL **The Inquisitioner**

Nobody Expects The Inquisitioner. Vol.29 Issue 1392

SYNTHESIZER CAUSES EARTHQUAKE!

QY700

Seismologists at the Underground Laboratory (UGLY) in Placid, CA have pinpointed the epicenter of a 6.0 earthquake that recently rattled Southern California: the second floor apartment of Wally Zaputo, a musician from Faulten, CA. "I was just playing a demo from the Yamaha QY700 when the earth started shaking like mad," says Zaputo.

"The demo caused the earthquake," confirmed Sandy Sandusky, UGLY scientist. "We recreated the entire episode in our labs. A new QY700 voice—called SINEBASS—shook our subwoofer halfway across the room and then the earth started to rumble." Although the demo is available at Yamaha dealers who stock the QY700, Sandusky strongly urges everyone to keep well away from it. "The power of the sound is unbelievable. We don't want anyone to get hurt."

The QY700 itself is a groundbreaking product, according to music expert Felix Overture. "It's a 48-track MIDI production studio in a box, complete with 480-voice XG tone generator, a 110,000 note sequencer, 3,800 editable musical "clip art" phrases, a huge backlit LCD screen and a micro-keyboard. There's nothing like it. It's amazingly powerful. But really, this should shock no one."

Overture told The Inquisitioner that Yamaha has been building up to this for years. "They've always done an excellent job of integrating tone generators and sequencers into tiny music production tools, like the QY10 and QY20, which have evolved into the hand held QY22. The QY300, which is still a powerful GM music production studio in its own right, was the precursor to the QY700, which has full XG implementation."

Meanwhile, UGLY has petitioned the President to ban the SINEBASS voice from the United States. "It poses a clear and present danger to the population. Who knows how many more earthquakes it might start," says Sandusky.

USE READER SERVICE CARD FOR MORE INFO

Musicians Give Top 10 Reasons They Love Yamaha Tone Generator

Since its introduction, the Yamaha VL70m virtual acoustic tone generator has become an enormously popular musical tool with our readers. In a special poll, The Inquisitioner has uncovered the top 10 reasons why.

VL70m

10) It sounds better than blowing on a baloney sandwich

9) Women dig it

8) Other musicians hate you for it

7) It weighs less than a tuba

6) It's gold and black, very stylish

5) It fits in a half-rack space or a bread box

4) It can be played from a keyboard with a breath controller, from a wind controller, from a guitar with a MIDI converter or from a gorilla-to-MIDI converter*

3) It has a big display with lots of neat pictures

2) It has a lot of buttons that helps you do things

1) It's a virtual acoustic tone generator so it uses computer models of instruments instead of samples for true acoustic sound; It's a melodic lead instrument so your solos smoke; you can double up to 326 times in one session without lugging a truck full of instruments; it's XG compatible and you can invent your own "acoustic" instruments using editing software and your Macintosh™ or Windows™ based computer.

*Gorilla requires special accessories

Forensic Audio

Unraveling Sonic Secrets

Tom Owens, Owl Investigations

The "black box" flight recorder box, which contains the cockpit voice recorder (notice it is not black), and the panel containing the cockpit area microphone

The voice recorder is housed in protective layers inside the recorder box, shown unassembled here.

A cockpit voice recorder box, damaged in a crash

As professional audio engineers, we are (one hopes) accustomed to working with recordings that have a relatively high signal-to-noise ratio, wide dynamic range and flat frequency response. But as any forensic audio engineer will gladly tell you, all recordings are not created equal. In fact, many are poorly made, crudely altered or downright unlistenable, and that's exactly how forensic audio engineers like them.

Unless you or a client has happened upon a cassette recording that sounds suspiciously like it has been altered, a "black box" that was salvaged from the charred wreckage of an airplane crash or a garbled microcassette that proves the butler did it, you may have never heard of these heroic engineers, or about the sonic miracles they pull off.

by Evan Ambinder

Forensic audio is the scientific examination and preparation of recordings so that they are suitable for discussion in a court of law. The field is usually broken into four areas: voice identification, which involves examining a voice recording in order to confirm or negate the speaker's identity; audibility analysis, which concerns the reconstruction of an aural sequence of events; tape authentication, which is the physical and electrical inspection of a tape in order to determine whether the recording is the original or has been edited, copied or tampered with; and tape enhancement, which entails applying various signal processors in order to improve a recording's intelligibility. All these processes are performed by both private forensic audio engineers—who cater to attorneys, corporations and private individuals—and government agencies like the FBI, who service both their own and other law enforcement organizations. Private forensic engineers were interviewed for this article.

Audio Forensics Center's Jack Freytag at work

TRICKY DICK AND THE GERMANS

Many people were introduced to forensic audio in 1974 when Judge John J. Sirica asked scientists Richard Bolt, Franklin Cooper, James Flanagan, John McKnight, Thomas Stockham and Mark Weiss to determine how and to what degree a recording of then-President Richard Nixon had been altered. On one tape requested by the Watergate committee, an 18½-minute gap of silence was viewed suspiciously. After several months of conducting tape authentication tests, the panel concluded that though most of the original tape recording was made on a Sony 800B open-reel recorder and displayed no signs of tampering, the 18½ minutes of silence were probably induced by several over-recordings made with a Uher 5000 tape recorder, implying that the tape had been tampered with. Nixon's secretary, Rosemary Woods, suggested that perhaps she had accidentally recorded over that part of the tape, but nothing was ever proven conclusively one way or another. Still, the public was impressed with the panel's investigation from a technical standpoint (not to mention a political one).

But this was not the first time forensic audio procedures had been employed. As U.S. troops stormed onto the European continent during World War II, army intelligence needed help in determining whether the voices they intercepted over the airwaves were those of actual German officers discussing troop movements. Observing that each person has distinct speech mannerisms due to the tremolo of their voice and the placement of their teeth, lips, jaw and tongue, Bell Labs invented the world's first forensic audio device, the spectrograph. The spectrograph works under the premise that if a recorded phrase can be separated into its phonetic components, the speaker can be identified by matching his or her phonetic components with those of the recorded speaker. To obtain these components, the spectrograph records the vibrations of the speaker's vocal chords, measures their time, energy and frequency, and graphically displays them in formants.

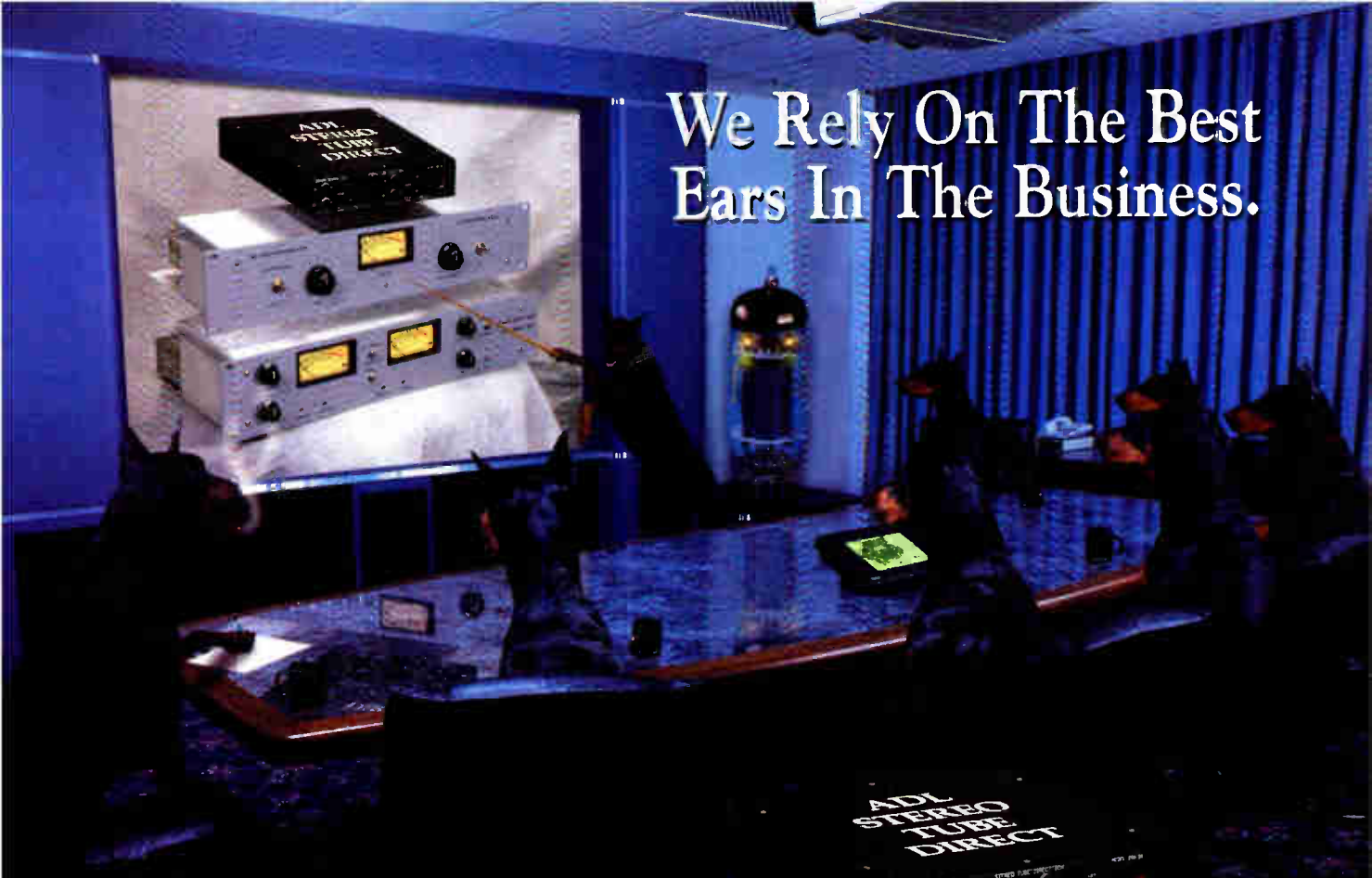
"You usually get two to three formants," explains Tom Owen, president of Owl Investigations, a New York-based forensic audio and video firm. "Because the human voice is harmonic, the first formant is the fundamental frequency, the second formant is the first harmonic, and so on using narrow-band analysis." Bell Labs' spectrograph produced black-and-white spectrograms by retrieving the sound source off of a tape loop, performing frequency analysis with a 300Hz wideband filter (to make the voice look visually intelligible), and printing the resulting spectrogram, or "voice print," on a thermal printer. Today's digitally based units, like the Kay-Elemetrics DSP 5500 and Computer Speech Lab, extract sound files off of computer hard drives; have variable bandpass filters; produce more detailed spectral, pitch, amplitude and sibilance information; and display formants in color. However, many forensic audio engineers still like to use analog spectrographs that are closely modeled after the original Bell Labs unit because of the equipment's ability to produce higher-resolution print-outs than those made from a standard laser printer.

Owen first got into spectrographs in the early 1980s while working at Lincoln Center's Rodgers & Hammerstein Archive of Recorded Sound. "I was doing historical re-issues for the Metropolitan Opera and was using voice print technology to establish who was speaking and singing on certain records we had. Then the New York City Police asked me to teach them how to enhance the intelligibility of a tape since I had been doing a lot of cylinder enhancement work that involved mostly the spoken word." By 1986, Owen was certified by the International Association for Identification (IAI) to be a voice ID examiner. (That same year Owen was co-nominated for two Grammys for his restoration work on "The Mapleson Cylinders," a collection of early 1900 Metropolitan Opera recordings.)

In 1989, Owen left Lincoln Center to devote himself full-time to performing voice identification, tape authentication, and tape enhancement for lawyers, business executives and law enforcement officials. Today, he uses a Voice Identification V700 analog spectrograph and the Kay-Elemetrics DSP 5500 and CSL to produce voice prints. And, like most forensic audio engineers, he also uses a digital audio workstation—Sound Tools II running on a souped-up Macintosh IIx—to examine waveforms and facilitate the transcription of recordings, as well as outboard devices like the Hewlett-Packard 3561A for FFT analysis.

Because of the highly complex nature of the human voice, a voice indentifier needs to have proper training in order to produce and interpret a spectrogram accurately. "Your voice varies from day to day with stress, health and one's physical condition, as well as the recording equipment used," notes Jack Freytag, managing director of San Francisco's Audio Forensics Center, and an acoustical consultant and expert witness in acoustics for more than 20 years. To compensate for such discrepancies, Freytag, who does not perform voice identification but does use a spectrograph for procedures such as breaking out the phonetics of speech, takes several samples of a subject's voice recorded at different times and compares them to the voice in a recording.

The Audio Forensics Center, which services criminal defense attorneys,



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public defenders and various government agencies, was started by Bernie Krause, the well-known nature recordist and musician, in 1984 and was bought out by acoustical consulting firm Charles M. Salter Associates three years ago. A third of the forensic audio jobs performed there are tape authentications, while most others involve enhancing tape recordings or creating acoustical simulations for audibility analysis cases. "These are conducted to determine if specific auditory information might have been heard by a person with average hearing ability at a particular time," Freytag says. "Since audibility always involves a signal-to-noise assessment, information may be readily heard in a quiet environment which would be indiscernible in a louder environment. The issue is whether the information in question was 'sound masked' by the background noise.

"I had a murder case where the police could not reliably establish the correct time of death. They alleged that this guy had shot his wife, ransacked their house to make it look like it was a robbery and then went off to the airport. A witness said she was in the area at the alleged time and heard two gun shots, so the question was 'Could the shots have been heard nearly a mile away?' We checked the weather report, got the same type of weapon that was allegedly used, set up an audibility simulation by comparing the sound of the gun shot [recorded on DAT at the same time of night and spot where the witness was located] relative to the background noise of the trees and wind, the temperature and humidity on the night of the murder, and concluded that the gunshots could have been heard."

AUTHENTIC, MY DEAR WATSON?

While voice and audibility analyzers primarily examine the waveform components of a recording, tape authenticators also look for electronic signatures and physical anomalies on the tape to determine if the recording is the original, was overdubbed or edited. Every time you make an analog recording, the switching on and off of the tape machine's bias signal, as well as the activation and deactivation of its electromagnetic heads, leave electronic stop/start signatures on the tape. These signatures, which are the same distance apart as the record/play and erase heads, become visible when the tape is magnetically developed with ferrofluid and examined under a microscope (they look like electronic spikes). If the start/stop signatures are close to other stop/start signatures, evidence of an over-recording exists.

Tape authenticators also use magnetic tape developing methods to identify which model tape recorder the original recording was made on and approximately when. Since head spacings vary with tape machine models and year of manufacture, a recording can be dated no earlier than a certain date by measuring the space between both heads' start and stop signatures and verifying when that type of head assembly was first produced.

One of the first forensic audio engineers to use magnetic tape developing for tape authentication was forensic specialist Anthony Pellicano. President of Forensic Audio Lab Ltd. in Los Angeles, Pellicano has been authenticating and enhancing tape recordings for law enforcement officials and private individuals for 25 years. "Telephone answering tapes are the biggest pains in the ass because they're used over and over again, and there's little oxide left on the tape, which makes it hard to develop those signatures," he says. "Also, if the person

doesn't erase the tape each day, you get layers [of recordings]. Sometimes you are able to discern what's on the tape, and sometimes you aren't."

Pellicano, who has worked on tape recordings of such well-known defendants as O.J. Simpson and John Delorean, has been able to recover audio that had been erased, and in some cases even recorded over. "If you take a recording made with recorder A and record over it on recorder B, you can still hear the recording made with recorder A on machine A," he says. "This is possible if the record and erase heads [of machine A] are not the same width as the heads in tape recorder B." When performing waveform analysis, Pellicano likes to use a proprietary program called Forensic Audio Sleuth, which he runs on a Macintosh 840 and 950. The program can also decode numbers being dialed on a touch-tone telephone. For tape enhancement, Pellicano relies on several digital enhancement filters made by Digital Audio Corporation, as well as an assortment of analog EQs and compressors.

In addition to magnetic tape developing, tape authenticators also perform other specialized procedures like physical inspection and even critical listening. For example, if they find that the tape's casing has been tampered with and/or the tape has been spliced (the reel contains inconsistent leader and/or tape stock) or even damaged (there is suspicious stretching or loss of oxide on the tape), evidence strongly suggests that the recording has been altered in some way. Tape authenticators might also note the tape's lot number, verify its date of manufacture with the tape maker and compare that to the alleged date of the recording to determine if the recording could have been made when claimed.

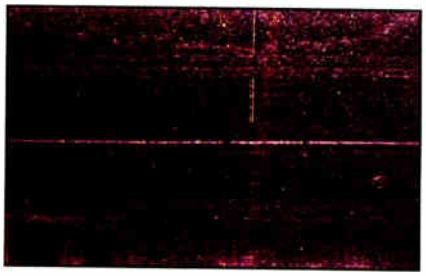
Airplane recording expert Mike McDermott

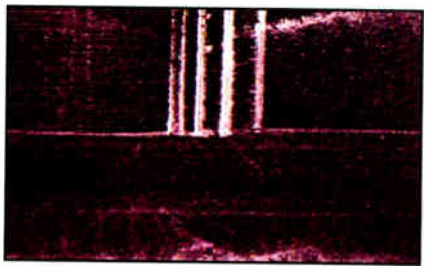
Of course, when it comes to discovering unnatural background sounds like dropouts, lack of reverberation in a closed-room recording, a 60Hz hum on a battery-operated tape recording or abrupt level changes in tape hiss—all of which strongly indicate that the recording has indeed been tampered with—tape authenticators swear by those aural wondertools on each side of their head. But with today's DAWs and the widespread availability of DAT recorders, can a trained tape authenticator discern whether or not a recording has been digitally edited? "You could fool a forensic expert who would normally look for a discontinuity in the background noise and phase shift at the point where the tape was spliced," notes AFC's Freytag. But, as Owl Investigations' Owen points out, "many copies of a recording are given to the prosecutor, the judge, the defense attorneys, etc., so an edited tape would soon be discovered."

One of Owen's most exciting tape authentication investigations to date

was for a certain Spanish singer embroiled in a copyright infringement dispute. "There was an individual who claimed that Julio Iglesias had stolen his song called 'Hey.' It was a love song that was a huge hit for Julio. This person claimed that he wrote it and sent it to CBS [Records], Julio or his producer. Julio's girlfriend came up with this tape, and they asked me to authenticate and date it. Now this tape was what I refer to as a 'drugstore tape.' No lot numbers, no screws. Pretty cheap tape. So I get this tape, and from my experience at Lincoln Center I know about the color of tape and generally what year it was made. Tape has two colors, one on the inside and one on the outside. During certain years, companies had certain colors based on their oxide formulation that they used on the inside and outside. BASF has a very unique oxide formulation; it's sort of a dirty brown, and that's what the tape looked like.

"My first test was to show that the tape was authentic, that there were original stop and start signatures, because there were about four or five tunes on this tape. If I could date this tape and predate the date that the individual allegedly sent it to CBS, that would be a big plus for Julio. Well, it turned out that the original start and stop signatures were there. I also looked at the design





Two prints of a magnetically developed strip of cassette tape produced from a video imaging printer. Above, the electronic signature of the record head; below, that of the erase head. The horizontal band delineates sides A and B of the tape.

of the tape and the oxide formulation, even to the chemical level, and conferred with BASF to determine that it had to have been made within a certain time frame, which predated the doctor's claim. In addition, when we got to court there were several women there, the most beautiful women you've ever seen in your life, who testified 'That was our song. Why, he played that for me in Spain'; 'Well, he played that for me in Italy,' and so on." Needless to say, Iglesias won the case thanks to the testimonies of Owen, other experts and Iglesias' numerous girlfriends.

MAYDAY, MAYDAY...

Every time an airplane goes down, the one thing you're bound to hear about, in addition to the casualties, is the "black box," which actually isn't black. "It's orange or yellow because those colors are easier to find in the wreckage," according to airplane recording expert Mike McDermott. "They're called 'black boxes' because they're often charred after an accident."

McDermott, president of Frank M. McDermott Ltd. (McLean, Va.), specializes in forensic audio analysis, enhancement, authentication and voice identification. He has been analyzing cockpit voice recordings, as well as air-to-ground recordings, for airlines and aircraft manufacturers for more than 15 years. "Usually, it's just a matter of enhancing the communications that took place, pulling out some of the background noises and determining a sequence of events leading up to an acci-

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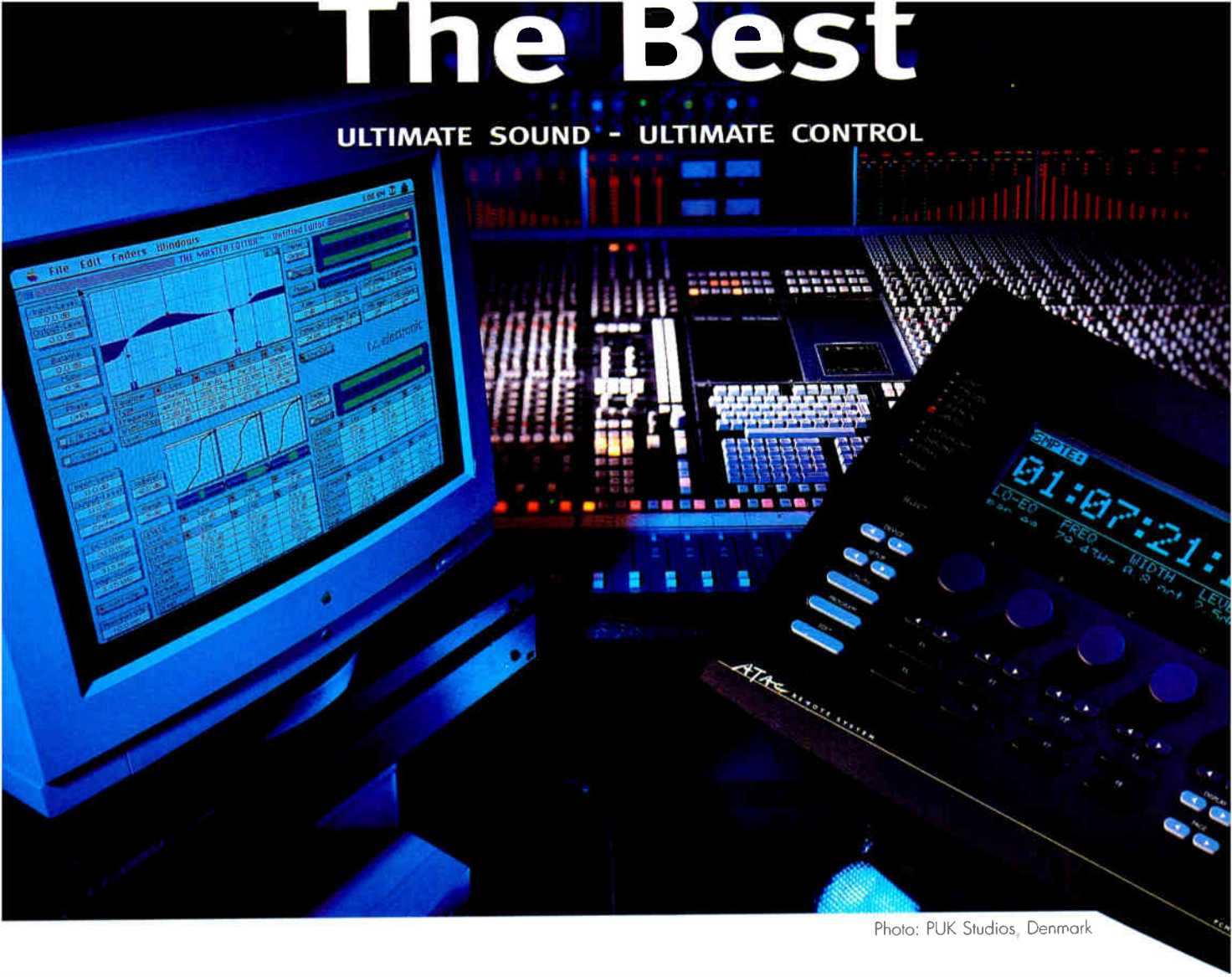

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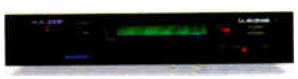

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dent. In some instances, if the pilot is keying his microphone and I have as little as a quarter of a second where he's not speaking, I can do a frequency analysis of the background noise in order to determine the engine speed, and when the landing gear horns and stall warning horns go off."

The Federal Aviation Administration (FAA) requires all major airlines to have cockpit voice recorders—the tape recorders that are housed securely inside the so-called black boxes—on board their airplanes so that the final minutes leading up to an aviation accident can be deciphered and reconstructed after an incident has occurred. "The actual recording unit is in the tail because statistically it is the portion of the aircraft that survives a crash more often than not, while the condenser microphone, VU meter, preamp, test button and, ironically enough, an erase button are housed in the cockpit."

The cockpit voice recorder, which records the sounds and conversations in the cockpit, as well as the radio calls going to and from the airplane, basically comes in two ¼-inch analog tape configurations: a 4-track, 4-channel recorder and an 8-track, 4-channel recorder, both of which record 30 minutes or more on a re-recordable tape loop. (Digital storage devices, which can record up to 100 hours, are becoming popular, but they are still very expensive.)

The 4-channel model, which is used in about 80% of all airplanes flying today, consists of a tape loop mechanism that pulls out the tape and re-records over it when it comes to an end, much like how an 8-track cassette player operates. The first channel records the captain's radio, the second records the flight engineer's radio or the P.A., the third records the cockpit area microphone, and the fourth records the first officer's radio.

Unfortunately, the FAA's audio specifications for cockpit voice recorders are hardly audiophile caliber: Recording speed is usually 1⅞ ips; the frequency response must go up to only 3.5 kHz for the radio channels and 5 kHz for the cockpit area microphone; the signal-to-noise ratio must be at least 45 dB; and the total harmonic distortion must be no more than 5%. On the other hand, these sonically challenged recorders, which are housed inside two titanium cases, are tougher than an SM-58. "The unit has to survive a 1,700 G-force impact, withstand a static crush force of 5,000 lbs. applied continuously for five minutes, survive an 1,100-degree Celsius fire for 30 minutes and take immersion in sea water at a depth of 20,000 feet for one hour," McDermott says. (Can your 3348 do that?) "Of course," he adds, "the only thing that has to survive is the tape."

McDermott aptly likens his craft to detective work. "There is a lot of information contained on these tapes that isn't readily apparent. Analysis and enhancement provide a very good record of not only the spoken word but also other sounds ranging from circuit breakers being popped to gun shots going off." For example, when USAir hired McDermott to determine how fast the pilot of flight 405—which crashed during takeoff at New York's LaGuardia Airport in 1993—had lifted the nose gear off of the ground, McDermott applied some decidedly Holmesian techniques. "When the weight is taken off of the nose gear, the strut, which is a hydraulic mechanism, drops to full extension with a thud. At the same time that this was happening, the pilots had the windshield wipers going, which were in a frequency range of maybe 50 to 100 Hz from where this thud was coming." Using his Kay-Elemetrics DSP 5500 and CSL to identify the thud's frequency range, and comparing the cockpit voice recording from

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flight 405 to his own cockpit DAT recordings of the same-model aircraft taking off and landing, McDermott was able to calculate the time between when the thud happened and when the stall warning horn went off, thereby determining how far and fast the pilot rotated the airplane.

A typical enhancement of the FAA air-to-ground communications recordings, like the one McDermott did for the crash of an Eastern Airlines DC-9, can employ a variety of signal processing techniques. "I attenuated the masking noise like static that occurred on either side of the vocal range [100 to 3.5k Hz]. If you have a lot of static at 4 to 6 kHz, you can chop it out and make the lower frequencies more intelligible. I also notched out tones like 60 Hz with its harmonics. Frequently the recorders don't give you a very flat frequency response so you have to boost or attenuate certain frequencies. I also used an adaptive filter to attenuate echoes and reverberations, which enhances intelligibility."

In his audio arsenal are various analog and digital processors, several custom audio tape decks configured specifically for maximizing the playback of cockpit voice recorder tapes, a TOA DP-0204 (which allows him to perform digital gain adjustment, compression, delay and parametric EQ), a digital audio workstation running SAW+ software (for frequency analysis and audio jogging), a Voice Identification Sound Spectograph 700 and a Kay-Elemetrics DSP 5500 and Computer Speech Lab. When McDermott needs to remove variable broad-band noise, he uses Digital Audio Corporation's (DAC) PCDF4096 cards, which contain an adaptive deconvolutional filter. Deconvolution is a process by which a high-order, digital adaptive filter analyzes the audio signal in real time to determine if repetitive or predictive signals are present and then subtracts them from the primary audio signal. DAC (Raleigh, N.C.) manufactures other high-end digital signal processors, as well as tape transcribers, but since they are one of only a handful of companies producing such sophisticated devices, their processors are expensive.

One of the most common problems that McDermott encounters with cockpit voice recordings involves the simple issue of microphone placement. "If you're trying to pick up the pilots' voices, you would like to have the mic placed in front of them at about mouth level, ideally at the base of the window between the pilots' seats. Unfortunately, the usual placement of the cockpit area microphone is on the ceiling, behind the pilots' heads." Luckily, the FAA recently began requiring pilots to wear microphone headsets like the ones telephone operators use.

SAY WHAT?

One of the more commonly performed forensic audio procedures is tape enhancement. Why? Because so many people, excluding professional audio engineers like you, of course, cannot make a decent recording. Tapes in dire need of enhancement are often recorded using induction coils attached to the back of a telephone handset, concealed body microphones and FM transmitters delivering a whopping 35 dB of dynamic range (not to mention a smooth 5kHz roll-off), telephone loggers that cram 64 tracks onto a 1-inch reel or microcassette recorders that, well, sound like microcassette recorders. When forensic audio engineers enhance these recordings, they usually encounter high-level background noise, a low signal-to-

noise ratio, improper microphone placement, poorly aligned heads, and/or recordings made on low batteries. "With noisy tapes, it will take a good listener a number of repetitions prior to understanding the contents. The goal of forensic enhancement is to reduce the number of times that a listener needs to play a tape in order to understand it," notes Gabe Wiener, director of New York's Quintessential Sound.

Wiener enhances microcassette, cassette and telephone log recordings for attorneys, executives, private individuals and media organizations. "We're dealing with electronically induced noises such as tape hiss, telephone line hum, rumble from the tape machine, and convolutional noises such as room reverberations, which are acoustically mixed in with the sound you wish to recover." Once they are enhanced, recordings are then used to produce transcripts and/or are played before a jury. However, your typical courtroom is likely to have speakers located in the ceiling, and more often than not, the room's acoustics, which most certainly were not foremost on the architect's mind, could make a pristinely enhanced tape recording sound unintelligible. To counteract this, tape enhancers like Mike McDermott often bring along a headphone system with enough headphones for the jury, judge, court reporter and lawyers when they testify.

Although they often use familiar tools like compressors and parametric equalizers, tape enhancers employ skills that are quite different from those required for music and sound production. "You learn to listen in a very different way," Wiener explains. "There are aspects of enhancement that require an understanding of the frequency range of the voice and the way in which humans listen to speech. For example, there are bands in the spectrum called 'critical bands' that provide cues to intelligibility, and these tend to vary based on the speaker's gender, age and range of voice...[Also] the vowel sounds are lower for men than women, and the resonance sounds, the sounds of the vocal chords, are lower in frequency, whereas the sounds of the fricatives and plosives of speech tend to fall in the higher frequencies, around 3 to 5 kHz. You need to balance these out so that the speech is intelligible."

Most tapes needing to be enhanced are either on cassette or microcassette. "The microcassette is a particularly bad format because the recorders have bad head assemblies which are not well-calibrated," Wiener explains. "There are very few tape players available for proper forensic playback...ones which enable you to adjust the gain structure of the output amplifier and the azimuth of the playback head. If the azimuth is misaligned on playback, you will loose your high frequencies."

Many recordings are of telephone conversations where the volume of the speaker on the other end is faint at best. "The infamous Nicole Brown Simpson tape we did for Fox TV is a classic example," Wiener recalls. "On that 911 telephone logger tape, you have the voice of the operator and Nicole Simpson. The voice they wanted to hear, of course, was O.J. Simpson standing across the room screaming. Now that tape [machine] probably logs 64 tracks on a 1-inch tape. Needless to say this is not a very high bandwidth. Next you have a telephone system which is carrying a bandwidth of 300 Hz to 3 kHz. Third, you have electrical noises induced all along the cir-

cuit of the telephone line and in the tape recorder's hardware. And then you have a near/far party situation where the voices of the two speakers on the phone [Nicole and the 911 operator] are quite loud, while O.J.'s voice at the other end of the room is distant and reverberant. We had to consider our options for equalization, compression [to compensate for the near/far party aspects] and deconvolution, or adaptive filtering. The idea was to push down the voices we didn't care about with EQ and then compress and de-convolve the audio we wanted in order to draw the listener to O.J.'s voice."

Wiener uses DAC's MAP-1 digital signal processor extensively to attenuate variable broad-band noise. "Its adaptive filter is perhaps a true equalizer in the classic sense of the word because its goal is to equalize the noise floor such that there are no rises in noise energy that are not your program." However, when it comes to broad-band, steady-state noises like tape hiss and thermal noise from a telephone line, Wiener will often employ CEDAR's DH-1 De-Hisser or Sonic Solutions' NoNoise.

Lest you think that tape enhancement is purely a serious and mundane business, McDermott recalls one woman who brought in a very important "unintelligible" microcasette recording and an abused-looking microcassette player. "I put it on the system that I usually play it back on. I turned it on and was scratching my head, saying, 'This sounds pretty good.' And she goes, 'That's great. You guys do great work!'" (Needless to say, proper playback equipment and technique can negate the need for enhancement procedures.) And Wiener remembers getting the type of recording that comes across a forensic audio engineer's desk sooner or later. "A jealous husband had put a microcasette recorder in between the mattress and the box spring in order to try to pin something on his wife. And then he asked us to get the bed spring sounds out. I regret to inform that bed springs are not the most removable sound in the world." ■

Evan Ambinder is a New York-based writer and engineer. *He would like to thank Tom Owen, Jack Freytag, Anthony Pellicano, Mike McDermott and Gabe Wiener for their help with this article. Special thanks to Bruce Koneig and his paper "Authentication of Forensic Audio Recordings."*

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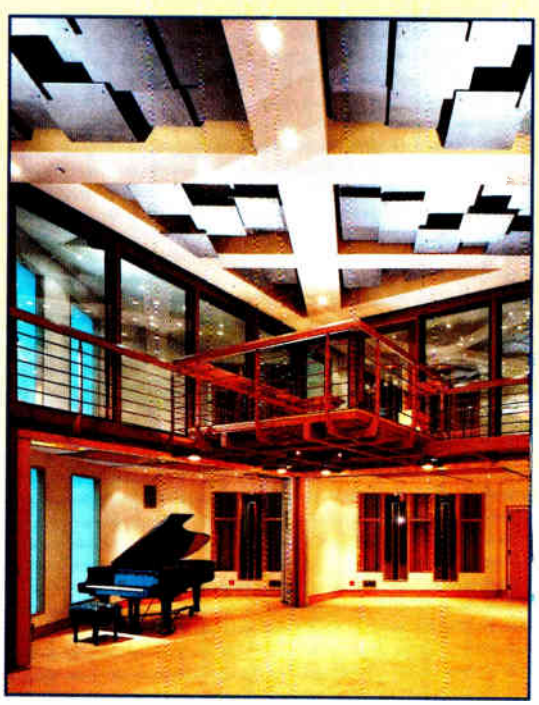
STARSTRUCK STUDIOS

Nashville Gets Another Major Facility

BY DAN DALEY

Nashville's studio community has been threatening to get serious for a while. Throughout the great growth spurt that began in 1990 and saw country music capture its highest ever market share—more than 16%—Nashville's studio environments tended to look more '80s than '90s. Even the albums of sales phenomenon Garth Brooks were recorded at producer Allen Reynolds' Jack's Tracks studio with a Quad 8 Coronado console in a studio designed back in 1985. Aside from proving that talent can take a modest level of technology a long way, Brooks' success also highlights the contrast between the success of the music and the local state of the technological art.

Nashville's studios have now started catching up with a vengeance. Late last year saw the construction of the first major new room in Nashville in over a decade, Masterfonics' Hidley-designed, SSL 9000 J-equipped The Tracking Room. Several major studios added significant upgrades, such as 16th Avenue Sound and Recording Arts with their new SSL G-Plus consoles; Sound Stage added its own 9000 J; Javelina, the former RCA Studios and possibly the largest of the Row's tracking rooms, upgraded with a new Neve Capricorn digital board. Ocean Way also has three new studios under construction. In addition, there is a rapidly growing base of smaller new facilities in and around the city, ranging from personal-use rooms on up. With its heavy concentration of rooms in so small a place, it's safe to say that no other city in the world has had as much significant studio-related activity as Nashville in the last five years. And now this...



A balcony juts out over the main recording room in The Gallery

RISING ON THE ROW

Starstruck Studios is the newest division of the Starstruck Entertainment empire owned by country singer Reba McEntire and husband/manager Narvel Blackstock, an empire that includes an eques-

Above: The Gallery control room diffusion wall; Right: The Cherry Room

trian farm, construction company, artist management company, booking agency, music publishing company and charter jet operation. Starstruck Studios sits in its own building, a smaller version of Starstruck Entertainment's equally new and impressive headquarters; the linked structures look like a hybrid of a hip church and a fashion-forward office building. But while the relative scale of the two granite-and-marble structures is clear, the 5,000-square-foot interior of the studio building seems as spacious as a structure twice its size, thanks to the vaulted atrium ceilings that it shares with the 24,000-square-foot headquarters.

The studio building actually houses two studios, known as The Gallery and The Pond. The larger of the two, The Gallery, is visually stunning, highlighted by a 9-foot-square balcony that juts out above the main recording room, and which in turn is connected to two isolation spaces (18x9 and 17x11) that ring the rear and side walls above the main recording room. When fully opened, the main room covers 1,077 square feet. Each

of those skybox-type iso booths has glass panels in its floor, providing sightlines with the rest of the room. (That's critical in Nashville, which remains a bastion of ensemble tracking.) The main floor has cantilevered interior walls that move on guide tracks and which, when extended, turn two areas of the main floor into air-tight, fully isolated recording spaces (18x9 and 17x11), giving The Gallery up to five sonically unique isolation spaces in addition to the spacious main room, plus the balcony.

The Slate Room

"The idea was to start with an acoustically brilliant room and then enhance it by making it as flexible as possible," explains Robert De La Garza, Starstruck Studios' manager, "and also to make sure that the ability of musicians in any part of this studio to see others in other parts would be unsurpassed." Other acoustical innovations include one-of-a-kind diffusors made of a combination of cherry wood and ceramic tile, which diffuse in three frequency ranges and maintain the studio's Southwestern U.S. motif. Other combinations of form and function include a deep red terra-cotta floor, which also provides the room with much of its resonance and reverberation characteristics, and a slate-tiled ceiling that also acts as a diffusor.

The Gallery's 21x22-foot control room has a new 72-input SSL 9000 J console equipped with Total Recall and Ultimation. Monitoring is via tri-amped Boxer T5 main monitors with custom crossovers, manufactured by Harris/Grant Associates subsidiary Coastal Acoustics, as well as a full complement of close-field monitors. The entire rear wall is a custom diffractal array made of etched glass, wood and ceramic tile, and is voiced for five frequency ranges.

The second studio, The Pond, has an identical control room in terms of size, design and technology. The Pond's three isolation spaces include the Cherry Room, a highly ambient area perfect for one of Starstruck's two hand-picked Yamaha Conservatory Grand pianos; the highly reflective Slate Room; and the Pond Room, a vocal iso space that overlooks a running waterworks in front of the building and also incorporates new electrically charged polarizing polymer "privacy" windows developed by 3M that go from clear to opaque at the touch of a button—part of the goal of providing all the studios with as much natural light as possible. A sculpted equestrian tableau, part of the building's front garden, is centered in front of the Pond's high-tech window.

The studios share a central machine room, equipped with two each of Sony 3348 digital multitracks, Studer A827 analog multitracks, Studer A820 2-track decks, Sony 9000 magneto-optical recorders and Otari DTR-90 timecode DATs. The machine room also contains the shared SSL DiskTrack hard disk recording system and a custom-designed-and-wired tieline system with D and DL connectors, allowing all studios, isolation spaces and control rooms to be linked to each other for sharing of audio, video and MIDI signals. Both studios also offer Starstruck's own cue system, developed by Starstruck's director of technical operations, Jim Rogers. The system is intended to complement the 9000 J's four-stereo-bus configuration, and it allows musicians to have eight mono and four stereo cue mixes at their fingertips.

Both studios also have digitally controlled, programmable, non-rheostat lighting systems, and the entire facility is wired with nearly 40 miles of oxygen-free Mogami cabling, coupled with a comprehensive "telescoped" star-type earth grounding system. All timecode cabling runs separately and is individually buffered by balanced distribution amplifiers, as are all video sync outputs. All cable runs are designed to be of minimal length between mic points and the console patchbays. In addition, 75-ohm cabling throughout is patchable to any combination of video talkback, video signal, video and word clock sync, and AES (unbalanced) digital audio, MADI and a range of other serial communications protocols. The addition of monitor, meter and tone generation capabilities in the machine room allows for alignment, calibration and maintenance from either studio or independently, as well as any combination of machine-to-machine dubbing.

THE DESIGN

Groundbreaking for Starstruck Studios was in 1994, under the direction of UK-

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DESIGN CONCEPT

Absolute Zero has been designed by audio guru Trevor Stride, the man behind the acclaimed Absolute 2 monitor.

Trevor has over 15 years of audio design experience behind him, working for a number of the industry's leading names, including SSL and Focusrite.

Trevor's design philosophy behind the Absolute Series is deceptively simple:

- *Any professional monitor should exhibit an even frequency response at high and low levels, on and off axis;*
- *it should have the most natural, uncoloured sound possible, whatever the cost;*
- *it should not cause listening fatigue (often arising from the inappropriate use of driver materials that produce spurious resonances that masking the monitor's true sound);*
- *it should be reliable.*

To satisfy these criteria, Trevor has scrutinised every element of Absolute Zero's design to optimise its performance.

THE INSIDE STORY

The Tweeter

Absolute Zero's tweeter is a custom-designed **catenary-profile soft dome unit** which exhibits all the extended high frequency characteristics of standard metal dome tweeters, without sharing any of their harshness. The tweeter is recessed to help protect it from surface impacts.

The Bass Driver

Absolute Zero uses a new 6.5"/170mm bass driver with a 30mm voice coil, providing extended bass response with high power handling capability.

The Waveguide

Absolute Zero's proprietary waveguide serves to "time-align" its tweeter with its bass driver, and to restrict the tweeter's dispersion to a 90° angle. This reduces diffraction and the risk of acoustic feedback, while focussing high frequency on-axis output to increase efficiency and power handling.

The Port

Many monitors utilise deep port designs positioned ***at the front*** of the cabinet, which can cause midrange response to vary by as much as 6dB. Absolute Zero's deep port is rear facing, guaranteeing midrange consistency.

The Cabinet

Many small cabinet speakers suffer from diffraction problems in the upper-mid frequencies caused by sharp vertical edges. In contrast, Absolute Zero's vertical edges are contoured to minimise diffraction from reflected sounds.

The Connectors

Signal information from an amplifier can be lost through cheap, poor quality connectors, reducing the effectiveness of even the most highly specified monitors. To overcome this problem, Absolute Zero uses only top-grade gold plated binding posts.

Custom Components

Many of Absolute Zero's components, including its tweeter and bass driver, are exclusive to Spirit to ensure its performance is not compromised by the use of off-the-shelf designs.

USING ABSOLUTE ZERO

The in-line driver array, with it's wideangle tweeter, means that Absolute Zero may be used horizontally or vertically. And, the rear-ported design not only makes for a smaller front baffle area but also allows the speaker to be used in mid-room positions.

Absolute Zero is rated at 95 Watts RMS but it's high quality design permits the use of more powerful amplifiers, albeit with caution. The sturdy, recessed binding posts will accept bare wires, 4mm 'banana' plugs or 6mm fork terminals.

CONTROLLED DISPERSION

Accurate monitoring is all about hearing a faithful rendition of your programme material. But sometimes your judgement can, quite literally, be 'colored' by the environment in which you're working.

Absolute Zero's controlled dispersion of high frequencies means you hear more of your music and less of your room.

Absolute Zero's tweeter is more efficient because it has a narrower dispersion angle and a higher on-axis output

SPECIFICATIONS

Power handling (Typical Music Signal Content):	95 Watts RMS
Frequency response (half space on axis):	55Hz - 18kHz, +1/-3dB
Impedance:	8 Ω nominal
Crossover (4th order Linkwitz-Riley):	2.5kHz
Sensitivity (half space):	9dB/2.83V/1m
Driver complement:	170mm LF 25mm HF
Dimensions (HxWxD):	320 × 230 × 290mm
	12.6 × 9 × 11.4 in
Weight:	11kg (24lbs) per pair

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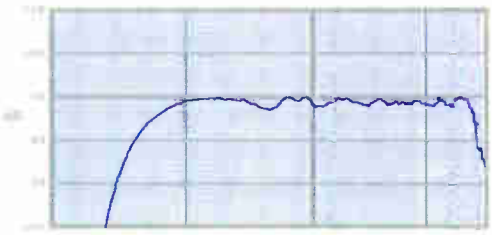

Absolute Zero at The Roundhouse, London

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TO: John

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Suggestions?

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based acoustical/architectural design firm Harris Grant Associates. "It originally started out as building one world-class room and a second room as a demo studio," recalls De La Garza. "But when we crunched the numbers, I said that it wasn't that much more money, relatively speaking, to go ahead and bring the second room up to the level of the first. Narvel liked the idea, so we went with that."

De La Garza was initially contacted about managing the studios by old friend and Starstruck COO Cliff Williamson. A former staff engineer at A&M in Los Angeles from 1980 to 1987, De La Garza made records for Lone Justice, Little Steven, Herb Alpert and The Carpenters before going independent and opening his own facility, Brainstorm Recording. Like many L.A. music industry people, De La Garza and his wife had long been considering a move to Nashville. He accepted the studio manager position and moved in late 1994, just as construction on the main building was getting under way.

De La Garza, whose constant smile and machine-gun conversational pace combines with his close-cropped hair to give one the impression of a very happy Marine drill instructor, was not surprised at how smoothly the entire construction process went. "We used Starstruck's construction company, and the only real issue that came up with them is that this was the first studio they had ever built," he says. "So they had to become familiar with concepts like a floating floor. Once they did, though, they went at it and it was fine. And we were staying spot-on to the original plans for the studios, so there were no major changes to sidetrack us."

(One interesting sidelight to the construction was a small but intense flap over the addition of a helicopter landing pad atop the main building. When word of the design addition leaked out in early 1995, after Starstruck applied for a zoning variance to allow helicopter operations to the building, it sparked a controversy that resulted in an evening meeting at Georgetown Masters, across the street from the construction site, of most of the major studio owners and managers from the Row area and beyond. There they voiced their concerns about what impact a very-high-SPL, very-low-frequency generator—another way of defining a helicopter—would have on neighboring recording sessions. The zoning application was withdrawn, and the heliport was redesigned into a roof garden. But most ironically, the meeting may have ultimately contributed to the formation of Nashville's first-ever comprehensive studio organization, NAPRS, which was formed earlier this year. In this case, a helicopter may have produced some very positive spin.)

Neil Grant, lead designer on the project, seems to have enjoyed designing a studio from the ground up, but nonetheless had space and other considerations to keep in mind. "When I arrived, I was looking at a hole in the ground," he recalls with a faint trace of his native Scottish burr. "We had to work around the fact that this was part of a very large, complex architectural plan that included the corporate headquarters. Some of the issues were not immediately apparent, such as how we would trade off space for the recording rooms versus the control rooms. And the fact that we were working with a crew that had never built a recording studio before." And, he adds with a laugh, "The fact that they were from Kentucky sometimes made it seem we needed a southern phrase book so the

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English could talk to the Americans."

Grant does, however, stress the fact that Blackstock had become intent on building a facility with truly international appeal, which translated to Grant as encompassing everything from a world-class design—"I don't like the idea of isolation booths, which are becoming less popular in Europe, and I wanted a design that offered as many combinations of space as possible"—to international sourcing of the interior materials. Beside the terra-cotta floor, ceramic wall and diffusor tiles imported from England, slate tiles came from Africa, upholstery fabrics from Italy and handmade paper screens from Japan. The tiles were sourced and designed by Grant's wife, Ginny, an artist; the technical installation was done by Harris Grant subsidiary Discrete Systems and supervised by that division's managing director, David Bell. "I had seen a number of Nashville rooms, and to me they were for the most part a series of dead boxes," Grant says. "This had to take the local design level to a much higher plane."

The rear wall diffusion design reflects Grant's disdain for bass trapping. "This design [the tiled diffusor] allows the energy to return and not be combined with the direct room signal," he explains. "The energy remains in the room, but it's summed constructively. And it's the first design using those materials that we've ever done, so it's rather unique."

De La Garza made the equipment choices. The major ones were the consoles, and he decided on the SSL 9000 J boards based on his belief that they would serve well as both tracking and mixing consoles, since both rooms would have the same console and projects could bounce between them as needed. He also liked the 9000 J's new automation approach, which borrows heavily from SSL's Axiom and Scenaria digital line. "It's gone through several updates since it was installed," De La Garza says, "but while the automation system is more sophisticated and complex, it's also easier to use once you get used to it. For instance, I really like the macros. And with so many of those desks coming into town, it also helps us interface with session overflow with other studios in Nashville."

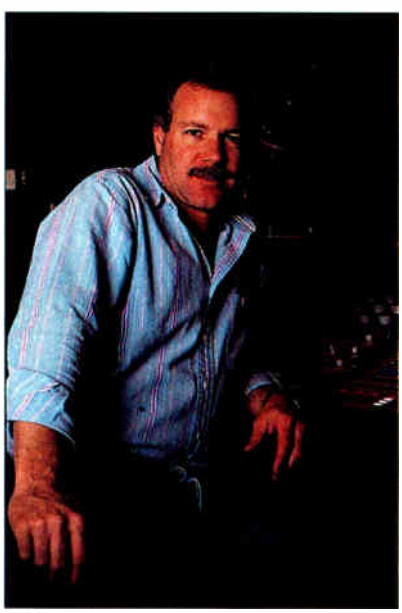
Starstruck's first session was for McEntire's new record and took place in May, before the official opening; there were no small-session shakedown cruises before the first major project. De La Garza says this underscores the fact that, in order to get the studio up and running as soon as possible, systems testing was going on even as it was under construction. De La Garza was also eager to catch a wave—he feels that there is growing demand for more sophisticated rooms. "[Starstruck] and the other studios coming online are going to be drawing an international client base, one that would not have been inclined to have considered using Nashville before," he observes. While McEntire's own projects, plus those of her publishing and management enterprises, are expected to provide a revenue base for the facilities, De La Garza points out that the studio operation, like all of Starstruck's other divisions, is expected to stand on its own financially, and that the studio will be booked by all clients, in-house and otherwise, on the same basis that all commercial facilities are booked. "But Nashville is at the point now where it is getting the kinds of facilities that will attract a whole new level of client," he says, "so it's going to be a whole new ball game in town." ■

A BIT Too Far?

Mastering Engineers on Getting

BY PHILIP DE LANCIE

Quick: What's the minimum bit resolution required of a digital audio system in order to capture the full dynamic range of the output of a good analog mixing console? In theory, the answer to that might be 12-bit (72 dB), 13-bit (78 dB) or at most 14-bit (84 dB) resolution. But in reality, of course, it has long been clear that 16-bit resolution is the minimum acceptable in order to maintain the integrity of the low-level components of an audio signal and to minimize the audibility of quantization noise. The answer to the next question, however, isn't quite so obvious: What is the *maximum* bit resolution required? Is there a point beyond which increased bit resolution yields absolutely no improvement in human perception of sound?



Steve Hall of Future Disc Systems, Hollywood

It is safe to say that the choice of 16-bit resolution for the Compact Disc was a good one at the time it was made—analog-to-digital (A/D) converters offering true 16-bit performance were hardly available—and continues to serve well for most program material under common listening conditions. But the professional audio community is not limited by the practical constraints affecting the design of audio systems for the average consumer. At the lower and middle levels of the recording industry, the widespread acceptance of DAT has cemented 16-bit as the norm for digital recording. The emphasis at many higher-end facilities, however, has been slowly shifting over the past several years toward a higher resolution—nominally, if not actually—of 20 or more bits.

For mastering houses, the trend toward higher resolutions has created a new set of questions. If the client has mixed to analog, should A/D conversion be at 16 bits or at 20 bits or more? And if master material is already in a high-resolution format, what is the best way to get it onto the 16-bit CD? Simple truncation—ignoring the lowest four bits, for instance, in a 20-bit recording—defeats the purpose of using a high-bit system in the first place. But the dither, noise shaping and other techniques now competing for recognition—most prominently Apogee's UV22, Pacific Microsonics' High Definition Compatible Digital (HDCD) and Sony's Super Bit Mapping (SBM)—are not necessarily without their own artifacts and tradeoffs.

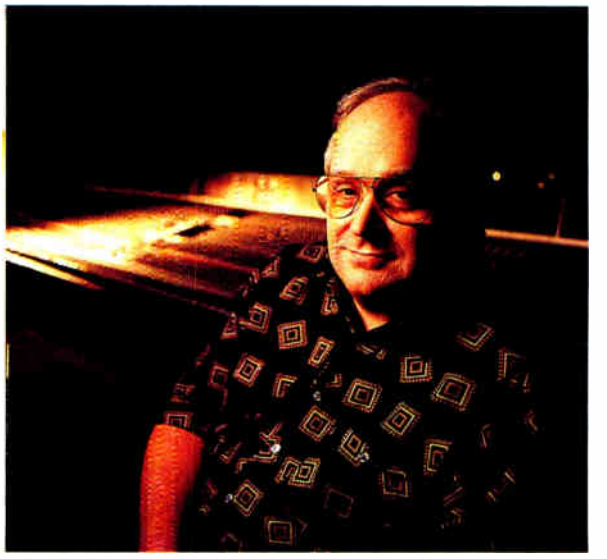
To help sort through these various options, and to get a feel for what works best in which situations, I enlisted the aid of three prominent mastering engineers with extensive experience in evaluating digital audio technology: Glenn Meadows of Nashville's Masterfonics, Steve Hall of Future Disc Systems in Hollywood and Ted Jensen of New York City's Sterling Sound.

Before we talk about specific systems for getting from high-resolution audio to 16-bit audio, give me some examples of why higher-bit-rate systems are advantageous even though the CD, the dominant release format, has 16-bit resolution.

High-Resolution Audio Onto CD

Meadows: To my mind, the ideal way to deal with digital audio is to retain as much resolution as you can as far down the chain as you can. It is best if you are able to mix to a high-resolution storage medium—either through an HDCD processor to get their A/D converters, or with an Apogee 20-bit A/D, or a Prism converter. If you are going to master and you decide to go back into the analog domain, you should use a high-resolution converter again. Every time we redither or truncate, or whatever we do to deal with staying at 16-bit, we limit the resolution, and it compounds down the line. So if we can keep the resolution at 20- or 24-bit until the point where we are forced to go to 16-bit to get to the consumer, the finished product is going to be better off—as well as closer to what was originally intended—and we are building a library of material that we will have waiting whenever a higher-resolution medium is available to the consumer.

I am getting tapes in now from a couple people in town with home studios who have the Yamaha 02R system. They are mixing 16-bit tracks from their ADATs or DA-88s, and they want to keep their full resolution even after signal processing and fades, so they are using the Rane PaqRat to make high-resolution 2-tracks on ADAT or DA-88, and they are bringing those in to master. And we also have done several projects here with our AT&T DISQ console, which has 24-bit output, where we mixed directly through a PaqRat to DA-88, and brought that into mastering. The difference between that and taking a 16-bit master of the same mix is amazing. You can hear in the finished CD which one came from the high-resolution mix source. You can hear the improved detail. But will it sell one more or one less record? No, because the people at home re-



Above: Glenn Meadows of Nashville's Masterfonics; Left: Ted Jensen of New York City's Sterling Sound

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late to the music.

One thing that I worry about at times is that we on the technical side tend to agonize over things that make no significant difference to the end-user. We can spend hours and hours deciding if we like UV22 or SBM or whatever the dither of the day may be, when in reality, if you played all the choices to the average person who is going to buy the music, they are going to say they don't hear any difference. As an industry, we tend to bow and ogle at the wall of technology, when the people we are trying to get the music to on the other side of that wall just look at the music.

That said, these systems are tools that mastering engineers should be using. To me, this is not something that is a choice where I am going to look at the client and say, "Do you want to use UV22 or nothing?" and if they want to use it we charge them extra because we had to buy the box. That's not an option. This is a tool that I need to use as part of what mastering is about and how it needs to be done properly in order to improve the product. Even if you are processing and staying 16-bit all the way down the line, you need to properly redither every time you do a fade.

Hall: For the most part, 16-bit offers a limited amount of resolution. We have been using A/D converters for five years or more that have up to 20 bits of resolution. The object is to get that resolution to dither down to a 16-bit format in a way that retains the advantage of converting from analog to digital at a higher bit rate. I absolutely think that the consumer hears that in the end product.

Jensen: In many cases the point is arguable that for most of the popular music out there now, the CD is not a bad carrier. But as a professional tool, I don't think 16-bit is enough. As you go stepping through the chain using 16 bits each time, you rapidly start losing dynamic range and resolution and other nice qualities of the sound. So I am completely opposed to sticking with 16-bit throughout the chain.

Any time you make a signal adjustment, you are going to end up with a long word. So if you reduce that to 16 bits and then go through another device and make another long word, you are going to be messing with the sound considerably. Even if you do it properly with dither at each stage, it can get kind of messy. And you usually have to go through at least a couple of stages. So I am firmly of the belief that if you want to mix digital you should try to get it onto a high-resolution medium and keep it at a high bit rate until the very end.

In cases when we get a high-resolution master in to work from, we make archives of our editing session from the Sonic System onto Exabyte tape in the high-resolution domain. So if the record companies ever want to go back and release their catalogs on DVD, we can go back to a 24-bit source, still keeping the session parameters intact, so we won't have to drag out a 16-bit copy to make the DVD disc from. So we are ready for the next step, whenever the labels decide to go that way.

Which of the bit resolution conversion systems have you used? How do you go about comparing the various options, and what impressions have you formed?

Meadows: All of these schemes—the HDCD, the UV22, the SBM—are methodologies for taking high-resolution audio back to 16 bits. And they all have their place. I compare the output of the analog tape machine to the A/D conversion process on a straight pass through the converter packages and back out. What I try to do is to find the converter package that is the most sonically neutral. You want to do the least amount of damage to whatever the client brings you.

We are a licensed HDCD facility; we have the Model One processor, as well as UV22 and the Harmonia Mundi/Daniel Weiss Engineering redither module. They all add some flavor of coloration. If you do a real critical A/B comparison, you are always going to hear a change in sound in going from high resolution back to 16-bit, no matter how you go back and forth. It becomes a matter of whether you like red apples or green apples. In a direct comparison with a 20-bit D/A you may say, "Gee, I wish I didn't have to do this," but the reality is that you have to get it back to 16-bit. And the people who buy the product aren't going to know the difference. They don't have the before and after to compare.

One unique thing about HDCD is that when you are taking a high-resolution signal back to 16-bit the processor allows you to do a function called DSP Gain to grab some of those extra dB of dynamic range and move them onto CD. Let's take the case of a classical recording where maybe once or twice there are peaks where there is no headroom left, but the average of the peaks is maybe at -4 dB. You can dial in 4 dB of gain, so the spots that went to -4 dB go to 0 dB, and you are capturing an extra 4 dB of dynamic range that you normally would be throwing away. And at the points that were going to 0 dB, they have a peak limiter/rollover compressor built into the system to keep you from doing hard clipping. When you play this back on a regular CD player, you will have the peak limiting, but in a typical situation those peaks are usually so short that you don't notice it. When you play the same thing back on an HDCD player, it uses DSP to move the gain back down and "unfold" the peak out of the top so you get the full dynamic range that you had, without the compression.

If we can keep the resolution at 20- or 24-bit until we are forced to go to 16-bit to get to the consumer, the finished product is going to be better off.

——Glenn Meadows

Hall: I am using the HDCD process now, which is up to 24-bit resolution, and their A/D converter runs at well over a 100kHz sample rate. And it is the most amazing-sounding thing I have ever heard going from analog to digital. We have a variety of different converters to listen to, which we would do at the start of a session. When a client comes in I can play their master straight through one of our high-bit A/D converters—I have Apogee, Manley, dB Technologies and Wadia—and right out through a 20-bit D/A. I can let them listen to that and then play them the 24-bit HDCD converter dithered down to 16-bits. I haven't had anybody yet turn down the HDCD. They are totally blown away. Most of the time, the difference is not subtle.

There is a licensing agreement for

HDCD requiring the client to use the HDCD logo on the end product in the same way that Dolby does for cassettes. If the client is not comfortable with doing that then I would use UV22. But that has only happened once, on a Japanese rock 'n' roll project where they didn't know if they could get HDCD clearance fast enough, so they decided not to use it.

We also have Sony SBM in software that runs on our Sonic System. I am not that excited about SBM, but Sony has come up with a newer system that is much improved from their original unit. You can get the Apogee process in software as well. But in my opinion, both of those processes are now kind of like antiques compared to what HDCD is doing. There is no comparison. You go through HDCD and you basically cannot tell the difference between the master tape and the 16-bit processed output. When you go through a device like that there is really no reason to use another system.

Jensen: We have done several HDCD projects. We have a system that lives here and we do use it, usually upon request. If people know about it and they want to use it, we are more than happy to accommodate them. But I don't try to push it to anybody. I think as a system it works quite well. Their A/D converter is actually quite good. What I am a little leery about is that there really are not that many HDCD decoders out there in consumer systems. So when you get one of those HDCD discs home, and you are not playing it back through their chip set, you can get the noise floor moving around a bit. It is not very drastic at all, and you are only going to really hear it either in an A/B comparison with the original or in some very critical sort of thing. I was doing one with just solo piano—very wide dynamics—and when he was playing very, very softly you could hear the room noise and the mic preamp hiss getting pushed around a little bit by the HDCD encoding. It didn't affect the music all that much, but you could hear the things behind it moving around.

We also have UV22 and the dB Technologies 3000S, and we occasionally have an SBM processor in here, though we don't own one. Anything after the first generation SBM is actually pretty good. UV22 is what we use the most, though. I think it is quite a good system.

How is your choice of conversion approach affected by the program material itself, both in terms of what type of music it is and what format it comes to you in? Have you seen any patterns emerge that would allow you to say that one system is usually better for a given type of project while another system usually works better for a different type?

Meadows: It's really hard to come up with a pattern. Ninety-five percent of what I master I try to keep in the digital domain completely. I'm not a believer in multiple conversions. The Daniel Weiss HMA mastering chain I use at the moment has 24-bit internal resolution, module to module. If the master comes in as 16-bit digital, I will input to the front of the HMA frame in 16-bit. Then anything that we do processingwise comes out the back end of the HMA in 24-bit resolution with all the details, and that is what I store on the hard drive of my SADiE editing system, so we stay at 24 bits for any further editing. Everything is archived from the SADiE onto Exabyte. Only at the end when we need to go back to 16 bits do we go through UV22, or HDCD if it's appropriate for the project.

> If you want to mix digital you should try to get it onto a high-resolution medium and keep it at a high bit rate until the very end.
>
> —Ted Jensen

When you are starting with an analog master, the conversion process the first time you come into the digital domain should be the highest resolution you can handle, period. You could say that if needed you could always remaster direct from the analog at a higher resolution down the road. But your analog tape may be degrading as it is stored. So then you have the analog tape's sonic qualities several years down the road compared with what it sounded like originally going through a 20-bit A/D converter.

Hall: It depends on the sound and direction of the project. Most of the time if the stuff comes in on a high-resolution digital format I will stay digital the whole way through, going through at 24-bit and then dithering down to 16. I used to use UV22, but now I am dithering down through HDCD, going in through the digital inputs.

If somebody comes in with a 16-bit DAT, the destruction has already been done, for the most part. They have already pretty well deteriorated the signal to its least usable form, as far as I am concerned. There are times when a DAT might sound better than analog to some people's ears, but those are few and far between—I am still a total advocate of mixing to analog half-inch. But if I take the DAT and go analog and do some tube compression or analog EQ, and then go into the 24-bit A/D converter on the HDCD, there may be some improvement, though not necessarily a lot. If it is pop or R&B, where a lot of stuff is samples or a lot of synth stuff, there is not much to be gained.

If the original master is analog, I would stay analog unless there is something I need to do that can't be done analog. For instance there is a Weiss de-esser that nothing in analog even comes close to. But most of the time I would do my processing, compression and EQ from analog in the analog domain. Then I convert to digital through HDCD 24-bit.

Jensen: The decision is certainly program-dependent, but it is hard to predict in advance which system you are going to like, both for the bit-rate boxes and the A/D converters. It is really a matter of having them all there and taking the time when the session is starting to see what direction you want to take things in. It is a little bit frustrating, because I would love to be able to say, "This is this type of musical content, so obviously we should use this signal chain." But it is unfortunately not that simple. You have to spend some time weeding through the combinations. And as you get more equipment, that time seems to get longer and longer. For example, dB Technologies has five different dither and noise shaping parameters. If you want to spend the time to listen to all those, plus the UV22, it starts adding up. ■

Philip De Lancie is a mastering engineer and multimedia designer at Fantasy Records in Berkeley, California.

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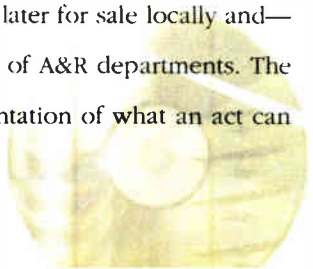
The New Masters Of Mastering

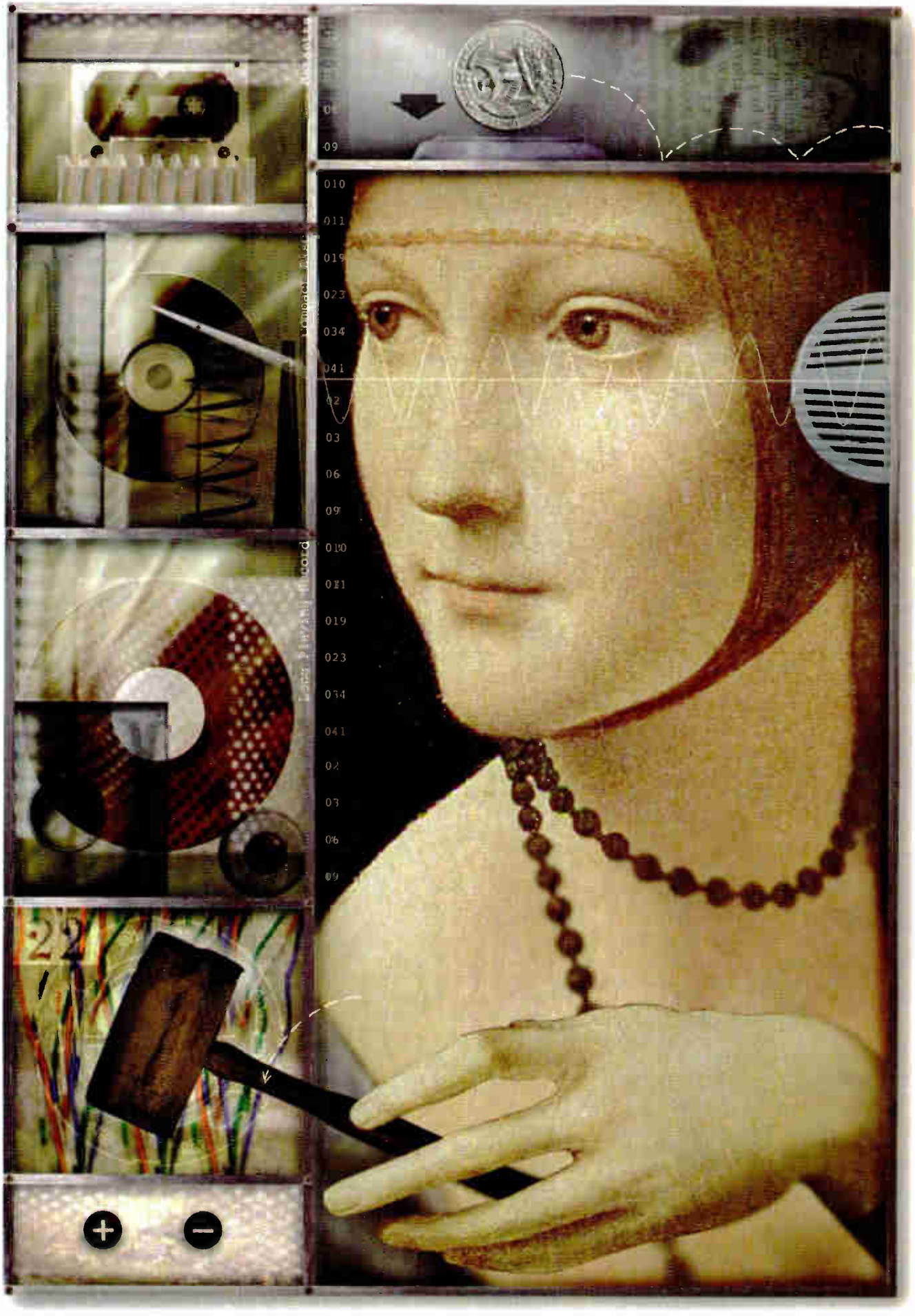
Budget Albums At Mid-Level Facilities

"There's an entire generation of people out there—musicians, producers, even some engineers—who don't know what mastering is," says Palmer Wood, partner in the two-year-old Griffin Mastering facility in Atlanta, commenting on yet another trend driven by the mass market success of low-cost recording technology.

We live in an age in which records costing $5,000 to produce are commonplace. Independent labels are proliferating, if not necessarily all flourishing, and are putting out a torrent of inexpensively made recordings created in home, personal and mid-level commercial studios. Bands whose horizons once ended on-stage at the local bar & grill are now routinely cutting full-length recordings on shoestring budgets, then sending the DAT mixes to brokered tape duplication and CD replication facilities by mail, getting 5,000 units back three weeks later for sale locally and—with a kiss for luck—onto the desks of A&R departments. The demo is no longer merely a representation of what an act can be—it's become the record itself.

BY DAN DALEY





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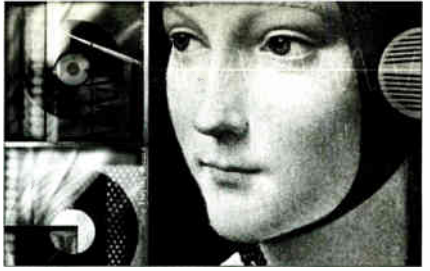


But to many who have acquired their basic professional audio knowledge from Tascam manuals (and that's not a slam—the PortaStudio manuals were pretty darn good about theory as well as practice), mastering is a mystery. Plenty of budget records have been made without the benefit of the mastering process in recent years. Butch Vig, producer of breakthrough records for Nirvana, Smashing Pumpkins and other major acts, spent a decade doing independent records in which budgets of $5,000 often seemed downright copious. All too often, mastering was a luxury that he had to forego.

"There just didn't seem to be any affordable mastering facilities at the time in the 1980s," Vig recalls. "I always wanted to master the records I did, but

> The demo is no longer merely a representation of an act— it's become the record itself.

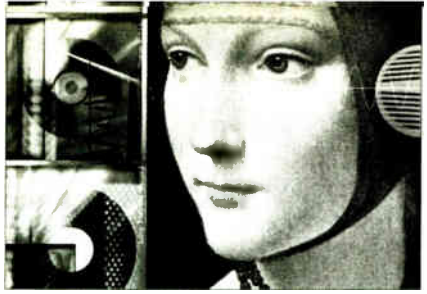
the independent labels usually balked at that, generally just sending the finished mixes right to the pressing plants. It was hard to even get a test pressing to listen to. I always thought that the records suffered from that. The vinyl never sounded as good as the mixes were."

It wasn't until Vig's production budgets crossed the $10,000 threshhold that he was able to demand mastering rights on a regular basis prior to duplication, replication or pressing. Vig developed a relationship with Masterdisk in New York City, where he continues to master his productions.

MID-LEVEL MASTERING

Some people are now addressing the budget mastering issue. Wood and Chris Griffin opened their facility in Atlanta in 1994 after Wood, a former newspaper reporter, wrote a story on local recording studios. "I saw that there were 150 studios in the area but virtually no mastering studios compared to the number of recording studios," he says. "I also was booking bands for local clubs, and I realized the potential there." Griffin learned mastering while working at a regional radio network and doing on-air compilations on the station's Sonic Solutions system. "I had been playing in bands for a long time, and I knew that the ¼-inch, 8-track demos we did just didn't sound like finished masters," says the 1986 Berklee School of Music graduate. "When I was going through the recording program at school, we would have Bob Ludwig or Roger Nichols come up and lecture on mastering. But when you're in the midst of learning about the recording process itself, it's hard to think about what happens after it. You know the concept but not the execution."

Wood and Griffin initially targeted local bands between Atlanta and Athens, Georgia. They found a market, but it was clearly in need of education. Wood developed a brochure that explains the mastering and disc replication processes (Griffin Mastering, like many new small such facilities, also brokers replication and duplication) to recording neophytes. And they also built relationships with local studios, which could not only enlighten their newer



also taking advertisements in regional music papers in St. Louis, Kansas City, New Orleans and Chicago. "It's no different than, say, Gateway Mastering, where clients don't necessarily come up to Maine; they FedEx the masters there," he says. "Clients can either drive here or [overnight] their DATs in." Gaines, who also offers free premastering consultations, says the studio has already had business from New Orleans.

Erik Wolfe, a mastering engineer for 20 years, opened Wolf Mastering in Nashville recently with a SADiE editing system and a high-quality analog tube processing chain. He notes that the developing needs for mastering services extend beyond budget record mastering to include the mastering of publishing archives onto disc and taking the edge off of MDM-originated demos. "The equipment opens up new possibilities [with clients] that would not have considered mastering before because of the cost involved," he explains. "Once you know you don't have to spend $200 per hour anymore, you're more receptive to the idea of mastering."

> Based on down-market trends, it's likely that the move toward mid-level and home-based mastering facilities will increase.

LARGER MARKETS?

Mid-level mastering facilities that have been in business for a while are not necessarily seeing a jump in business from the budget record sector. Madison Digital, a production and mastering facility in Los Angeles, has been open for six years, serving an array of independent clients as well as owner Randy Sapp's own record label. "We get some new business from those sorts of clients by word of mouth, but not really all that much," says Sapp, who uses WaveLab mastering and editing software running on an HP computer and a Symetrix 620 20-bit redithering processor for his all-digital mastering, monitoring through Genelec 1031 speakers. "But I am aware of the large numbers of new records done at these price points, and it makes sense that they're reaching the point where mastering becomes an issue for them."

Secondary markets such as Memphis and Atlanta will probably be the biggest beneficiaries of this trend, since the major markets already have a base of dedicated mastering facilities of various sizes. Also, because of the development of regional markets such as Minneapolis and Seattle, bands no longer find it imperative to go to those main markets to get signed in the first place. It makes sense that support facilities like mastering studios are developing in the regions where the music is now being made.

The reaction from dedicated, big city mastering houses is somewhat paternal in tone. Denny Purcell, who has mastered an average of 300 major-label projects per year for the last two decades at his Georgetown Masters in Nashville, says, "Look, I don't really think that they're truly mastering facilities or mastering engineers in a lot of cases. It's just a person with some equipment. But it's better than nothing. And on a positive note, I think that sometimes people do amazing things because they don't know that they can't do them. So it's good that this is happening in that sense."

But Doug Levine, owner of Masterdisk in Manhattan, finds a silver lining in the trend of more and more low-budget records. "These new mastering facilities are not full-service, by any means," he says, "but they reflect a need in the market. What we've done is allowed some of [those records] to come in and be mastered by our junior engineers during off hours at our convenience and off-rate. I take the attitude that we're making an investment in future major recording artists."

Based on the trends surrounding the increasingly down-market recording industry, it's likely that the move toward more mid-level and even home-based mastering facilities will increase. As Palmer Wood of Griffin Mastering in Atlanta puts it, "There's 500 bands between here and Athens, and they all want to make CDs." ■

Dan Daley is Mix's East Coast editor.

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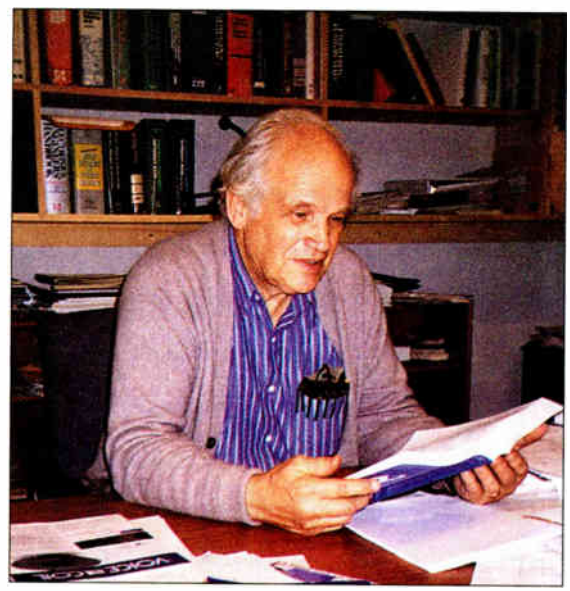
DAVID BLACKMER

DEVELOPER OF THE VCA, FOUNDER OF DBX AND NOW PRESIDENT OF EARTHWORKS

David Blackmer is one of the more intriguing figures of the pro audio industry. Best known as the founder of dbx Inc. (now part of the Harman Empire and celebrating its 25th anniversary), Blackmer has also worked in less visible corners of the electronic design world. In recent years, he has turned his analytical attention to psychoacoustics and the ways in which we process sound. Specifically, his focus has been on fundamental research into human hearing, and the dramatic importance of time coherency. One tangible result of that ongoing work has been a new series of high-performance studio microphones—designed to eliminate some of the artifacts produced by conventional microphone designs—from Blackmer's new company, Earthworks Inc.



How did you end up working as a consultant with API, which is probably the first legitimate audio manufacturer I see listed on your biography?

I had known Lou Lindauer when he ran Trans Radio; he bought [the studio] after I had left, but I continued to do some work for him while I was at Raytheon. Lou was the person who started Automated Processes Inc. [API]; he was looking for someone to help design his early products. I did some work on faders, in terms of an absolutely natural way of getting a log response. He had done it by using a tapped element with selected resistors, and I showed him how to do it by making a certain shape and running a ground stripe [that produced] a log response.

In 1971 you formed dbx. What was the spark of that company?

I had done some further consulting work for API on defining a compressor/limiter—our VCA and level-detector concepts were the cornerstones of the entire dbx product.

I know "d" and "b" in dbx stand for David Blackmer. What does the "x" represent?

Actually the symbol we wanted to have that stand for is "decibel," as in "decibel eXpansion." The concept being we were expanding the decibel range that people could cover.

What made you look at compressor/limiters specifically?

I'd done things like this over the years as part [of my work] at Trans Radio, and it was just an interesting basement project. I was fascinated with how you control gain, and I kept looking for better and better ways to achieve good measurement of level. In 1970, I used some logarithmic techniques that were actually an outgrowth of some things I did in the medical business. I had this concept of a gain control device that was *absolutely* predictable, with a very specific kind of response. I was as surprised as everyone else when it *did* work; it worked very well.

What was the key design concept behind pre-dbx compressor/limiters?

In general, most of them were either vacuum tubes, diode bridges or something with a not very predictable response curve. When you use transistors, the properties are incredibly precise—so precise you wouldn't dare believe it! Every [device] you built was within a certain, reasonable tolerance. It meant we had the ability to do compressor/limiters with feed-forward systems [and] could go beyond infinite compressor. By measuring the input level, and then changing the gain appropriately, we could get any degree of compression or expansion, including going beyond infinity—to the point where the louder it got the softer the output got—if we needed that function.

Temperature stability and other parameters are also important in VCAs.

At one particular point, these particular circuits are absolutely temperature-independent; either side of that the gain-control constant varies exactly proportionally with temperature. All you have to do is know *what* that constant is, and you can build a resistive divider that corrects for it. In my case, I simply made sure that the temperature-measuring circuit was at the same temperature as the VCA, and then everything tracked perfectly. (As a matter of fact, the temperature properties are *so* precise you can use it as a very high-quality thermometer!)

Once you'd developed a highly ac-

BY MEL LAMBERT

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curate, repeatable, mass-producable gain element, it could be used in compressor/limiters, noise reduction, plus fader-automation systems. How did the dbx 2:1 noise-reduction system come about? Was this in response to a need for an alternative to the more expensive Dolby formats?

One of the first things we did with the [level-detection] circuit was to build a 2:1 compressor and a matching 2:1 expander; I didn't know at that time how Dolby worked. I thought that [our circuit] made sense and would make a good noise-reduction system.

Was this discrete circuitry? Eventually Signetics offered an IC with 2:1 compansion, but without your noise-shaping circuits.

Yes, the initial dbx circuits were discrete. The Signetics chip was done with a Gilbert Cell-type multiplier, which is vaguely similar to my circuit principle, but is much harder to maintain an immovable DC axis as you change gain. One of the key things in my circuit was it allowed you to change gain by 40, 60 or 80 dB, and have almost no coupling in terms of DC axis shift.

I recall that there was also pre-/post-conditioning of the signal for tape recorder systems.

Yes. We pre-emphasized or boosted high frequencies by close to 20 dB, [which] gave a little extra with noisy tape hiss problems. But dynamically and statically, the system was non-obtrusive.

My circuit allowed you to change gain by 40, 60 or 80 dB, and have almost no coupling in terms of DC axis shift.

What other applications were there for this VCA gain cell? Obviously compressor/limiters come to mind, noise reduction and automation. Anything else?

The kind of precise measurement you need for laboratory instrumentation was also used in the Zenith-dbx [TV Stereo Sound] system, which involves a two-band adaptive system, and a variable ratio. Not to mention VCA-controlled automation for mixing consoles.

Were you involved with those stereo television developments at dbx?

Yes. The basis for those circuits were things I'd done several years before. Rene Jaeger and I had the concept of this 2-band adaptive circuit. We patented it a couple of years before the Zenith system came along. It was adapted into a form that was specifically matched to the needs of TV. The objective was to have the noise be the same or less when the stereo light goes on than it was in mono—even in fringe reception areas. A very tough objective.

When dbx was sold in 1979 to BSR, you stayed for a couple of years and then vanished from the audio world for a while. Yet you became involved with Kintek, a firm that manufacturers cinema-sound products. What was the interest there?

We used many of the same techniques in Kintek products for stereo playback systems in cinema. First of all, we developed a very good system for creating ar-

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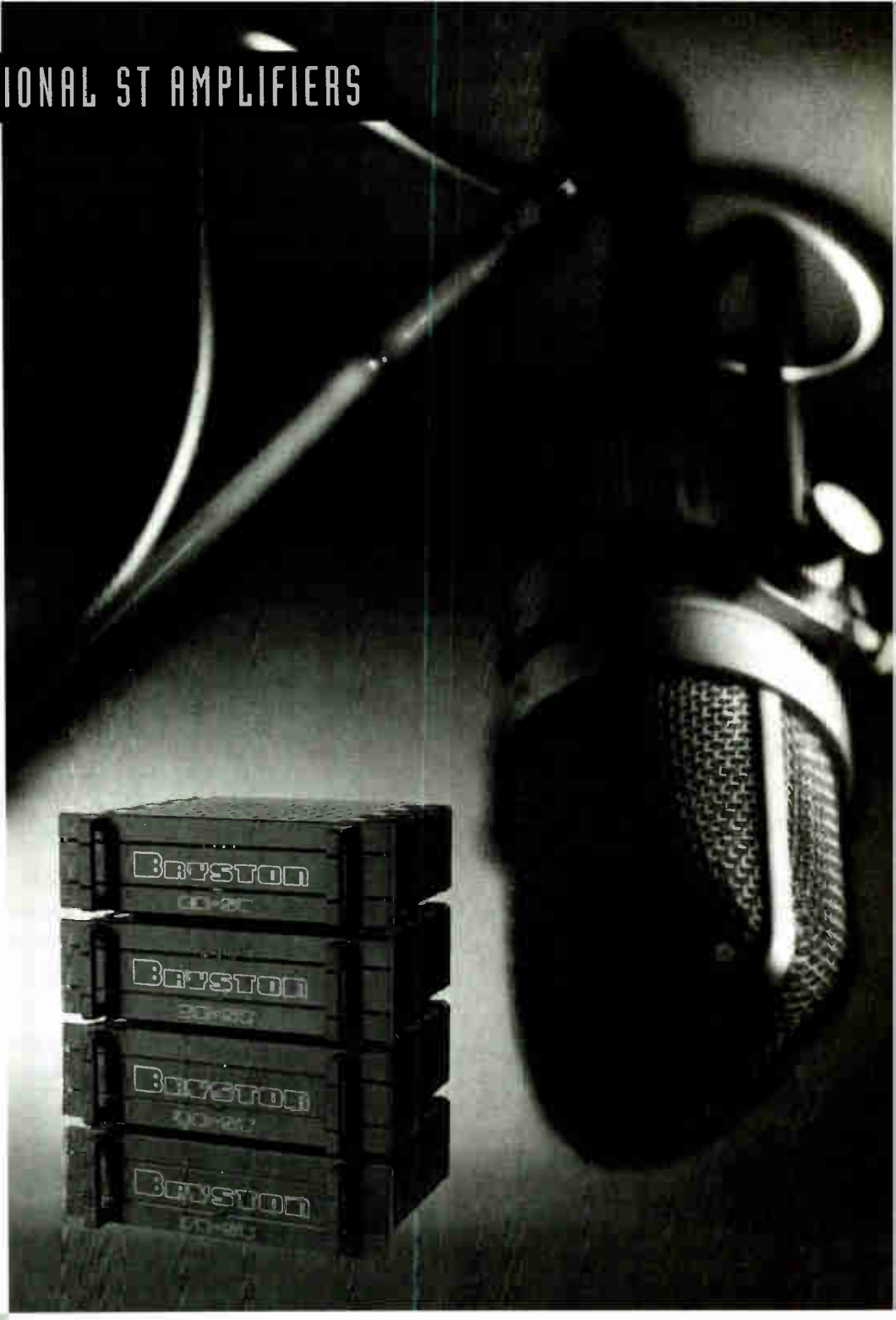

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tificial stereo sounds from a mono optical track. We used a circuit to determine when there were primarily effects on the track, and when there was primarily voice. We could then center the voice, and spread the effects slightly to left and right. When there was a reverberant sound effect, for example, we could direct it to left, right and surrounds.

How did you detect what was voice and what was a sound effect?

We did it by rate of change. If you look at a voice signal on a VU meter, it bobbles up and down mighty fast. When an effect's going through, it moves more slowly. If you look at the rate of change in dB, you can tell what's going on. Highly articulated sound is always up close, whereas sound that's distant is relatively slow-moving. You can just use that one piece of information to tell you right away which speaker channel to assign it using VCAs.

We actually sold a lot of units to TV stations as stereo synthesizers, based on the same basic principle. The [system] would look at the characteristics of the input signal, and then decide when it was mono and when it was stereo. It could create stereo by using a large number of all-pass filters to form a very complex comb filter.

And, meanwhile, you had bought and restored an old mill in Southern New Hampshire. You needed a hobby?

It had a power-generating system; I'd always wanted to do that kind of thing. And I developed a project for reducing the amount of water used in laundromats for washing clothes.

You seem to have the kind of mind that never rests. You're doing all kinds of basic research in many fields and thinking up new products to develop. Your latest involvement is with Earthworks. When did that begin?

Earthworks was actually started about the time I sold dbx, primarily to handle construction for the mill building. In fact, it still does construction.

In terms of these new microphone products, let me backtrack a little. For a long time, I had been interested in fundamental research into the way that the human hearing system works, in terms of its neurological and psychological mechanisms. Over the years, I had been struck by the incredible difference between the standard human hearing model used by audio engineers, and the actual experience of listening. There is the certain kind of researcher who says that everything you can perceive can be predicted by measuring intensity in critical bands, and applied in a simple algorithm. Two years ago, I began to look more closely at that algorithm.

What specifically did you look at?

How human hearing does what it does. In the cochlea of the ear is a very good frequency-specific kind of acoustic circuit. The cochlea itself is arranged in such a way that the highest frequencies are detected closest to the oval window, where the signals come in from the outer eardrum through the little bones that connect the two. The medium frequencies are detected lower down [the cochlea], while the lower frequencies are detected toward the very tip, the small end of the cochlea. Except that as you go down in frequency you start having a different phenomenon come into play: waveform detection. As a result, the lowest frequencies are detected more in terms of a waveform than in terms of some kind of a physical filter in the cochlea. There's something else going on there that is very, very important.

The ear is incredibly sensitive to signal-dependent time changes. A lot of the things that "high-end" people hear fall into that realm.

As we listen to sounds, each kind of instrument and audio source has a certain kind of characteristic. You might say, "that's an oboe," or "that's a flute." How do you do it? People are writing paper after paper about trying to do this with spectral analysis—especially with patterns of harmonics—and none of it works.

How do you think we tell the difference between, let's say, an oboe and a flute?

We do it by waveform recognition. Let me describe what happens. There are something like 3,000 of these little hair cells in the ear; cylindrical cells with a whole group of cilia on top, [functioning as] little microscopic motion-sensitive devices. But there are between 50 and 100 [cilia] for each hair cell; signals from those are processed into impulses that go from each hair cell into the brain. Within the brain there are a series of between ten and 15 correlation centers that exist between the nerves from the cochlea, and the part of the brain that has consciousness: the cerebral cortex. These centers correlate time differences. Some cells will respond if it is a 100-microsecond time difference; that cell will perk up and say, "Yeah, I recognize that." Others look at correlations between the left and right ear. Then there's a fascinating center that takes visual, tactile plus sonic information, and correlates the three.

How accurate a time piece is the brain? Is it in the millisecond or microsecond range?

Microsecond. And that research is very old. Von Bekesy published a paper in 1932. If you look at the numbers the way he describes them, we sense time between the two ears with a precision of around five microseconds. I believe that, in fact, the time resolution function is even more accurate within each ear. We have the same basic wiring—although it's not evolved nearly as well—as bats and other echo-location animals. Although we have all the same apparatus, we don't have ways of perceiving as high a frequency as they do. But I can tell you with great certainty that we do respond to things well beyond 20 kHz. Even people like me, whose hearing cuts off at 12 kHz, can hear a very great difference between a recording done with a DAT recorder that samples at 96 kHz and one that samples at, let's say, 48 kHz.

What's the mechanism?

The mechanism is what the ear does to code information largely in terms of the time delay between one pulse [in the cochlea nerve path] and the next. In other words, the time delay between one pulse and the next is constant information. For certain kinds of sounds, a whole volley of nearly simultaneous pulses go down a number of parallel synapses, and the brain interprets those near simultaneous events into a map.

There's an interesting experiment you can do. Cover one ear, listen with the other ear and you can still locate sounds. How do you do that? Well, part of it is the shape of your head, but a much more important aspect is the outer ear, the pinna. We learn the time transform of the pinna. We model the response of the pinna in time and frequency, and have sophisticated detection systems in our brain. Our brains and ears operate together in the dual domain.

Would you say, in rough terms, that the

time correlation gives us directionality, and the frequency correlations give us timbre recognition?

It's much more complicated. The sense of timbre is a mapping function very much like position. It's instant. If your ears are sensitive, you have absolutely no difficulty recognizing a flute played in the middle of an entire symphony orchestra. You don't do that by spectrum analysis; you couldn't pick out a complex flute pattern out of something that complex. You need a mapping function that's stronger than just harmonic components.

There's a certain kind of a character...an arrival pattern. The ear is incredibly effective in picking out the first sound that arrives in any given wave train and tells us which is which. One of my pet peeves in that area is people who think they are doing somebody a favor by equalizing motion-picture theaters, based on frequency response measured with microphones at various theater seats. Of course it sounds terrible. The ear does a wonderful job of analyzing reverberant sound fields; I don't know how it does it because these fields are so fantastically complex. Think of a symphony orchestra with 100-plus instruments, and a number of reflective surfaces. You have in effect as many as 1,000 things going on at the same time, and yet we map the whole experience.

If you want the room to be flat, you work very hard to make sure the reverb time has the appropriate curve vs. frequency. Anybody who does a good job of equalizing control rooms or any listening space has to make both the first sound and the reverberant field sound right.

Most measurement systems average the effects. They will put pink noise through the system and use measurement microphones to look at the frequency response over a long time period. We need to examine the short- and long-term performance.

That's right. The degree that this is important is very hard to believe. The difference in impulse response of microphones accounts for most of their differences in sound performance. A number of recordings have been made over the years in which a single source is recorded through a series of different microphones—every one sounds different!

What is this impulse response? Is it a combination of the mechanics and electronics?

Mechanics, electronics and the shape of the physical object that the microphone capsule is mounted in. It's very common to mount the capsule in a cage, but those mountings produce reflections of sound that clearly affect the performance.

So it's a compromise. You need to physically protect the capsule from damage, and you need something to reduce breath noises, but all of these are going to degrade the sound. What do you do?

In our mic designs, we maintain the simplest possible shape and take very great care about how things relate to each other. We get a much faster impulse settling time by doing that than even the B&K mics, which are superb. For example, we have a B&K lab mic that's good to well over 100 kHz, yet its settling time is not nearly as fast as our 40kHz microphone.

What's the mechanism here? We've got a lot of sounds bouncing around inside a closed space with nowhere to go.

And bouncing around the outside [of the microphone]. Every point at which anything can reflect affects the sound. One time we moved a mounting clip further down the mic to eliminate a frequency anomaly.

You have also been quoted as saying that we need to look at what is happening to sounds beyond the tradition-

—CONTINUED ON PAGE 217

1996 TEC Awards Winners Announced

It was standing room only in the Biltmore Bowl in Los Angeles on November 9, as the winners of the Twelfth Annual Technical Excellence & Creativity Awards were announced. Special awards were also presented to Hall of Fame inductee the late Willi Studer and Les Paul Award winner Brian Wilson. For a complete TEC Awards wrap-up, read next month's Mix.

The Twelfth Annual

Technical Excellence & Creativity Awards

Outstanding Institutional Achievement

Acoustics/Facility Design Company
Walters-Storyk Design Group, Highland, NY

Sound Reinforcement Company
Clair Brothers Audio, Lititz, PA

Mastering Facility
Bob Ludwig's Gateway Mastering, Portland, ME

Audio Post-Production Facility
Skywalker Sound, San Rafael, CA

Remote Recording Facility
Westwood One Mobile Recording Division, Culver City, CA

Recording Studio
Ocean Way Recording, Los Angeles, CA

Outstanding Creative Achievement

Audio Post-Production Engineer
Gary Rydstrom/Gary Summers

Remote/Broadcast Recording Engineer
David Hewitt

Sound Reinforcement Engineer
Robert Scovill

Mastering Engineer
Bob Ludwig

Record Producer
Don Was

Recording Engineer
Bob Clearmountain

Outstanding Technical Achievement

Ancillary Equipment
Apogee Electronics AD-1000

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Focusrite Red 7

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Digidesign DINR v. 2.0™ TDM

Microphone Technology
Shure Beta 58A

Sound Reinforcement Loudspeaker Technology
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Genelec 1039A

Musical Instrument Technology
Kurzweil K2500XS

Signal Processing Technology
Lexicon PCM90

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Alesis ADAT-XT

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"if art doesn't communicate,...

George Duke

... then it doesn't really fulfill its goal. It's not doing what I think it's supposed to do. As an artist, I feel like I haven't achieved my goal unless I touch that one person out there. I DO believe that spiritually sometimes things are given to me. I mean, a melody will pop into my head and I don't know where it came from. You know, it certainly didn't come from me.

I'm fortunate enough to have a studio so I basically can record whenever I want. And so the creative process is changed. I'm just making music. Whatever pops in my head is what I'm doing; whatever style it is, that's what it is. And I'll put the album together later. Well, that's a luxury.
The diversity is what is important. But in all seriousness, if you don't have the tools to make this work right, it's not going to happen. To be able to express myself and do all of the myriad of things I wanted to do. – For what I CAN do and what I KNOW I'll be ab to do in the future because there's produ development going o all the time. – Serious I'm doing stuff I woul n't have ever dreame that I'd be able to do. It's not so much to do with a commitment t the product as much a I have a commitment to MY work, and the a that I'm trying to do. It keeps me going in music. It's like, 'MAN, this is interesting! I ca do this; I can do that!'

George Duke

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TODD BARKAN

JAZZ FROM CLUB TO STUDIO

In his heyday as a jazz nightclub owner/booker in the 1970s, with Keystone Korners in San Francisco and Tokyo, Todd Barkan put together provocative and imaginative shows featuring the biggest names in jazz—he once booked a week of Sam Rivers and Oliver Lake and billed it "Rivers & Lakes." Now growing confidently into his career as a record producer, the 50-year-old Barkan is exposing Latin jazz to its widest audience ever and bringing an impressive, sometimes unusual list of talents to light.

PHOTO: JOHN LIGON

Todd Barkan (center) with Mongo Santamaria (L) and Chico O'Farrill

He has a remarkable track record over the past five years, including Grover Washington Jr.'s *All My Tomorrows*, McCoy Tyner's *Prelude And Sonata*, two Chartbusters releases, sax heavyweight Eddie Harris' *There Was a Time*, Lonnie Smith's Jimi Hendrix tribute with John Abercrombie and Smitty Smith, debuts by George Mraz and Steve Berrios, "comebacks" by Chico O'Farrill and Pucho & His Latin Soul Brothers, live recordings with Jerry Gonzalez and Fort Apache and Manny Oquendo & Libre, and much more.

Barkan grew up in Columbus, Ohio, where jazz and classical music were played at home throughout his childhood. An aspiring pianist, he met Rahsaan Roland Kirk in Columbus and soon after decided to move to San Francisco. He was playing in a salsa band when the opportunity arose to buy Keystone Korner, which he did without having any previous business experience. When the club closed its doors 11 years later, Barkan began producing records for Japanese, French and Polish companies, before catching on with Fantasy Records. "Fantasy gave me the chance to be taken seriously as an American record producer, and for that I'll always be grateful," he says. "And also because of their commitment to high-quality music."

Did producing the live concerts at Keystone Korner help spawn your recording career?

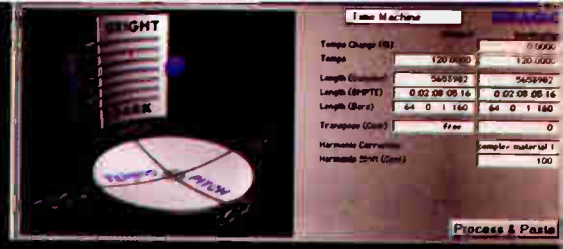
I feel that what I do now is just a part of what I've always been doing. We always tried to create the warmest, most expansive kind of environment for the creation of great music at Keystone Korner. A lot of special music happened there, and it was definitely a function of the kind of environment that was operative. I try to create that kind of environment on recordings, and sometimes we're successful. The Keystone Trio record, with John Hicks, George Mraz and Idris Muhammad, comes very close to the kind of music that we used to have at the club, where the music gets out of itself and there's an exhilarating level of swing and uninhibited creativity. I don't hear it that much, and it's important to me to try to strive to that level. Unfortunately, we've lost a lot of the bandleaders who most regularly could generate those standards. Betty Carter is still around, but we don't have the Art Blakeys and Cannonballs and Rahsaans.

BY ROBIN TOLLESON

Keystone Korner was an invaluable experience, to teach me what the music can sound like, what its real potential is, and how there should be a certain kind of warmth and clarity to the sound. We try to get a sound like being in the fifth row of the club, where you're not even conscious of it being amplified.

Do you see it as part of your job to develop young leaders?

That's one role. But in the last couple years, I've been recording a lot of people who have been unjustly neglected by the music system, who have gotten less attention than a lot of younger musicians, even though they have a greater depth of expressive art happening. That would include people like Chico O'Farrill, who hadn't made a record in 30 years when I recorded him. George Mraz, who Ron Carter looks up to as a musician. Eddie Henderson. Steve Berrios, who is 50 years old. The Fort Apache Band with Jerry Gonzalez—giving them the kind of exposure and recording scope that they hadn't been given before. There's no greater saxophone player in the world right now than Eddie Harris, and you can hear it on that record with Jimmy Smith. He invented a lot of what is called contemporary jazz today. Miles Davis would tell



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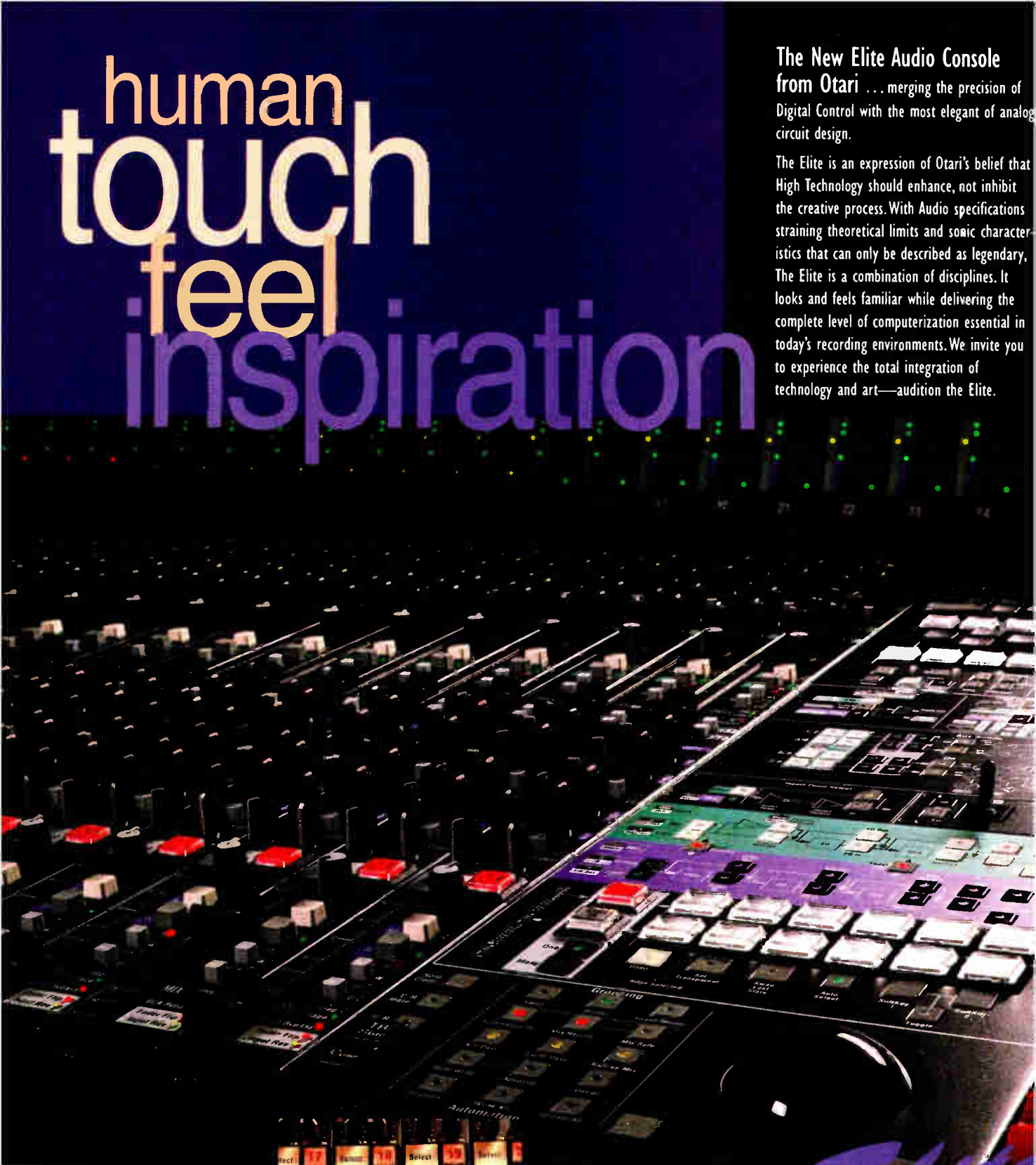

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you that while he was alive, because he copied Eddie quite conscientiously and used him as a role model. And Pucho is one of the guys that invented what they call acid jazz now, Latin funk. He hadn't made any records in 25 years. So recording people like that has been part of my gig. Everybody's got a gig. I do think it's a function to develop the leaders of tomorrow, but even more generally than that to keep a standard going, where the musicians themselves can hear the level the music is supposed to be, and how it's supposed to sound. Thousands of jazz records come out every year with this cookie-cutter production, where they're roughed off very quickly and not enough attention is paid to the sound and the planning. We try to strive for as much originality and quality as we can. And fortunately, the people at Fantasy are very knowledgeable about music.

I've been enjoying Steve Berrios' playing with the Fort Apache Band.

Chico O'Farrill says that Steve is one of the most profoundly bilingual drummers in the world. He is, and he's very essential for understanding what the possibilities of real Afro-Cuban bebop are, because that's an area that can still be developed a lot more deeply than it has been. And even as far as Fort Apache has taken it, it still has enormous room for development and exploration. That's going to be a major element that creative music can move into. But the challenge is that it's going to take musicians that are really fully bilingual and trilingual in the development of it. And unfortunately, a lot of what is considered Latin jazz music is merely a mambo with a jazz-filigree solo over the top of it. They're not structurally bending both idioms to create something fresh. Integrating those art forms and really doing something creative with them, that isn't done very often. That's why Fort Apache is important, because they do it in an honest way and really meld those art forms. They're really happening with true spontaneity in both idioms.

Freddy Cole has been one of the underrated ones.

He's one of our greatest living jazz singers, but it's still a challenge to get him the audience that he deserves. Because overall in this world, artistic innovation has been replaced by competence. And competence has been replaced by mediocrity. So basically the whole scene has gotten much more profoundly superficial. The Grover Washington record was encouraging, because it sold worldwide over a couple hundred thousand copies. So I don't feel that great music is necessarily that limited in its audience.

Besides finding a comfort level, what are the other roles you play as producer?

It depends on the artist and the situation. Because of the small budget involved in producing a record, the producer wears hats that would be worn by different people in a movie production. You become producer, director, screenwriter, lighting director and other functions. In terms of planning repertoire, most times I'm very intimately involved in the selection, but again it depends. If I suggest a song to Freddy Cole, it doesn't matter how gorgeous, hip, challenging and unusual it

PHOTO KEYSTONE KORNER INTERNATIONAL

The Keystone Korner, San Francisco

great engineer. He's got a wide scope of experience on a high level in this business, and it makes him a particularly effective engineer. You need people who really care, and David, Jim, Troy and Michael do.

Do you enjoy the live recording dates?

I enjoy it because I've had a tremendous amount of experience producing those kinds of sessions even when they weren't being recorded. Creating a real open, receptive kind of environment, so that you give the music as much chance to exert itself as possible. In comparison with the Fort Apache Band's studio dates, you'll hear much more expansive and spontaneous musical expression, because they function at full-throttle best as a live band. There are pluses and minuses to recording live. You have to think first of the audience that you're performing for, so you don't have as much control over length of songs as you do in the studio, and you definitely don't have as many safeguards on the sound quality as you do in the studio. There's naturally going to be a lot of instruments bleeding to one another in a live process, no matter how carefully you record it. Sounds are bouncing around all over the place. You're more limited in how you can mix the sound, but the advantages more than outweigh the disadvantages. The intense feeling of spontaneity, the exchange with the audience, the fact that it's a living art form being recorded as it was meant to be performed. It's a great opportunity when you're able to record live.

In the studio, do you like to record as much of the band live as you can?

I'm not a layers man, by and large, just recording one layer of stuff over another. But in Latin music, it's natural that you do some degree of that. You go back in and do percussion and sometimes horn and keyboard overdubs. Because of its polyrhythmic nature, I end up doing more overdubs in Latin music than anything else. But my preference is to record as much with a live feel as possible, and inevitably you get the best music that way. We've been doing so much Latin music lately, we've kind of got our own ABCs, making sure the bass drum has a tone, making sure you can hear the hi-hat and the full kit, making sure you can hear the bass and its overtones, making sure the bells have a certain full tonality, even warm-sounding, the cymbals and snare drums—the way a snare on the ballads should sound like eggs on the stove. Keeping certain elements as your reference is very helpful to me as a producer. It's always helpful to learn lessons from as many genres as possible. It gives the music that much more richness. And one of the major challenges with jazz music in general is bringing a greater degree of theatricality and accessibility to it. That has to be done also in the recording. It doesn't have to necessarily be head-solo-head-solo-out. There's a lot of ways of telling a story. One of the people who got me into that on a practical level was Rahsaan Roland Kirk. He was a genius at conceiving and devising story lines in recordings, like *The Case of The Three Sided Dream in Audio Color* (Atlantic). He started me really thinking about that and not just have a record be an assemblage of hip tunes, alternating fast tunes and ballads.

Do you like to use much in the way of effects?

I'm reluctant to put any reverb on a piano. Sometimes a little bit is necessary. Blue Note is now recording a lot of stuff using just a couple microphones. I think there's validity to that practice, but I don't think it's necessarily the only way to get a natural sound on a record. I think that way of recording produces a sound that is more accessible to very high-end audiophiles that have the equipment to be able to play that kind of recording. But you have to be sensitive to the fact that all kinds of people listen to records, and it should sound as good on very limited equipment as very good equipment. You might want to have the kind of bass that would shake the entire house, but a lot of systems couldn't take that, and a lot of systems can't get all the high end that you could put on a recording.

I heard that the Keystone Trio wasn't even planning to record an album.

We were making an Archie Shepp record with that rhythm section, and I heard something instantaneously happening that was real magical. I told Ralph [Kaffel, president of Fantasy] about it, and he thought it was worth pursuing. I'm thrilled with that record, and I hope it gets some small degree of the recognition that it deserves. To me the guys really created a masterpiece. It's always a crap shoot whenever you're recording. It depends how the musicians are feeling that day, how the equipment's working, no matter how great equipment you have. All the forces of the universe are always at play in any recording session, and even though you think people are going to play well together, things just click better on some days than other days. There was such a spirit of cooperation and openness, that it was a total joy to make that record. It's almost like they get out of themselves and into that pure Alpha level, and that to me is what it's all about. You're not conscious of playing the changes or the choruses, the intellectual component of it is subordinated to just the sheer exhilaration of just swinging that hard, and spelling out the solo that clearly. That's also a good example of taking care of the sound. There's a clarity and presence to that sound which I think is extraordinary. I feel the same way about almost all the records we've mixed at Fantasy—I think we've created a sound. ■

Robin Tolleson is a writer and musician living in Marin County, Calif.

PHOTO: KEYSTONE KORNER INTERNATIONAL

L to R: Bola Sete, Rahsaan Roland Kirk and Todd Barkan in Sausalito, Calif., 1974

What Makes the 160S the Next Industry Standard?

Check out the processing racks in any large studio, broadcast facility, or concert rig and chances are you'll find one or more dbx 160's (amongst a bevy of other great signal processors). Names like Abbey Road, A&M Studios, Westlake Audio, and Skywalker Sound still count on their 160's to deliver silky smooth vocals, tight bass and crisp, punchy drums... all dbx hallmarks.

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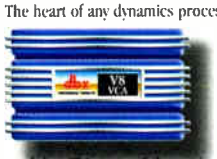
The heart of any dynamics processor is its VCA. The dbx 160S features dual proprietary V8™ VCA modules. This state-of-the-art implementation of dbx's original Blackmer decilinear VCA boasts an unheard-of 127dB dynamic range and ultra-low distortion. Encased in a specially designed aluminum-zinc housing for shielding and thermal characteristics, the V8™ maintains its superior performance in harsh environments.



Premium Signal Path

High-voltage 24V supply rails and wide dynamic range active components in the signal path allow the 160S to cleanly process audio while providing a huge 26dB of headroom. Patented high current transformer isolated outputs feature >100dB common-mode rejection and distortion so low it's immeasurable. Designed for extreme conditions these outputs will drive 1000 feet of Belden™ 8541 cable at +30dBm.

Over-designed Power Supply

The 160S power supply features a massive toroidal transformer chosen for its low stray flux characteristics and mounted in a mu-metal can designed to attenuate stray field by 30dB. The can is then isolated, along with the AC power circuitry, inside a shielded power supply cover providing even more noise attenuation. Only clean DC power exits the isolated supply.

Discriminating Component Selection

The new 160S takes full advantage of the most technologically superior components available today. Premium active electronics, precision 0.1% and 1% metal film resistors, great sounding temperature stable polypropylene capacitors, high-reliability board-to-board connectors with gold-palladium-nickel contacts, Jensen® transformers, gold plated Neutrik® XLRs, rare earth magnet relays with gold contacts in a hermetically sealed nitrogen environment, military grade glass epoxy circuit boards, to mention a few, contribute to the most technologically advanced compressor in the world.

Distinctive Craftsmanship

The craftsmanship of the 160S is as stunning as the engineering is innovative. A striking blue front panel machined from 1/4" aircraft aluminum, hand-crafted solid aluminum knobs, LEDs mounted individually in machined stainless steel housings, custom VU meters with peak indicators, and heavy gauge chassis solidify the 160S as the benchmark compressor for decades to come.

Ultimate Flexibility

The 160S combines the best features of all the great dbx compressors, past and present. In addition to having the auto attack and release as well as the hard knee threshold characteristics of the classic dbx 160, the 160S is also switchable to OverEasy® mode, made standard by the classic dbx 165A. And speaking of the 165A, all of its features, including variable attack and release controls, as well as dbx's latest limiting algorithm PeakStopPlus™, are included in the 160S. Not to mention new features such as hardwire relay bypass and external sidechain input, switchable from the front panel.

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MERCEDES SOSA

A LIFE COMMITTED TO SONG

The brilliant singing career of Mercedes Sosa—a career that has lasted for more than 30 years—began in the early 1960s when, at age 15, hidden behind the pseudonym Gladys Osorio, she sang for a radio contest in Tucumán, Argentina, her native land.

Even then, Sosa's commitment to Argentinean folklore was strong, and she soon became the leading voice of Argentina's "New Song" movement. Sosa also incorporated modern protest songs into her folk and traditional repertoire; she strove to bridge the gap between classes and regions of her country through music.

In 1979, the newly installed military regime in Argentina forbade Sosa to sing, and she fled to Europe, where she toured successfully and became known as "the voice of Latin America." She returned to Buenos Aires in 1982, when the dictatorship collapsed. Her triumphant concerts that year were attended by thousands.

Sosa has been the recipient of numerous awards in recognition of her longtime dedication to the Latin American song, and for her work in support of human rights worldwide. Last year, for example, she was honored by the General Secretary of the United Nations' Politic World Conference on Women for her work on the album *World Divas*. This collection, which includes her version of Violeta Parra's "Gracias a la Vida," unites some of the world's most important female vocalists: Edith Piaf, Marlene Dietrich, Amalia Rodriguez, Lucha Reyes, Miriam Makeba, Celina Gonzalez, Aretha Franklin, Elis Regina, María Bethania, Gal Costa and Celia Cruz.

This tells you just a little about Mercedes Sosa's accomplishments over the years. In her home in downtown Buenos Aires, Sosa elaborated on her long career with the simplicity that is characteristic of great artists.

PHOTO: PABLO CUNOURI

You began your career singing folklore and were a part of the New Song movement. What did this movement mean?

It was a movement in the 1960s for integration in Argentina. We wanted a movement that would unify our country and imbue popular music with themes of human labor.

Television did not exist here at the time, so it was through our songs on the radio that people started to understand the jobs of their countrymen. They heard about the people working in the different regions of Argentina. For example, cotton is gathered in "El Chaco"; in "La Quiaca," other harvests are collected. Therefore, people at "La Quiaca" have a different way of living, thinking and singing.

As soon as we started this movement, we were tagged as communists. It did not mean that some of us wouldn't, later on, join the Communist Party, but that was not the original meaning. It was a cultural and informational movement, along with the new Argentine movies. Nevertheless, our movement lasted longer—the movie industry was repressed, and to this day, very few movies are being made in this country. So, this movement was made up of new songs and poetry—songs that I am now trying to revive, because I see the need that each region has to listen to its music.

Did you have any connection with

—CONTINUED ON PAGE 96

BY IRIS ETCHEVERRY

STUDIO MEGA

Big in Rio

Mega is a fitting title for Rio de Janeiro's newest studio complex. This five-story facility offers two large recording studios, audio post-production and audio/video duplicating, as well as personal amenities such as catering, lounge areas and the sights of Rio.

Mega was designed by Horacio Malvicino of Miami's Acoustic Integrated Design. Malvicino's background includes work as a maintenance engineer in a number of top NYC facilities, and later, design of numerous studios in the U.S. and Latin America. He says that pro audio in Latin America is exciting right now because he believes that, though the U.S. is fairly maxed out as far as new-studio construction, there's plenty of space and money in South America for new rooms. "Also," he says, "real estate is not that expensive down there, so I can get to build. Where I would build one studio here in the states for the money, down there I could build three, with big live rooms and big control rooms. Here, people just seem to need meeting rooms so they can make money."

Money certainly doesn't seem to have been in short supply for the creators of Studio Mega. The facility is owned by a lending institution called Nortep, in conjunction with Phillipe Neiva, a successful Brazilian jingle writer; and producer Liber Gadhelia, who also serves as studio manager. "Originally, it was going to be for their own productions," Malvicino explains, "they were going to build one MIDI room and one Neve room. But it became a full-fledged commercial thing, and it's already very successful."

The SSL studio at Mega

Mega is situated in a residential area, on a steep hillside. The existing structure, when Malvicino first visited the property, was an old house, which was retained and converted to business office/catering use. But the studios are all new construction. "It was an ideal situation, because the owners let me work on my own pretty much," says Malvicino. "They hired a Brazilian architect, Indio da Costa Architetura, who designed the building. He would get plans from me and redesign things and we used fax and modem to send things back and forth for four or five months."

The ground floor of the main studio building contains reception, offices and some parking. On the first floor, there is a dedicated post-production studio, an SSL OmniMix room that was scheduled to go online within two weeks of press time. This studio offers surround monitoring from Westlake Audio (Westlake provided all of the main monitors for Mega), a Foley room and a duplicating room capable of handling a range of video formats. There's also an online editing room, Henry Quantel Online Editing, and a private lounge. "Each floor is about 4,000 square feet," says Malvicino,

BY BARBARA SCHULTZ

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On the second floor, there's a Neve tracking/mixing room. The control room is treated with a cluster of diffusion devices designed by Malvicino and built by design/builder Eduardo Bergallo of Acoustik. It is fitted with a V-2 console, two Studer 827 tape machines, a range of new and vintage outboard gear and mics, and near-field speakers from KRK, Yamaha, Genelec and others. Main monitors are Westlake Audio's passive, bi-amped BBSM15s. The studio space is large and live, with variable acoustics via movable panels, and automatic curtains that reveal the studio's view of downtown Rio and the coast beyond.

The third floor of the building houses a machine room that feeds power to the independent air conditioning units in each studio. The top floor is the SSL room; it is identical to the Neve studio, except that the console is a 4064 G Plus—same tape machines, monitors, outboard gear, etc. "And we have some equipment floaters, too," Malvicino says, "a Sony 3348, 32 tracks of ADAT, 32 tracks of DA-88. Anything you want can be used in either studio." The rooms were tuned by Audio Integrated Design's Claude Miretti, using the Meyer SIM system.

The most challenging thing about getting this studio built, Malvicino says, was the physical limitations of doing construction on the steep hillside. "You have to understand, we are building uphill," he explains. "We are up on a mountain, and the foundation is stone, so we had to use explosives, and we are in a residential area, so you have to be careful about that. But the biggest problem was getting materials uphill. Like a console: If it rained, we'd have the console come from a plane from England, and then they come in a truck to the bottom of the hill. Now, getting a truck to go up the hill with an SSL, which weighs about a ton...we had to wait about a week, because we had a week of rain."

Now that the main studio complex is completed, the partners are going ahead with phase 2: "Next door, we are building another building the same size as this building," Malvicino says, "which is going to have ground-floor parking. It's going to have a screening room, production offices, pre-production offices and a meeting room. One floor will have offline editing on the Avid MU-1000 plus one Quantel edit box (online editing), Sonic Solutions for mastering and a conference/audiovisual room. There will also be one MIDI room with

AR STUDIOS

This year, Brazil also welcomed AR Studios, a new 10,000-square-foot, $3-million recording/mastering facility designed by Walters-Storyk Design Group of Highland, New York. The control room of AR's Studio A (pictured) is situated on the second floor of the building, affording visual access to the recording room and iso booths, as well as natural light. Equipment in Studio A includes a restored 60-input Neve V-3 console, two Otari MTR-90 multitrack recorders and Genelec mains. Studio B—across a courtyard from Studio A—has a Mackie 32-input board and a Pro Tools-based mastering setup. ■

INTI-ILLIMANI'S "I WILL RISK MY SKIN"

Next year will mark the 30th anniversary of the eight-man Chilean ensemble Inti-Illimani. This group plays and sings traditional Andean music in ways that exceed the boundaries of the *nueva canción* movement they are associated with. They blend classical guitar playing with varying groupings of instruments—violins, flutes, clarinet, saxophone, hammered dulcimer, any number of percussion and other traditional instruments—with warm, vibrant and romantic vocal performances. The sounds they create and the emotions their songs evoke transcend the language barrier, and they defy category.

This fall, Inti-Illimani released a new album, *Arriesgare la Piel* [*I Will Risk My Skin*] on Green Linnet's Xenophile record label. This latest collection is as intimate and passionate as the title suggests. It was recorded in Studio Master in Santiago, Chile, by a Canadian engineer named Toby Gendron and produced by the band with Montreal-based producer Paul

—CONTINUED ON PAGE 218

a Soundcraft console and ADATs."

At press time, Mega was hosting sessions with a number of Brazilian artists, including dance artist Lulu Santos, and upcoming work included a Russ Titelman production project and, possibly, a Bruce Swedien mixing project. "The first two rooms opened in late June," says Malvicino, "and they're booked solid until the end of the year. We're talking lockout." ■

—FROM PAGE 92, MERCEDES SOSA

similar movements in other countries? At the time, in the early 1960s, a new music in Brazil was appearing—the bossa nova, brought forth by Tom Jobim. Americans were also coming up with a new wave through Joan Baez and Bob Dylan. Bob Dylan was primarily a poetic force while Joan Baez was an activist in the movement. Likewise, the New Song movement came from strong sources within us, especially in northern Argentina. We first aspired to an integrated Argentina and, later on, tried to reach out through Latin American music.

How did you become so closely connected with Latin American folklore? My contact with Latin American folklore began several years ago in Mexico, although this is sort of strange since I have never sung any Mexican music. I found their songs too chauvinistic. Also, the songs were of a revolutionary tradition that belonged to the Mexican people. So, I could never sing any Mexican

SOUND REINFORCEMENT FOR MERCEDES SOSA

[Engineers Alejandro Goñi and Enrique Garcia provided this description of Mercedes Sosa's live setup. Goñi has worked with Sosa since 1987, first as monitor engineer then front-of-house beginning in 1995. Monitor engineer Garcia joined in 1991—Eds.]

THE BAND

There are four main musicians: Nicolás "Colach" Brizuela on acoustic guitar, Gustavo "Popi" Spatocco on keyboards, Carlos Genoni on bass and Rubén Lobo on drums and percussion. Bandoneón player Walter Ríos joins to enrich tango themes in the repertoire, with Beatriz Muñoz providing backup vocals. On tours through Latin America, the possibility of impromptu invitations from Mercedes to local artists means we have to be ready with an extra mic or line input and another monitor mix.

VOCALS

The intelligibility and quality of Mercedes' voice is critical to making a connection with the audience. We use two wireless Cetec Vega microphones with Shure SM87 capsules (condensers) and transmit in the UHF band with excellent results. There is a VHF transmitter as backup, but that can risk interference. Her voice is processed through a Lexicon PCM 70 or PCM 80. It's also important to vary the reverb in the monitor mix, especially since we travel from small concert halls to large outdoor facilities. It also helps that Mercedes enjoys hearing the reverb treatment, most of all in the high-volume side fills.

The use of compressors is unpredictable. One of its virtues is the large dynamic range they can produce. This "modulates" the level of the band when there are limiters in the system, which usually happens when working with sound reinforcement companies.

A compressor should be of high quality, and its calibration requires extreme care. Generally, for both monitors and house mix, we ask for Drawmer 1960s, DL 241s or BSS DPR 402. But more than once we "meet again" with the classic dbx 160. On the house console, the extensive use of compressors helps maintain a stable and compact mix, due to a repertoire that shifts from solo guitar ballads to rock.

GUITAR

The guitar has a particular importance in folkloric music, and in the beginning it was quite a challenge because we were working with a traditional Spanish guitar. We used a Sennheiser MD-421 microphone with a Klark-Teknik graphic EQ insert to attenuate resonant frequencies in the monitors and house system. However, amplifying it properly was troublesome, so we opted for a Takamine with an output jack—a natural-sounding instrument that we continue to mic for warmth, but only in the house.

KEYBOARDS

Gustavo Spatocco has a very complete setup, with an Ensoniq ASR-10 sampler at the core and Yamaha KX88 controller for a Roland MKS20, Korg M3R, and Ensoniq MR rack. For folkloric themes, it was necessary to sample native handmade instruments like the sikus, mexenios, quenas and erkes. All of these instruments are constructed out of canes from the Argentine countryside.

PERCUSSION

Apart from his Gretsch kit, Rúben Lobo plays on a series of percussion instruments typical of Latin American music such as the bombo legüero, with its body as large as that of a floor tom and made out of one piece of a mahogany tree trunk using goat leather for the top and bottom membranes. We generally mic this drum with a Sennheiser 421.

SOUND SYSTEM

From New York to Cologne to regional festivals in rural Argentina, the acoustical considerations and availability of equipment can vary dramatically. What follows is our desired equipment list.

FOH Console: Yamaha PM4000

Processors:
9 Drawmer or BSS DPR 402 compressor/limiters
2 Lexicon PCM 70 or 80
1 Yamaha SPX 990
1 Roland SDE 330

P.A. System: Typical Stack by Meyer, EAW or Adamson, with Crest or Crown power amps.

Front Fill/Center Cluster: Two-way Matrix Out ⅓-octave EQ.

Monitor Mixer: DDA Forum or Ramsa 840

Processors:
9 ⅓-octave EQs: Klark-Teknik or BSS Varicurve
4 Drawmer compressor/limiters
1 Lexicon digital reverb

—CONTINUED ON PAGE 218

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music, though I do have a great appreciation for Mexico. I also traveled to Venezuela, whose music I enjoyed, though I wasn't drawn to their lyrics. You see, when you have Chilean poets like Pablo Neruda, Violeta Parra and Victor Jara right here across the moun-

tains, and even poets within Argentina, like Armando Tejada Gomez, then it is difficult to choose a repertoire from any other place.

How do you choose your repertoire?

Music. The most important thing is the music. The music may have good lyrics, but I seldom sing wonderful lyrics if they don't have good music since it's very difficult to take it to the stage. A song has to touch my heart first, because I am a sort of satellite dish with people. If I don't feel the song, people will seldom feel it.

There are artists who can hide very well what is happening to them. All my personal problems do not bother me when I am onstage; I leave them out of it. But the problems I cannot solve, like smoke or defective sound, make me nervous, and that is felt by the audience. It is very easy to see through me, which is why if I do not feel the song I cannot sing it. The repertoire I select is very important for communication.

When you sing outside of Argentina, does your repertoire include more folklore music?

I have to change the repertoire according to the place. When we toured in Puerto Rico and North America, I used one repertoire in Puerto Rico, another one in San Francisco and another one in Los Angeles. We then went to Dallas and Austin, and the repertoire I sang in Austin was the one I sang for the rest of the tour. Fortunately, we keep records

—CONTINUED ON PAGE 218

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AudioGraph International

BRIDGING THE AUDIO GAP BETWEEN THE U.S. AND LATIN AMERICA

In past years, audio productions, both musical and commercial, destined for Spanish-speaking countries have been recorded and produced in American cities such as Los Angeles, Miami and New York—and with good reason. These cities have traditionally had the superior technology, production talent and world-class facilities required to handle such projects. Recently, however, this trend has been changing.

With the demand for professional audio productions in Mexico and Latin America growing rapidly, more high-end studios and production facilities are springing up in cities like Buenos Aires, Sao Paulo, Bogota, Caracas and Mexico City. Latin American studios are employing up-to-the-minute audio technology in their facilities—technology that, more often than not, has been primarily marketed to English-speaking users.

The challenge, it would seem, for both studio personnel and audio manufacturers lies not only in selling or obtaining this technology but also in getting suitable training and documentation in Spanish for audio professionals in Latin America.

Latin American students at the Sony MPX-3000 during the analog class at AudioGraph International

BY TIM MUSTAIN

One solution is presented in the recent career of José "Chilitos" Valenzuela, a design engineer, studio professional and author. After publishing his first book, entitled *Descubriendo MIDI* (*Discovering MIDI*) in 1991, Valenzuela was approached by several companies seeking Spanish translations of technical documentation. Soon afterward, he expanded his efforts to provide Spanish-language educational resources for the pro audio community and began doing business under the name of AudioGraph International.

Today, AudioGraph International has grown into a multifaceted enterprise that provides technical translation services for the MI and pro audio industries, a bilingual pro audio training center and a new production company dedicated to producing musical acts as well as commercial projects. Manufacturers including Audio-Technica, TC Electronic, Rane, Alesis, Digidesign and Peavey, as well as magazines such as *Guitar Player* and *DJ News*, use AudioGraph International's expertise to aid their marketing efforts in the rapidly expanding Spanish-speaking market.

One of the biggest problems inherent in translating technical documentation is that it rarely comes across literally—differences in language and nomenclature can cause translated versions of manuals to range from confusing to indecipherable. To help with this difficulty, AudioGraph employs a staff of bilingual audio professionals familiar not only with the equipment they are describing, but also with the Spanish spoken every day in Mexican and Latin American studios.

Another problem with technical translations, according to Valenzuela, is the differences in technical nomenclature between regional dialects of Spanish. "Speakers may be called one thing in Mexico, something else in Argentina, and something completely different in Spain. A computer, for example, is called *ordenador* in Spain and *computadora* in Mexico." To help alleviate this confusion, Valenzuela created a dictionary with cross-referenced listings of various electronic music, computer and audio terms, indexed in English, with synonyms and definitions given in Spanish. He hopes that the dictionary will help to standardize the terms used in Spanish-speaking studios, enabling audio professionals to collaborate more easily, regardless of geographical location.

Initially, AudioGraph's Los Angeles-based training facility was intended to provide facilities and equipment for Spanish-language classes in MIDI. After a number of successful courses and seminars, however, requests from South America, Mexico and Spain began coming in, leading to the expansion of the curriculum to include more general training in digital and analog audio engineering. Valenzuela enlisted the help of numerous manufacturers to help expand AudioGraph's training facilities by providing equipment, software and other resources.

Valenzuela stresses that AudioGraph's facility is more aptly described as a bilingual training center than as a school. "Our curriculum is based in practical applications," he states. "I would estimate the curriculum at 75 percent practical, hands-on training with 25 percent theory. Also, we try to keep class sizes at ten students maximum so that the curriculum can be tailored to the students' specific interests. For example, a student might want to learn console automation, or maybe audio-for-video. We work with the student to create special projects that address the skills that they want to learn."

Students at the training center have access to a wide variety of high-end tools to use on their projects. The facility features Alesis and Fostex ADAT and Tascam DA-88 digital multitrack tape machines, a ¾-inch Sony UBV-800 pro video deck, and an assortment of synthesizers, drum machines and sound modules. Additionally, students have access to Macintosh-based workstations loaded with MIDI sequencers such as Steinberg Cubase Audio and Digital Performer from Mark of the Unicorn, as well as Digidesign Pro Tools and Roland DM-800 for multitrack hard disk-based recording and editing.

Valenzuela also travels regularly, giving presentations at the School of Technology in Mexico City and in other cities in Mexico, Spain and Latin America. He has also done clinics in Los Angeles for companies such as Korg, Digidesign, Steinberg, General Music, Drum Workshop, TC Electronic and Euphonix. With all these responsibilities, you might think that he seldom gets any time behind a console. But, in addition to his other projects, Valenzuela is starting a company to produce musical acts, television and radio commercials and to do audio post as well as sound design in both Spanish and English. "It keeps me busy," Valenzuela laughs, "but I'm doing what I love." ■

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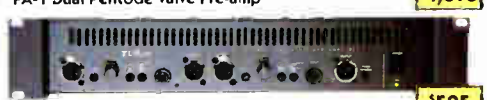

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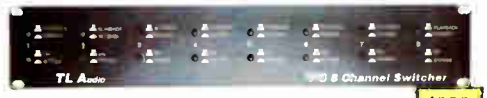

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MANHATTAN BEAT

COMMERCIAL MUSIC IN MEXICO CITY

Manhattan Beat Studios has been applying high-tech solutions to the problems of Mexico's low-budget ad industry for several years. The facility is owned and operated by three partners—producer/engineers Rafael Dondé and Manuel Guerra, and composer Gerardo Garcia. Since it began, Manhattan Beat has grown from a one-room project studio to a four-studio advertising music/production house.

Dondé and Guerra have been friends and colleagues for years; they traveled together to Boston in 1983, hoping to become rock stars. "But the surprise came when we found how many other music students had the same idea," remembers Dondé. The two enrolled in the Berklee School of Music, and Guerra landed a part-time job as a runner at Soundtrack in Boston. During the three-and-a-half years he worked there, Guerra progressed to engineer and became familiar with the studio's impressive variety of equipment. Dondé worked for four years in Le Studio Boston as the house engineer.

In 1989, they returned home with the idea of starting their own studio. In October of that year, they traveled back to the East Coast to attend the AES show and selected their first batch of equipment: an Allen & Heath console, a Macintosh running Sound Tools (the first in Mexico), a Tascam 16-track machine, Yamaha NS-10 monitors and a spare collection of outboard gear and mics. They also acquired TimeLine Lynx synchronizers and a JVC 8250 video machine. "The other really big thing when we started," says Dondé, "was getting associated with a very talented composer, Gerardo Garcia."

As Manhattan Beat's client list grew, the partners began adding rooms and equipment. They added Studio B, a jingle production studio, for Garcia to work in, but that meant that Dondé and Guerra were working practically 'round the clock. "We started doing all the engineering ourselves, Manuel and I," says Dondé. "After the first year, though, we were getting old too fast, so we started training an engineer to take care of Studio A. Then Manuel and I were working in Studio B. But business kept growing, so we trained another engineer for Studio B and opened Studio C. Then with Studio D, same thing. Now we have three engineers who handle Studios A, C and D. But Gerardo Garcia still does all the composition in Studio B, and I produce the jingles with him and mix them. Manuel takes care of booking and coordination of the studios. The clients like that, because they know that the owners are right there and are personally involved in the project. Service is so important when you're working with agencies."

Recently, the partners updated Studio A to include a Spectral workstation. That room still has the Allen & Heath (though the partners plan to replace it soon with a Yamaha ProMix 01) and Tascam 16-track machine, and a JVC ¾-inch machine (the standard in Mexico). In addition to the Yamaha NS-10s they started with, they've added a pair of UREI 803s and Auratones. Studio B, the jingle production studio, is equipped with an Amek Einstein console, Cubase MIDI sequencing, and more NS-10s. Studio C has a Sonic Solutions system, a Tascam multitrack and a Sony BV850OU ¾-inch video machine. The facility uses MicroLynx synchronization to picture in every studio.

Studio D, the most recent addition, is the most modern. "With the last studio we opened up, Studio D, the technology was more advanced than when we opened Studio A. We gave a chance to the Spectral system in that room, and we ended up very happy with it," says Dondé. Studio D is also equipped with a variety of outboard gear from Tube-Tech and Yamaha, and a Yamaha ProMix console. The facility also offers a selection of Sony and Shure mics, and 32 tracks of DA-88 that can be used in any room.

At the time *Mix* spoke with Rafael Dondé, Manhattan Beat was immersed in three major projects: advertising campaigns for Volkswagen and Coca Cola, and a lengthy ongoing project for Mattel Toys in Studio D. "We work with 30 or 40 agencies," explains Dondé, "which, in the economic crisis that we are living in in Mexico, keeps us going. But it also means that sometimes we are working on competing products. It's important that each studio is well-separated from the others. Discretion is important. Along with service and know-how." ■

BY BARBARA SCHULTZ

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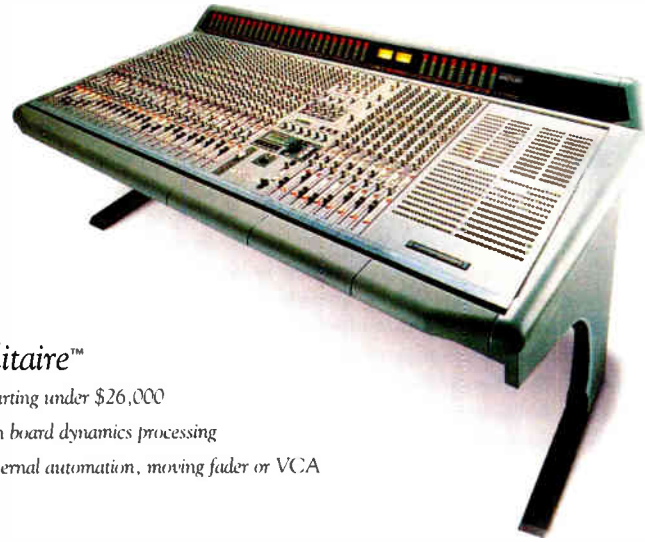

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SOUND DESIGN For

The English Patient

BY TOM KENNY

***The English Patient* is not an easy book.** The Booker Prize-winning novel by Michael Ondaatje opens in southern Italy near the end of World War II, in a bombed-out villa-turned-hospital. Hana, a young nurse, is caring for a severe burn patient with no identification, whom officials believe to be English. Gradually, and often in morphine-inspired prose, his past is revealed through poetic, sometimes unsettling flashbacks to the deserts of North Africa, the chaos of Cairo in the 1930s and travels through war-torn Italy. It's a love story about time and displacement, about people who have nowhere to call home—from the Bedouins who rescue the patient as he leaps burning from a plane, to the patient himself, who ultimately reveals his Hungarian roots.

And as anyone who has read the book will attest, it would not appear to be an easy movie to make. The weaving in and out of time, which works so well on the printed page, is challenging in film, where the pace is not controlled by the viewer. As film editor/lead re-recording mixer Walter Murch says, the mental inertia of reading is much less than the investment required when viewing sound and image combined, and what would appear easy on the page does not necessarily translate to film. It is the difference, he says, between trying to stop a pickup truck and trying to stop an 18-wheeler.

"Our biggest challenge," Murch says, "was figuring out how to put the film together so that the flow back and forward in time felt organically part of the story. So that the audience would be able to engage with the story at any one time period, but then be willing also to move from that period to another without feeling cheated or frustrated. Any film with these kinds of time transitions rides that line, but *The English Patient* does so more than any other film I have worked on. If there are too many transitions, or the transitions occur at the wrong places, we would wind up inhibiting the audience's identification with characters and situations, jerking them around

ALL LOCATION SHOTS: PHIL BRAY
SAUL ZAENTZ FILM CENTER PHOTOS: STEVE JENNINGS

Music editor Robert Randles

SFX editor Kyrsten Mate Comoglio

Clockwise from top left: director Anthony Minghella, ADR supervisor Marc Levinsohn, re-recording mixer Mark Berger, supervising sound editor Pat Jackson, and film editor/re-recording mixer Walter Murch

to the extent that they either never commit to the story emotionally, or they do commit and then become annoyed when we take them away from it. It's a bit like taking a sports car through corners along a twisty road, without losing traction, so that your passenger feels exhilarated and safe at the same time."

The challenge of the film was also its biggest attraction. Writer-director Anthony Minghella's background was in stage, radio and television before he broke through with the art-house favorite *Truly, Madly, Deeply*, followed by the "Hollywood" film *Mr. Wonderful*. *The English Patient* was shot over the course of five months in Tunisia and Italy, with a bit of set work, most notably the patient's room. As in most films of this scope, the story evolved in the editing room. Murch says the number of transitions in the final is roughly half of what was in the script, which was probably a fourth of what was in the book. And three-quarters of the transitions were created in the edit.

As has become increasingly common, picture changes were made right up until the final mix. But because the Miramax release was finally locked at 2 hours, 42 minutes (18 reels), changes typically involved far more work than would be required on a shorter, more linear film. The relatively tight temp/premix/final mix schedule was made easier by two factors: The Saul Zaentz Film Center, where the film was edited and mixed, has the most extensive Sonic Solutions network in the world (see sidebar), with original units, temps and alternates available on hard drives; and Murch

Chief engineer Jim Austin, left, and systems engineer Vince Casper in Transfer B; the Sonic network loading station is pictured through the window at right

THE SONIC SOLUTIONS NETWORK

About four years ago, under the direction of facility executive vice president Roy Segal, the Saul Zaentz Film Center began assembling a Sonic Solutions editing network. Chief engineer Jim Austin and systems engineer Vince Casper started with four rooms and a couple of Sound Designer II sidecars. Today, the company boasts 18 Sonic-equipped rooms, with more than 60 4-gigabyte drives accessible from any room, at any time. But, the facility has not thrown out its Sondor mag recorders, and DA-88s and Pro Tools systems are used throughout.

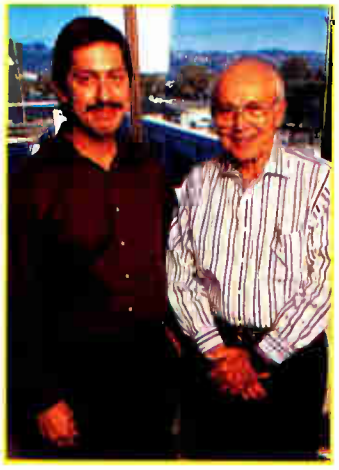
"The whole time this technology is developing, we're making feature films," says Casper. "So our original intent was to make the network work side by side with mag, with the understanding that this is an evolutionary process. Each show, we have added more digital rooms.

"The main thing Sonic contributed here, and I guess Andy Moorer is the genius behind this, is the MOFS [Media Optimized File System] file structure," he continues. "This is what allows the multiple mounting of drives. This is what allows several people to use the same file. This is what allows transfer to be recording on a drive while someone is playing back off it. About two or three software upgrades ago, we were given the ability to mount any of these Sonic drives on the Mac desktop, which is a wonderful feature because it allows you to do Finder tasks to the drives—drag-and-drop copying, searches, lists.

"We've learned a lot here coming from four rooms to 18. It's very, very advantageous having file servers as opposed to having individual rooms with hard drives. Traditionally, if you have a stand-alone system and want to move material or troubleshoot a crash, you have to shut down the system and stop editing. You then sneakernet the hard drive to another room or repair the system. That takes time. Using the network and the drive servers, a local computer can go down, and the rest of the editors continue to work without interruption. Here, any Sonic station with a MediaNet card can be a server in an emergency."

On a typical show, the transfer department will first load and deploy the server room, which consists of four Mac IIci computers, each with eight 4-gig drives. (As the Sonic network card handles the file and all SCSI activity for the net, state-of-the-art computers are not required for this function. Editing rooms are equipped with Quadra 950-class machines.) Then, when more drive server space is needed, individual rooms—the ones not in heavy use—handle the overflow. In the case of *The English Patient*, there were servers for ADR, Foley, dialog and effects, with additional stations for temp mixes (so editors could edit multitrack mixes, and still go back to original elements) and a guide track. "Originally we were putting guide tracks in with the dialog system," Casper explains, "but we realized that it's such a dominant player on the net that we had to give it its own server. Anyone who's cutting wants a guide track to play against." Daily backups are done to Exabyte, from 5 to 9 in the morning, and at 2 a.m., via automatic macro-dash scrips, running Retrospec backup software. Casper performs low-level formatting of the drives about every three months as a preventive maintenance measure.

There are a number of sub-networks involved, including the music net, which allows a direct fiber optic link to the Sonic System on the dub stage and allows music editor Bob Randles (who has a mirrored set of six 4-gig drives) to switch to the larger editing network as well. Because music is played back directly from the Sonic, in case of changes or drive failure, the dub continues without interruption from his music editing drives. Also, there is an AppleTalk network, known as Walter World Wide Web, for the picture editor/re-recording mixer Walter Murch, which is linked with supervising sound editor Pat Jackson and two of her assistants. This net is for exchanging FileMaker III database updates containing picture change information, and, of course, the ever-present e-mail. The print station AppleTalk network consists of two Quadra 610s running Trackit cue sheet software, with an HP LaserJet 4 as their target. Also, there is the company office network which extends onto the dub stages and the client lobbies for administrative tasks.



Steve Shertz, Saul Zaentz Film Center director of operations, and Roy Segal, right, executive vice president

Perhaps one of the big bonuses for sound designers is that the Film Center has made Pro Tools sidecars available in the effects rooms, what Casper refers to as the hybrid rooms. "We've set up a digital switching situation where we can route digital signals from Pro Tools to Sonic, Sonic to Pro Tools, DAT to Sonic, using Z Systems sample rate converters and switchers," he says. "We bridge the two platforms by moving things digitally—maybe not the most efficient way, but until all the file structures are compatible through something like OMF, it's probably the only way. It allows these hybrid rooms to do an assortment of tasks, and it lets the designers who want to do something in Pro Tools then just move it into the Sonic. It's been an interesting evolution for the Pro Tools people, when the first time they open up the Sonic Manager and see they have access to that many hard drives, their eyes pop out. I think the next step you'll see around here is putting Sonic MediaNet cards in Pro Tools computers and literally allowing the ability to mount a Sonic drive on the Pro Tools desktop." ■

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wore the two hats of film editor and re-recording mixer, an unusual but effective arrangement. When he and Minghella made picture changes, the Avid output was dumped directly to super VHS for updating the temps or premixes.

Even with all the high-end technology employed at the Zaentz Film Center, the glue that held the project together was a core crew that has worked together on and off for the past 20-plus years. Re-recording mixer Mark Berger and supervising sound editor Pat Jackson were hired by Murch for *The Conversation* and *Godfather II* back in the early '70s, and the relationship of Berger with Zaentz goes back to *One Flew Over the Cuckoo's Nest*. As Jackson says, "This is the Saul Zaentz company doing a Saul Zaentz movie, so there's a lot of excitement about it."

THREE WORLDS OF SOUND

Transitions in and out of time are traditionally the domain of the composer and the music editor—a prelap or postlap cue, perhaps a single piano note to trigger an event or a memory. And while those types of transitions certainly lent a great deal of emotion and coherence to *The English Patient*, as will be discussed later, the groundwork for the audio transitions was laid in early discussions about the three main settings covered in the film.

"There's the desert, there's Italy at the conclusion of World War II and there's the monastery," explains Jackson. "We conceived of those as three separate universes, and they each have their own audio world. Anthony was very clear that he wanted the monastery to be a refuge from the other two worlds, so early discussions with Walter were about how to create the feeling that the monastery would be a sanctuary. That meant it had to be a sanctuary *from* something. The world of the army in Italy is noisy, and it has artillery and clattery elements going on—it's chaos, it's war. The desert is another kind of assault, which you certainly see in the sandstorm. And Cairo [which, technically, could be considered a fourth world] is a babble of people, an exotic chaos. Then, when you get to the monastery, the present, it's very serene."

"The sections of war are such that almost all of the sounds you hear are manmade sounds—motors for the most part, explosions, guns. Nature plays a very minimal role," Murch adds. "When he goes to the monastery, that's when

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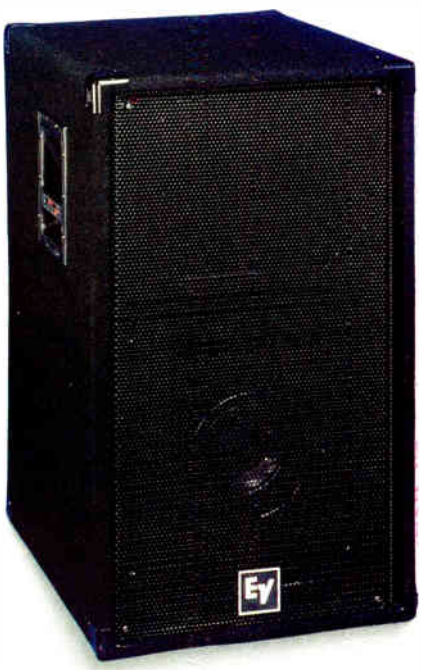

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nature takes over, and the war, the mechanism disappears, and we suddenly start hearing birds for the first time in the film."

"The monastery has a lot more birds," Berger agrees. "There's a lot more movement of the rustling of winds and branches and trees. It's a warmer sound, a friendlier sound. There aren't a lot of sharp edges, and there's more echo surrounding you, enveloping you in rooms, so you tend to feel enclosed and safe."

This is not a loud movie, but as many editors and mixers intuitively know, apparent loudness is key to a dynamic mix, which explains Jackson's statement about the monastery, the hospital, being a refuge *from* something else. Sometimes you know how quiet an area is by what you can hear, Jackson says. Small sounds, slightly exaggerated, can convey: "This is really quiet."

"There's a wonderful moment where Hana has come up to the patient's room for the first time, and she brings a plum," Murch says. "She chops the plum up and feeds the patient. It's probably the first time he's had fresh fruit in months, if not years. And at the same time, all of the ambiences that were playing had been reduced so you hear very clearly the sound of someone eating a plum. But also at the same time, two miles away, you hear the sound of a distant church bell. There's kind of a synesthesia of the sound of the bell and the taste of the plum. We're asking the audience to remember what a plum tastes like, and in a way, that distant bell is the sound equivalent of: 'Oh yeah, I haven't heard this in a while.' That's the first time in the film you've heard anything like that. I said earlier that you begin to hear nature at the monastery, but at the same time, you also start to hear what remains of civilized humanity, which in this case is symbolized by the church bell. Everything up to that has been bombardment."

Many of the flashbacks have a sound effects or music trigger, sometimes both. They are subtle in most cases, as there is always the danger of sounding too perfect or contrived. Some examples: As a medical tent is bombarded by artillery, the lamps in the tent clang together, and the clanging dissolves into the tinkle of a medicine man's bottles as he arrives at a desert oasis to treat the patient's burns. In another, Hana is alone playing hopscotch, and the English patient hears

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her footsteps in rhythm to the beat of Arab drumming in the desert as he falls into a flashback. Or, the patient Kip (an Indian bomb expert, temporarily housed at the monastery) and Hana are joking about the patient drinking all of Kip's condensed milk. As Kip taps on a new can before opening it, the tapping helps the patient drift back to Cairo, arriving after a sandstorm, to the sound of metalwork in an open-air marketplace.

Those examples were planned, either in the script or in the picture edit. Sometimes, however, those "happy accidents" take place at the mix, where all the elements are in place and, as Jackson says, "movie magic happens."

In a scene where Hana watches and the English patient hears Kip and a partner drive away on motorcycles, the sputtering triggers the sound of trucks coming across the desert. "We had designed this to overlap, for the motorcycle to trigger the truck effect," Jackson explains. "At the mix, though, there was music right on top of it. We had been struggling anyway to get the motorcycles and the trucks to connect, but it became apparent that it was overly complicated, and that we needed to let the motorcycle go away, let the patient have a moment to breathe while the music sort of wafts over you, and then go into the trucks. I wound up feeling that it was the sound effects making it complex. So let's let the music carry it through."

In another fortuitous moment at the mix, during the final on reel 11, a quiet reel, the English patient asks Caravaggio (a former spy who's come to the monastery) why he's wearing bandages on his hands. A Benny Goodman tune, "Wang Wang Blues," is playing on the Victrola. As Caravaggio rises to unfurl his bandages, there is a cut to the Fall of Tobruk, during the war, where the story of his bandages is explained. "As part of the premixes on the Tobruk scene, we had put in an air-raid siren, synched with picture," explains Murch. "But there was suddenly something about Benny Goodman's clarinet that reminded me of the siren, and as this clarinet rolls up in pitch, I thought it would be a good idea to start the siren a little earlier and have the sound come out of the clarinet. So we laid up that track, slipped it and put it in. It doesn't happen on the frame, but you go from relative quiet to as loud as the film gets within a couple of feet."

"All we had to do was move the air-raid siren 12 feet, and it makes a beau-

tiful music transition," adds Berger.

The war in Italy is loud, with distant artillery ringing in the backgrounds, and the scenes in Cairo are packed with urban ambiences. This is the age before air conditioning and before, as Murch says, the internal combustion engine has taken over. The shouts and babble outside the open windows depict an active, dense human environment. There are not a lot of car honks or trucks—just street life and open markets. The only place like it today would be Venice, Murch says.

The desert, where the English patient—actually a Hungarian desert map maker known as Almasy—both finds and loses love before crashing in a burning biplane, presented its own set of challenges. At times it was deathly quiet, described by Berger as "a constant search for that perfect air, the air that isn't there. What is the sound of the desert when nothing is happening?" Murch called it "varieties of air, with a few particular kinds of insects. On the production tracks from Tunisia, we heard this dry cricket sound, almost a pure sine wave-type chirp, very unlike crickets in temperate zones. There are insects where the sound itself speaks of dryness."

"It's dry, it's hot, it's windy," adds Jackson. "There are insects, desert birds of prey. The relentlessness of the desert is what we were trying to create. Even the contrast can sometimes make it work. When the English patient crashes early in the first reel and is discovered as a smoking ruin by the Bedouin, there's sand and wind and a camel caravan. Then he's taken to an oasis, and it's pretty subtle, but you can hear the sound of water in the oasis, in a way that makes you realize by its soothing quality what it's like everywhere else in the desert."

Many effects transitions were discarded as picture changed, others were created in the temps or at the final. Filmmaking is a constantly evolving process, a moving target, but by the end, right up to the final mix, the only wild card left was the music.

MUSIC BY DESIGN

Actually, because of the way composer Gabriel Yared worked, music was not such a wild card, which could have been problematic in a film of this length that was so heavily dependent on timing and transitions.

"One of the things that helped is the composer had actually done scratch mixes that were used in the temp mixes very early on," explains Berger. "The cues were done on synths, so the timbre and the frequency ranges that the music was going to be in—and where there was gong to be music and how big—was all available for working against early on. So all the sound effects editors and the music editors knew from the temp mixes and the screenings what their various areas were going to be. They were able to mark out their territories—'I've got the low frequencies here, and you can have the high frequencies. This is going to be a music scene, so let's not get too detailed. Or, we're going to be working back and forth here.' Because music was conceived of very early, there has been a lot of collaboration and a lot of synergy."

Rick Kahn and Grant Foster in Transfer A where the Nagra-D tracks were loaded into the Sonic network

Music editor Robert Randles echoes the glory of collaboration, which he says is made much easier through the use of the network. Basically, from his Sonic Solutions setup in Room 309 at the Zaentz Film Center, he can call up individual scenes and listen to the dialog edit, effects edit, or any combination of the previous temp mixes. "For example," he says, "in the main titles we have an airplane, and we have basses in the orchestra in about the same pitch range. So we pitched the sound of these airplane propellers to follow the music. The effect of the pitch changes following the orchestra is subtle and would sound natural as an airplane engine, but it also fits with the orchestra. This is the sort of collaboration that is easier to do when you are on the network."

There are numerous other examples of effects and music working together, especially in the transitions. Part of that may have to do with the fact that Randles does more "music design," piecing together bits and adding textures, than regular music editing. And on this film, that was necessary because of the short time Yared had with the orchestra.

The score was recorded over two days, four sessions, at AIR Studios in London. Not a lot of time for a long movie. The 60-plus piece Academy of St. Martin in the Fields orchestra was recorded to 2-inch, 24-track at 15 ips, with SR, by Keith Grant. Rather than trying to cover every scene, there were times Yared asked for cues in a certain key, or a coda, with instructions for Randles to use them where they would fit best. Sometimes they got only a single take; other times they were able to only record the rehearsal. Tapes were then flown back to the Zaentz Film Center and mixed by Michael Semanick to eight tracks (L-C-R-[orchestra]-LC-RC-L-C-R [solos, synths]) directly into the Sonic Solutions system, using the 18-bit Sonic converters. Some synth passages were also added at this point, to spotlight certain Middle Eastern instruments.

One of the more interesting textures Randles added after the fact was low, low tone clusters. He recruited six voices from the San Francisco Gay Men's Chorus and San Francisco Opera. Rather than tracking specific cues, he recorded them 3-track into the Sonic, singing in various pitches down to A below the staff. Those tracks were then quadrupled and added where it helped fill out the tracks. In one case, director Minghella wanted to repeat a quiet, plaintive clarinet and harp passage against the backdrop of the desert, when Almasy is going to rescue Katharine. To avoid strict repetition, Randles dropped in a counter-melody of low voices. He also added them as tone clusters to a sorrowful Hungarian lullaby that is heard inside a cave, added them to an airplane scene and put them in the 70-plus tracks of "Silent Night" at a Cairo Christmas party.

The Christmas party scene had to be premixed in the Sonic down to a more manageable 24 tracks for the dub stage. The actors had sung it in production, and Randles added untrained voices of whoever was roaming the halls at AIR Studios. Low tone clusters were added, and antiphonal parts—not too perfect—were recorded. And holes were allowed for the orchestra to creep through, although Randles had to piece together a

—CONTINUED ON PAGE 204

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BY TOM KENNY

POST SCRIPT

SOUND FOR FILM

FILM SOUND MYTHS

by Larry Blake

In writing about and working in the wacky world of film sound, I find myself trying to uphold the techniques and practices of the past (five channels behind the screen, intelligible dialog) as much as I tout the wonders of newfangled techno-toys. Just as conflict is the foundation of all good drama, I have used the struggle between the old and the new as the starting points of many columns. This one will in fact focus on myths—long-standing and recently minted—that float around the world of film sound (or, should I say, the ones that piss me off the most; I have a reputation to maintain, after all).

What bothers me about these myths is not so much whether they're true or not; it's the fact that people follow and repeat them blindly. This "lemmings" factor creates an environment in which the *status quo* is never challenged. I say: Always doubt and always question everything and everybody: Dolby, DTS, SDDS, THX, Oscar-winners and, yes, Larry Blake.

Mythmaking also creates a Haves and Have Nots atmosphere. An inexpensive sampler and the cheapest workstation that you can afford will do just fine...if you have the talent to back it up. Don't apologize because none of the equipment that you own is mentioned in articles in *Mix* about film sound. Now, to the list:

• "XYZ Workstation Cannot Cut Dialog": Or music or effects or whatever. This one just blows me away because I have heard it so many times. I will not repeat the name of the alleged offending workstation because, having cut much dialog on it, I know such accusations are groundless.

It's one thing to have opinions on given systems and their respective software/hardware pluses and minuses. Clearly, a RAM-based system will provide additional power that is quite useful for sound design work. But I don't think one can say that XYZ RAM-based system *cannot* be used. And anyone who tells me anything like that will have to play me sound effects created with *their* system that are more creative and have more panache than the effects that Ben Burtt created 20 years ago for *Star Wars* using a 4-track, ¼-inch TEAC deck and, for the most part, simple tape manipulation. (I hate to drag this argument up for the umpteenth time, but I will continue to do so because it works so damn well.)

Am I saying that all workstations are created equal? Not by a long shot; for example, I think any DAW that doesn't broadcast all waveforms all the time is ergonomically challenged. I've cut on DAWs that do and do not display waveforms, and I think that not seeing what you're hearing is robbing you of the intuitive ability to go right to what you need to cut, to find which side of the stereo track is left-heavy or which track goes quiet all of a sudden or where the ADR starts to walk away from production. It's like the difference between looking at an analog clock and a digital clock: Your brain processes "ten minutes before 11" a lot quicker than it reads the cold numbers "10:50."

The glib comeback that I've heard to these opinions, from proponents of certain non-waveform-displaying DAWs, is "well, I like to *listen* to what I'm cutting." Huh? As if people who can see waveforms don't listen, too? I am reminded of the

—CONTINUED ON PAGE 120

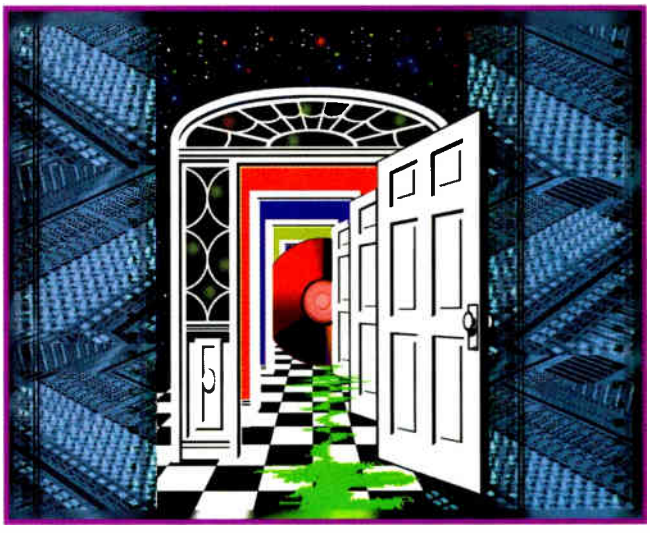

ILLUSTRATION: TIM GLEASON

FACILITY SPOTLIGHT

THE NASHVILLE NETWORK

BEYOND THE GRAND OLE OPRY

by Loren Alldrin

Though The Nashville Network may be best known for its affiliation with country music and The Grand Ole Opry, there's a whole lot more going down at TNN than just line dancing and guitar pickin'. The facility has done audio/video production and post-production for everything from classical ballets and dance programs to cooking shows and music awards.

PHOTO: THERESA MONTGOMERY

"Most people have no idea the extent of what we do here," says audio engineer Marc Repp. "When I list some of the shows that have been done here at TNN, I often hear, 'You did *that*?' They're surprised by the size of the facility, the quality of the equipment and our track record. It's the biggest little secret in the TV industry."

"TNN is an outgrowth of what we used to be, which is a production rental facility," says Danny Wendell, director of operations. "We are still, and always have been, producing programs for everybody else, as well as TNN. We're doing [programs] for ESPN, NBC, ABC, CBS, PBS, the Home and Garden Network, the next Farm Aid in Columbia, South Carolina—you name it." In addition to all this outside work, TNN's parent company, Gaylord Entertainment, owns and produces programming for the CMT (Country Music Television) and Z Music cable networks.

The bulk of Gaylord Entertainment's production takes place in two large sound and video stages, as well as in the theater that

—CONTINUED ON PAGE 126

SOUND FOR

MUHAMMAD ALI

THE WHOLE STORY

by Gary Eskow

In the mind's eye, he still floats and stings, the grace of his dance masking the violence of the craft he practiced so well, if too long. A thousand blows to the head have taken their toll, but the public's fascination with Muhammad Ali remains remarkably vigorous. When TNT VP of program production and executive producer Carl Lindahl commissioned Consentino Films & Video to produce a film biography of Ali, he counted on it generating strong public interest. What the network got in *Muhammad Ali—The Whole Story* was the largest viewing audience for a documentary in the cable network's history.

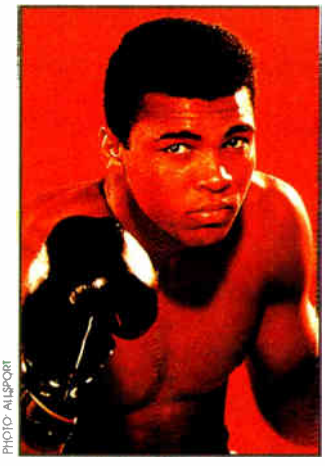

PHOTO: ALLSPORT

Coincidentally, Joe Consentino, producer of the film and a former professional baseball player in the Boston Red Sox organization, had been a camera man on the "Fight of the Century," which took place more than a quarter-century ago. When Ali stepped into the ring at Madison Square Garden against reigning champ Joe Frazier in the first of a trio of legendary bouts, the world watched those four corners, where one man, a symbol of American doggedness and comparative rectitude, stood toe to toe with one who had achieved the American dream and stepped outside it rather than serve in the Vietnam War—on grounds of religion and conscience.

PHOTO: STEPHEN CONSENTINO

Front to Back: re-recording mixer Andy Ebberbach, director/editor Sandra Consentino and producer/DP Joe Consentino

"I remember quite vividly being in the Garden at about 4 in the afternoon, checking my lighting," Consentino recalls. "The place was empty.

—CONTINUED ON PAGE 129

—FROM PAGE 118, FILM SOUND MYTHS

time I complained about the design of a company's new EQ, which had no values screened on the unit so you really couldn't write down what you had done, something which I think can be very helpful. The haughty reply that I got from the guy at the company's booth at a trade show was, "Well, we'd like to think that you would *listen* to what you're doing." Listen to *this*, pal.

But *can* you cut on a non-waveform-displayed system? Yes. Can you do great work on one? Yes. Will I be able to hear the difference? No. But will *I* work on one? No.

• "PDQ Workstation Doesn't Sound Good": Whenever I hear this opinion, the first question I ask is: "Have *you* made a direct A/B comparison, using the same A/D and D/A converters, with the alleged offending system and the one you are championing?" I have not yet heard an affirmative answer to that question. Again, we have the lemmings factor. Someone, perhaps a well-known mixer who really knows what he or she is doing, offers this opinion and people repeat it as gospel without any first-hand evidence.

The bottom line is that workstations and MDMs are in essence storage systems, although software capabilities, as noted above, are a big factor with workstations. If you think that a certain MDM sounds bad when compared to your mag recorder, have you tried it hot-rodded to 20-bit, or at the very least with external converters?

• "Why Don't You Have a DAT?": I am referring to the way very green producers will look in wonderment when a production mixer will show up on the set with a Nagra. This idea that DAT=Digital=Good is such a pile of crap. I am much more concerned about what kind of console the mixer is using or if the boom operator knows what he or she is doing. Or does the production sound team know when to plant mics instead of instinctively reaching for radio mics. Or even as simple as what kind of mics they're using in the first place.

This question is made even more irrelevant when those same producers will not bring the sound crew on early enough to participate in the location technical scouts or will not give them time to get wild tracks. It's really just a case of the forest for the trees, with DAT vs. Nagra being just a tree, while correct mic placement is like an old-growth forest: the real thing, beautiful and increasingly rare.

• "I mix for dailies": This is the familiar chant of production mixers who feel as if they are making their tracks safe for dailies by using EQ to taste, along with considerable fader moves. This is true science fiction to me and to everyone else I know who deals with production tracks in post-production, namely dialog editors and re-recording mixers. (To those of you who are sick of reading me rant and rave about this, you have my permission to jump to the next section.)

It all boils down to distortion, defined as any change of the original signal, which in this case is what the microphone presents to the production mixer's panel. EQ causes phase shift and distortion, and unless you're preventing overmodulation (or are helping a lavalier radio microphone cut through clothing), the knobs on a production panel should remain flat, save for highpass filtering below 80 Hz. Regardless of how much traffic noise is on the track or how much low end remains in the actor's voice, creative EQ of this track is best left to post-production, when a) it is cut together with other takes from that scene, b) calibrated monitors are used, c) top-quality EQ can be used, and, last but not least, d) one can press Rewind. If all of the low end is removed before the track hits post, the track can't be shaped to remove as much noise as possible short of hurting the voice.

Regarding "b," I was scared a few years back when a company was talking about designing a headphone box that would give production mixers an accurate simulation of X-Curve response. Though there is nothing intrinsically wrong with this idea, I was scared that it would open up a Pandora's box for production mixers who would be twisting knobs away to taste.

I respect the tough position that production sound crews

PHOTO CRAIG T. MATHEW

Left to Right: Douglas E. Turner; Nella Torri; David J. West, CAS; Michael Williamson

EMMYS SWEEP FOR WEST PRODUCTIONS

It was quite a September weekend for West Productions of Burbank. On the 7th, they swept the Emmys sound categories for a drama series, taking home trophies for Outstanding Sound Mixing and Outstanding Sound Editing on *The X-Files*. Kudos to the re-recording team of David J. West, CAS; Nello Torri; Douglas Turner; and production mixer Michael Williamson. Congratulations also to sound supervisor Thierry Couturier, dialog editors Maciek Malish, Chris Reeves, Michael Goodman and Marty Stein; sound effects editors Susan Welsh, Michael Kimball, Rick Hinson, Ira Leslie, Jerry Jacobson and Greg Pusateri; ADR editor Debby Ruby-Winsberg; music editor Jeff Charbonneau; and Foley artists Kitty Malone and Joe Sabella. On the previous night, the team, which makes extensive use of QSound technology to create an enhanced stereo spread, took home the 1996 International Monitor Award for Best Audio Post-Production. ■

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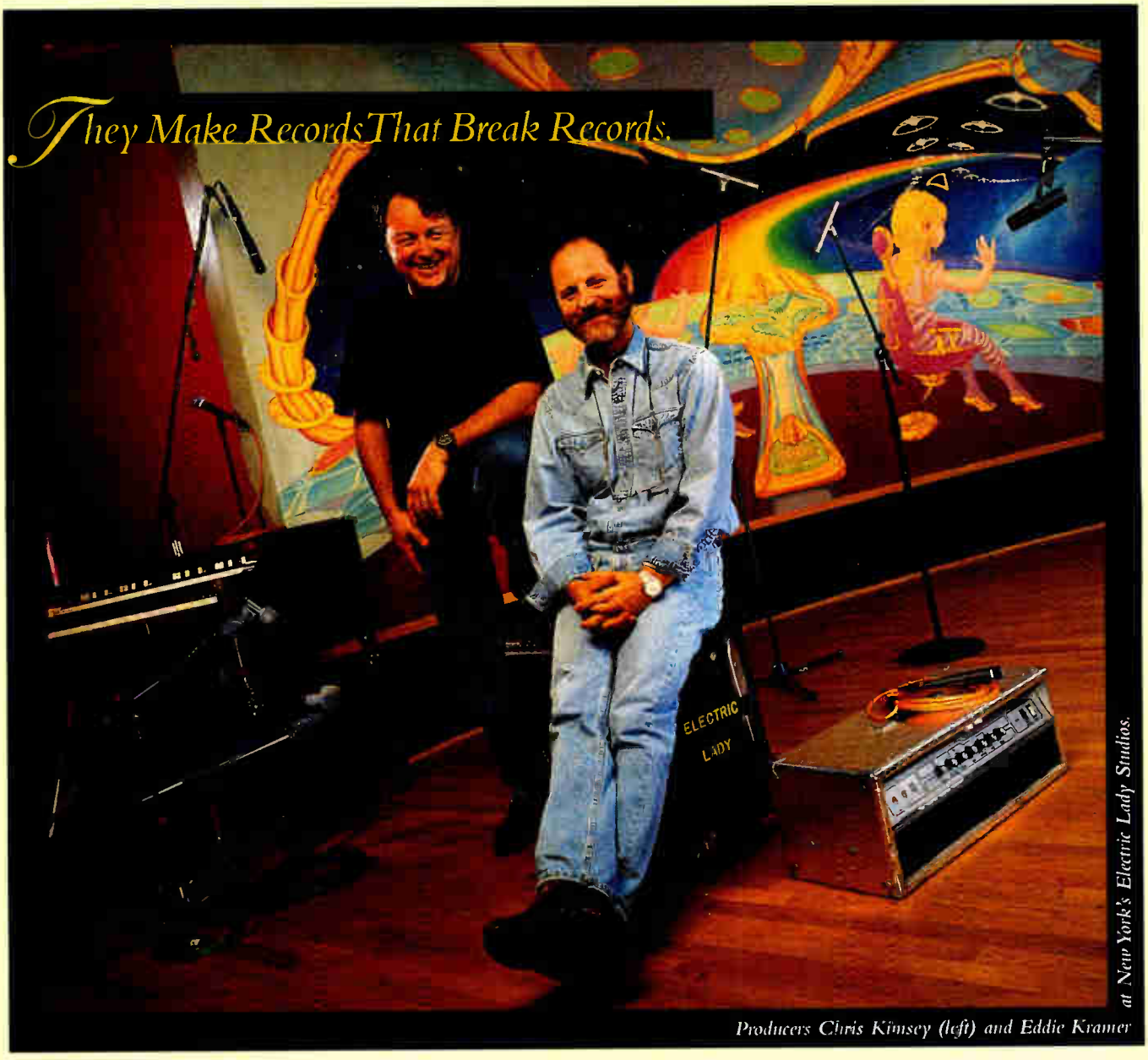
are in, but I think that the whole concept of mixing for dailies has become a self-fulfilling prophecy used to convince producers that they are rescuing the tracks from oblivion. A few movies that I have worked on were recorded "fat and flat," and they sounded just great in dailies, with many of the crew wondering why they had never heard something that good before. And indeed, when I got these tracks in post-production, there was very little for me to do other than to give them overall shaping and light compression.

So, please, brother and sister production mixers, try what I'm talking about. Let your producer and director know what you're doing and enlist the backing of whoever will be handling post-production on the film. I can guarantee support from our end.

• "This room was tuned recently":

POST NOTES

On the Ranch: Projects this fall at **Skywalker Sound**, Marin County, Calif., included *Romeo and Juliet* (Timm Holland, supervisor), Tim Burton's *Mars Attacks* (Richard Hymns, supervisor), *One Fine Day* (Tom Bellfort, supervisor) and *Sleepers* (again, Tim Holland, with sound design by Richard Beggs)...Down at **Digital Sound & Picture** in L.A., meanwhile, after finishing David Lynch's *Lost Highway* in early August, the facility handled audio post on *Washington Square* for Caravan Pictures (Frank Gaeta, supervisor), *Going West in America*, a Rysher/Paramount/Gale Ann Hurd production (Greg Gerlich, supervisor) and *Austin Powers* for New Line (Fred Howard, supervisor). John Ross, owner of the facility, was lead mixer on all three...At **Media Ventures**, the Santa Monica facility headed by Hans Zimmer and Jay Rifkin, composer Jeff Rona continued his duties on *Chicago Hope* and picked up a feature, *Do Me a Favor*; John Powell is scoring the second season of the Steven Spielberg-produced *High Incident*. Lee Curreri began composing for the TV series based on the film of the same name—*Dangerous Minds*. And John Van Tongeren continued with the moody scores for *The Outer Limits* and *Poltergeist*...Joe Macre and assistant Steve Hammond of **Video Post & Transfer**, Dallas, recorded ADR lines for *The Evening Star*, a Rysher/Paramount sequel to *Terms of Endearment*...**Alan Ett Sound Design Group**, a division of Alan Ett Music Group in Burbank, completed work on the new fall package for Entertainment Tonight's fall season, as well as the promotion for *Home Improvement*. Also, Alan Ett welcomed Daniel Colman, formerly of Sound Techniques in Boston, to its staff...Rex Recker of **Photomag**, NYC, mixed a series of spots for Major League Baseball on Studio D's AMS Neve Logic 2, with playback of an Avid AudioVision file through a 24-track AudioFile Plus system. The spots feature performances of "Take Me Out to the Ball Game" by Aretha Franklin, Mary Chapin Carpenter and the Goo Goo Dolls...At **Music Annex** in San Francisco, Jon Grier engineered some promos for the Oakland Raiders, and engineer Mary Ellen Perry worked on a multilingual project for Sun Microsystems' Netra Internet Server, making use of voice-over talents in Italian, Spanish, German, Chinese, Japanese, French, Korean and Swedish...Dan Gralick of **Dan Gralick Music and Sound Design**, NYC, designed an 8-channel surround mix (engineered by Matt Sietz) on a 32-voice Pro Tools PCI system for a Brown University historical presentation in sound and light...**Music A La Carte**'s (Miami) Rene Barge scored two 21-minute "edutainment" videos for Warner's KidVision label...**Milbrodt/Music & Sound Design** produced the soundtrack for a Janssen-Parmacia video presentation on cures for mental illness, and recorded voice-over, into a Synclavier, for a multimedia training program for Holderied Graphics...**Awards!** Santa Monica's **Pacific Ocean Post** won two International Monitor Awards for work on the Rolling Stones' MTV special *Stripped* (Best Audio Post Production in Tape Originated TV Specials; Mitch Dorf, engineer, with Ed Cherney, Bob La Masney, Bob Clearmountain, Jess Sutcliffe and Chris Kimsey) and Tom Petty's Music Video "It's Good to Be King"...**Gary Remal Malkin** of San Francisco won a fifth straight ASCAP Film and Television Music Award for his total body of work in the Most Performed Underscore category—primarily for his work on NBC's *Unsolved Mysteries*...**Studio News: Post Edge Hollywood**—Florida, that is—opened a couple new audio suites as part of its relocation. The rooms are centered around Yamaha 02R 40-input digital consoles and Studer Dyaxis 16x8 workstations with removable drives and Plug and Play MO storage...**Synchronized Sound** in Atlanta took delivery of a 32-channel Neotek Elan production console with Audiomate moving-fader automation for ADR, sweetening and mix-to-picture work in Studio C...studio bautton has completed the architectural and acoustic design for **Swell Inc.**'s (Chicago) three new audio post suites...**7th Level**, the multimedia production house owned by music industry veterans Bob Ezrin and Scott Page, opened a new audio division and brought in a Euphonix CS2000 console and Spectral workstations...**Woodholly Productions** in Hollywood took delivery of two Otari Concept consoles and has two more on the way. Recent projects mixed by chief engineer Larry Forkner include *Great Drives* for PBS and *Amazing America* for The Learning Channel...The Walters-Storyk Design Group completed a 5,000-square-foot facility for **Steve Shafer Music** (Chicago), a leading commercial music production studio. Besides the main room, the studio features two control rooms, with a Euphonix console Synclavier/PostPro, Otari 24-track and Sound Tools II for editing...**Gremlin Interactive**, a UK games manufacturer, purchased a SADiE disk editor for its audio suite...**Apres midi** has opened in Paramus, NJ, billing itself as the "only multimedia facility of its kind in the area," with an emphasis on video production/editing and audio production/post...**Adding On: EDnet**, the San Francisco-based digital networking systems provider, has named Alan K. Geddes as its new VP/CFO, and Ray Mussato as VP of marketing...Casey Mershon, formerly of Avenue Edit, has joined **Spots BME** in Chicago as audio engineer...**JBL**'s 3678 Screen Channel Cinema System has received THX approval for small-room applications—meaning rooms up to 45,000 cubic feet, with screen distances no more than 40 feet...And finally, **Convention News!** The Hollywood Reporter has entered a strategic alliance with the American Film Marketing Association to relaunch **POST/LA** at the American Film Market in March 1997. Call 818/843-7058 for more information. ■



Producers Chris Kimsey (left) and Eddie Kramer at New York's Electric Lady Studios.

Twenty years after its release, "Frampton Comes Alive" still holds the record for the best selling live album in history.

But for veteran producers Chris Kimsey and Eddie Kramer, it's only one credit in a body of work that spans three decades, includes more than 50 gold and platinum albums and reads like a who's who of rock history.

Kramer's work with Jimi Hendrix is legendary. Not only has he recorded 11 Hendrix albums, but he collaborated with Jimi to build a rock shrine: Electric Lady Studios.

Kimsey's credits are equally impressive. To date, he's been behind the board on nine Rolling Stones albums, in addition to his work with scores of other internationally acclaimed artists.

And although the music they've recorded has changed over the years, their choice in microphones hasn't.

"I've been a big Shure fan since the mid sixties," says Kimsey. "Today I use them more than ever — for both studio and live recording. There's a very high comfort factor."

"Success over time comes from constantly reinventing yourself," adds Kramer, "something Shure has done consistently through the years." Which is why Kramer and Kimsey are frequent users of newer Shure models like the SM98A, SM91A and VP88 condensers and Beta dynamics — along with performance-proven favorites like the SM7, SM81, SM57 and SM58.

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The Cult	Psychedelic Furs
Duran Duran	Rolling Stones
ELP	Ten Years After

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This nugget of wisdom is frequently uttered by assistant theater managers or theater service personnel who just cannot grasp why anyone would question the alignment of a room. I religiously supervise the line-up of the theater every time we show a film: either a screening for friends, a public preview, the cast and crew screening, or opening engagements in Los Angeles and New York.

A key reason that I make sure that the A and B chains are aligned *that day* with me present is to minimize the variables that will always hang around. Though we should never expect the Cerritos multiplex to sound like the Academy theater, we do have the right to listen and have non-blown drivers on all channels, to have all channels aligned to 85 and to have the A-Chain level, azimuth and frequency response checked. Sometimes time does indeed prevent a B-Chain adjustment, as does politics, when one is going into a dubbing stage or someone's private screening room. In these instances, you should just verify with pink noise the channel balance and timbre.

If you don't do all this, then not only can't you trust what you hear, but you lose the ability to check the translation of your mixing studio to the real world. In addition, and perhaps more importantly, getting out in the field gives you a chance to see how it's done "out there." You will undoubtedly learn how you can make your work better (preparation of test tones, for example) and you will find sincere appreciation for meeting them halfway. You'll be that much better prepared at your next preview.

But remember: Anyone who tells you that their room was tuned recently also has a "check in the mail" for you. Beware.

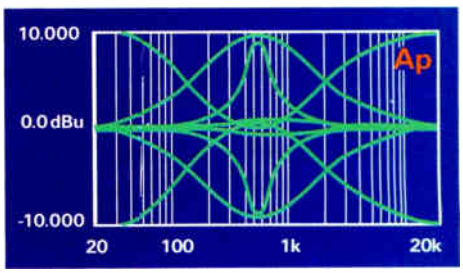
• "You don't need tones with digital": If I am ever featured on the evening news for random spraying with an AK-47, you can safely bet that I will have heard this comment one too many times. As I fire away, I will be thinking of the grief that all of my disgruntled transfer and mixer friends go through when a unit of sound (be it from a workstation, MDM or DAT) arrives with no known reference. The fact that the system that you use might have no external A/D or D/A level trims does not obviate the need that external analog devices, such as consoles and recorders, have to adjust their I/Os precisely. If your console fader automation is to function correctly, you should ad-

master pieces

an era of mixed analogue and digital audio chnology, the requirements of mastering ıgineers have never been more precise. It is in sponse to growing demand that Focusrite has eveloped two new products, designed to ldress the key processing functions of equali- ıtion and dynamic control.

ıe Blue 315 Mastering EQ and the Blue 330 astering Compression Limiter both make use the highest quality switches for all rotary ınctions. These provide precise and repeatable ettings in units of unequalled build quality, ısuring long-term reliability and performance.

Mastering is the process by which a mixed product is refined – the fine-tuning and assembly for particular medi. Private discussions with individual mastering engineers, coupled with careful research, revealed many small differences between a programme equaliser and a product designed for top-quality mastering. These differences were the starting point in the design of the impressive 315.



Blue 315

was the widespread desire to see the legendary A 110 Equaliser available for mastering which led the creation of the Blue 315. The simple request s for rotary switches on all functions, but of course ere is a great deal more to mastering than recall- ility of rotary switches alone.

The frequency ranges have been gently expanded to allow for finer resolution and the Q controls boast higher resolution and wider low-end range. In addition, the boost and cuts are designed with small increments close to the null point and larger steps at the extremities. The filters have minimum ripple roll-off and the extra-fine variables of the input gain controls allow for absolute precision.

Mastering will always be a very personal skill, and it is with this in mind that the 315 has been constructed to allow simple adjustments according to individual preference.

This technological 'masterpiece' has been achieved without any sacrifice of Focusrite's traditional standards. You are assured of the best performance parameters (often superior to digital), the highest quality components and construction, along with both transparency of sound and ease of use.

"The Blue EQ is a superb sound sculpting tool. It allows me to develope textures no other equaliser enables you to achieve"

– Tom Coyne, Sterling Sound. New York.

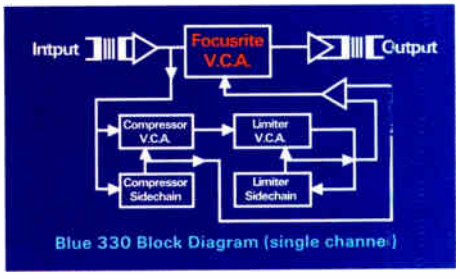
"In almost a year I've used my three old EQ's three times. Any other questions?"

– John Matousek, Masterworks. Los Angeles.

Blue 330

lso the product of customer demand and extensive search, the Blue 330 represents the transformation the Focusrite Red 3 Compressor and Limiter into Mastering format. Unique and unrivalled in all its tributes, we feel it genuinely deserves masterpiece itus alongside the 315.

The structure of the circuits is very different to at of other compressors/limiters. The 330 separates e compressing and limiting processes, which are en implemented by one signal path VCA through mbined controls signals. You are able to compress d limit in turn, meaning that the limiter only com- esses the peaks that remain after the completion of e compression process. The overall result is clean- and less intrusive than that which can be achieved with a compressor that rolls over into limiting.



Blue 330 Block Diagram (single channel)

Our diagram shows that the main signal path has only the Focusrite proprietary VCA between input and output. Its feed is from two separate sidechain circuits – compressor and limiter – each with their own VCA.

Just like the 315, the 330's control ranges and sensitivities have been suitably adjusted to meet the needs of fine-resolution mastering. The input gain and make-up gain controls are of the same sensitivity, allowing tandem contra operation, so that all other settings can therefore be raised or lowered without re-adjusting each control.

Both the Blue 315 and the Blue 330 are now available for evaluation, either direct through Focusrite in the UK, or via our appointed distributors elsewhere in the world. To find out more, please contact us today.

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just the input trims so that you get a 0 VU reading with the fader at 0.

It gets especially important when you start to mess around with your own reference levels. For example, it's possible that your workstation, even at a 0VU=-20dBfs reference level, will not be able to deal with the hot levels found on SR-encoded mag premixes or stems. If you will be loading them into your DAW to conform them to picture changes, and have to lower the level 6 dB to avoid crapping out its converters, remember to also transfer a 1kHz reference tone from the mag into the DAW so the mixer will know that this conformed material is not coming in at its original level.

Tones at the head of each tape will always be welcomed and are never superfluous.

I'll continue this discussion of tones next month with a sequel to my "Pop and Tones Forever" column of last January. But for now, please send your favorite industry myths to PO Box 24609, New Orleans, LA 70184, fax 504/488-5139, or via e-mail: swelltone@aol.com.■

Larry Blake is a sound editor/re-recording mixer who lives in New Orleans for reasons too numerous to mention, although one of them would have to be that the majority of his friends there think of 20 bits as $2.50, not quite enough to buy an oyster po-boy.

—FROM PAGE 119, THE NASHVILLE NETWORK

houses the world's longest-running radio show, "The Grand Ole Opry." All three facilities have fully equipped control rooms, with multitrack recording capability and tielines between rooms. At around 5,000 square feet, Studio B has hosted such shows as *Marty Party*, *Country Kitchen* and *Southern Living*. Its control room houses a Neve V3 60-input mixer, UREI 813B and Genelec 1031 monitors and various outboard gear. Perched above the 4,400-seat Grand Ole Opry theater is a similar room, equipped with a Neve V3 60-input mixer and Genelec monitors. When not tied up in a Friday- or Saturday-night Grand Ole Opry shoot, this room is used for remixing and sweetening a wide variety of projects.

A recent arrival to the Gaylord studios is a 128-input Neve Capricorn digital console, now sitting in the control room for the 5,000-square-foot Studio A. Studio A hosts a wide variety

of regular shows, including *Grand Ole Opry Live, The Statler Bros. Show* and *Riders in the Sky Radio Theater*. Most of the *Dance in America* series for PBS was shot in Studio A and posted at the Gaylord facility. Studio A's control room, designed by Russ Berger around the Capricorn console and Genelec 1031 monitors, is also used extensively as a remix location. Otari MTR-90 and Mitsubishi X-880 tape machines float between the three rooms as needed.

"The Capricorn resets itself fully, which was a major purchase consideration," says Repp. "I just don't understand how some manufacturers can charge a million dollars for a mixer that makes you manually reset every knob. When we're doing awards shows with 12 different acts, I can reset the whole board in less than ten seconds."

TNN will be accepting shipment of its second decked-out Capricorn (96 mic inputs, 96 tape inputs and 64 digital inputs) around press time. The board will eventually be installed in a truck for remote recording, which will be the first Capricorn-equipped remote truck in the world. When not traveling, the truck will be providing audio for *Prime Time Country*. The addition of this new rig will bring Gaylord's number of remote audio/video production trucks to seven.

Recently, the facility added three nonlinear video editing suites, each equipped with an AdCom NightSuite digital video editor and SADiE digital audio workstation. When audio complexity exceeds the 8-track capability of these systems, post is handled by a suite that serves all three nonlinear editing bays. The nonlinear suites share a single digitizing room as well; both audio rooms are equipped with a Yamaha ProMix 02 automated digital console. Additional gear in the post room includes a Sonic Solutions system with sound-for-picture video option, Sony PCM-800 DTRS 8-track digital recorder, Genelec 1032 monitors and various outboard gear.

Three identically equipped rooms handle the majority of the linear audio post work at Gaylord. Each Russ Berger-designed room boasts a fully automated 48-input Harrison Series 10B console, Sonic Solutions workstation, Genelec 1037 monitors and a healthy complement of outboard processing. Each audio post suite is tied via timecode and RS-422 serial to a CMX video editor in an adjacent video suite. Each

pair of audio and video post rooms are themselves linked by a common window and door. Does this tight integration of the audio and video post rooms sound a little out of the ordinary? It is.

"We have a unique approach to audio around here," says post-production supervisor Tom Edwards. "For most shows, we post audio and video simultaneously, instead of doing audio after-the-fact. This way, the producer is hearing and seeing finished product all the time. There's no guesswork as to whether the audio post can 'fix this,' or 'make this fit.' We don't have an off-line situation where we know going in that a sound bite is of a specific length. If a voice-over doesn't fit, it can be modified right then. The producer doesn't get caught at the back end, in an audio room, wondering if something is going to work. Problems with the audio, such as buzzes or other noises, can be corrected right there as well. Plus, by avoiding the layover and layback of typical audio post, we save lots of time. The producer is walking away with a finished, airable product. They're done—they're not walking down the hall to start doing audio.

"By the time we start post-production on an entertainment or sports show, the remixes of the multitrack are done to R-DAT or center-track timecode ¼-inch," he adds. "We start editing at the top of the show, putting in all the audio elements with the video. The producers get to see the pacing and the timing of the audio, matched up against the shots they're selecting—they're listening to the full mix. We're sort of in a random-access linear mode at this point, because all the audio is still spread out on all its sources in real time—we're not layering up anything. It's all there on separate tracks in the Sonic, on R-DAT or on the videotapes themselves.

"If a producer wants to do a final 'traditional' audio sweetening session—if they want more audience excitement here or some more shouts there—we do that in what we call 'post-post.' During the original edit, we lay down stereo audio on all four channels of the Digital Betacam master: Channels 1 and 2 are a pair, and channels 3 and 4 are a pair. For sweetening, we bounce tracks 3 and 4 down to 1 and 2 with the new material. If somewhere down the line a client decides she doesn't like the changes, she can go right back to channels 3 and 4. We do the same thing with voice-over in sports shows, giving them a mix-minus master."

Another unique audio post-production technique at Gaylord has editors sweetening the audio by triggering sampled applause and laughter—in real time—with a standard MIDI keyboard and footswitch. This "live performance" aspect of audio post ties in nicely with the Gaylord approach to simultaneous audio-video post.

"There was a user interface question we had to deal with, since the sampler was made as a musical instrument," says Edwards. "It wasn't clear how we could best access all the samples. Then we thought, 'Why not just use a keyboard?' The more we looked into it, the more it seemed to be the perfect solution. Editors can customize the keyboard mapping to their particular tastes. Because the MIDI keyboard is touch-sensitive, most of the samples are built up to respond to how hard the key is hit. If you hit it harder, it accesses more material—*more* applause, not necessarily louder applause. A light key-press may get a couple of snickers; hit it harder, and you get full laughter." Editors use the footswitch to trigger various MIDI events when their hands are busy with the faders."

Once wrapped up tight stockpiling

content for its own cable networks, Gaylord Entertainment is now finding more time available for outside bookings. "For a while there," says Wendell, "outside clients were so used to hearing 'not available' from us, that they'd kind of forget about us. We're working on changing that."

Once the word gets out that Gaylord Entertainment is available for a greater number of bookings, Wendell feels, the facility will stay busy. "When clients come in here, the place promotes itself," he says. "We have so many facilities and so much state-of-the-art equipment that people really aren't aware of. As programming-hungry as cable is right now, there is a continuing need for studio space, quality crews and equipment—we definitely have all that." ■

Loren Alldrin is a Nashville-based freelance audio and video producer.

—FROM PAGE 119, ALI

All of a sudden, Ali's voice roared out, 'I want Joe Frazier right now!' He was staying in an apartment at the Garden that day, and he was whipping himself into a frenzy."

Joe Consentino and his wife, Sandra, who co-directed and edited *The Whole Story*, shot about 15% of the footage used in the final. This footage included interviews with Ali's wives, ring opponents, and a conversation with Bryant Gumbel. The remaining 85% of the footage consisted of archival material, and much of it had nearly unusable audio tracks. The online edit was handled by Stephen Consentino.

Due to time constraints, Consentino decided to do the audio post-production in his own studio. "Everything in our studio is in component Betacam SP and Digital Betacam," Joe Consentino says. "When it came to audio posting the Ali film, we relied heavily on several pieces of gear, including a Sonic Solutions USP system, a Yamaha 02R digital console and a Sony PCM-800, which is their pro version of the Tascam DA-88. We were also incredibly fortunate to have Andy Ebberbach mix the show. Given the fact that we had 1,200 hours of footage to deal with, spanning a 35-year period, and that lots of the footage had horrible audio problems, we weren't sure whether we'd get anyone to take on the task of mixing sound. We found the right guy. Composer Michael Terry

also labored under extremely tight deadlines and did a great job for us."

Ebberbach, a Manhattan based re-recording mixer, has been freelancing in the metropolitan area for the last several years. He previously owned a music-recording studio, where he sat behind the console on numerous pop music records. Ebberbach owns no workstation of his own but has made it his business to stay up to date on all of the popular DAWs. "For the last several years, I've been doing a lot of work for the USA Network out at their facility in Newport, New Jersey. They have a Scenaria, which is a Cadillac piece of equipment. But I have to say that the combination of the Sonic Solutions workstation and the Yamaha 02R was quite amazing."

The Consentinos divided the 94-minute film into eight sections, or acts, and Ebberbach's first task was to achieve an aural unity between each.

"On the most basic level, you don't want one act to be louder than another," he says. "The hard thing about this project was that we were constantly mixing out of sequence, and revisions were occurring all the time—up until the day of the premiere, as a matter of fact. When you mix a film, you're generally dealing with picture that's almost a final. You expect changes to come in, but they're usually not drastic. That way, it's easier to get a sense of the aural flow, and your ideas on how to create a balanced picture remain fairly clear.

"Mixing over a period of months, rather than days or weeks, with changes happening all the time, puts you in danger of losing the consistency of your audio color," he cautions. "The biggest obstacle we faced was weaving all of the interview clips together in a balanced way. The sound on this footage varied widely, in terms of the recorders and microphones that were used, as well as the formats. Certainly, the older material was the most difficult to work with. I ended up No-NOISE-ing, filtering and EQ'ing each clip, and listening to clips back to back a lot to ensure that the processing I applied to one made sense flowing into another, which might have had radically different problems.

"The Sonic Solutions is a great piece of equipment," he continues. "I spent a lot of time developing EQ filters, and this feature proved invaluable as we worked to create as seamless a flow as possible from one clip to another. As for our use of the NoNOISE feature, the

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Mix Magazine, Oct. 1996

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EQ Magazine, July 1996

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EQ Magazine, July 1996

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Radio and Production, May 1996

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greatest challenge came when we were delivered an interview on VHS. It must have been about a sixth-generation dub, and the audio was almost completely buried under tape hiss. I wasn't at all sure that we would be able to lift out dialog, but we were—it's not perfect quality, but the Sonic Solutions system did a remarkable job of separating out the junk and keeping the good stuff. Years ago, you would have had to simply shrug your shoulders and say, 'No way!'"

When a Sonic Solutions system shows up in a film mix, it's generally used to fly in effects or do edits "offline." Here, the Sonic was it. "In my opinion, we were using the system at its deepest level," Ebberbach says. "We weren't mastering a record, which is pretty tame comparatively. We took an entire 94-minute film, loaded, conformed, edited and totally mixed it within the system, using the 02R as a mixer. I'm really pleased with the results, and the performance of these two pieces was outstanding."

Yamaha received mixed reviews when they came out with their first digital console, the Pro Mix 01, in January 1995, but the industry seems to be heaping unqualified kudos on its successor, the 02R. "Keeping its price out of the equation, it's a tremendous piece of gear," Ebberbach says. "When you factor in its low cost, what Yamaha has achieved is remarkable. The 02R is laid out in a very intuitive manner—the console got me out of its computer functions and into mixing very easily. The compression blew me away—it's versatile and quite smooth, and the effects are more than serviceable, especially for film work. The routing of the system is brilliant. I was able to bus out to the PCM-800 in one pass digitally, which saved us a ton of time. Our delivery format was as follows: stereo mix, music and effects, three tracks of natural sound and interviews, and a mono mix. The 02R has the busing to handle this routing on one pass, and as I said, the time savings on a project of this size was substantial."

Consentino owns an Avid 8000 system and a pair of Avid 800s, which are normally used as offline systems. "We pressed all of our equipment into service on this project," says Consentino, "and we're really proud of what we were able to accomplish at our studios."

The grounds of Consentino Films are gorgeous, and the 12x10-foot suite was designed with video/audio post-production in mind, with its Avid at one end and custom high-tech furniture surrounding three walls. During the show, it also housed the nearly 1,300 videotapes used in the project. "I wouldn't mix a record under those conditions, but there's a totally different criteria involved when you mix a record," Ebberbach says. "There, your volume is part of the mixing environment, and you have to assume that the listener may have the finest audio components available. When I mix for a television documentary, I work under the assumption that most people listen to television at a comfortable listening level, in rooms that aren't as perfectly designed as a good theater would be. The room that Joe and Sandra have is perfectly adequate for mixing such a project. We're happy to let the results speak for themselves."

Perhaps the extraordinary numbers of people who gravitate toward Ali do so in part because he so vividly represents the polarized qualities we all possess. Kindness and cruelty, bile and beauty, heart and hubris, they were all there on the surface, take it or leave it. *Muhammad Ali—The Whole Story* makes for compelling viewing. ■

Gary Eskow is a freelance writer, producer and musician based in New Jersey.

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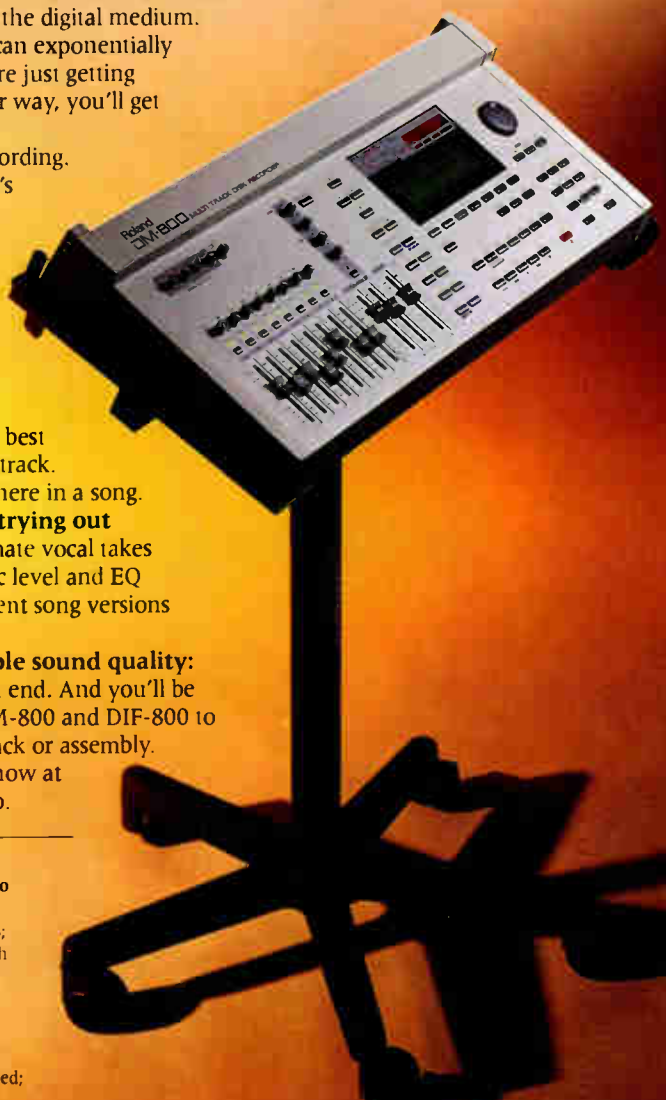

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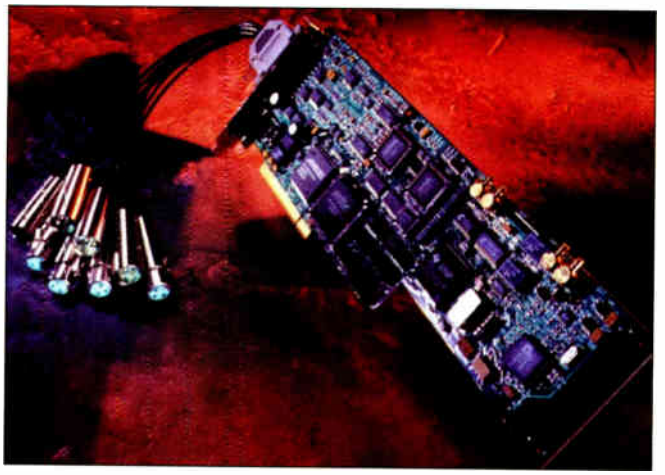

ANTEX DIGITAL AUDIO STUDIOCARD

Antex Digital Audio's (Gardena, CA) StudioCard,™ is a 4-channel PCI-based digital audio adapter offering four tracks of 18-bit sound and real-time digital mixing capability. The 32-bit memory mapped StudioCard features four independent balanced analog I/Os (+4dBu or -10dBV) and AES/EBU or S/PDIF digital I/O, plus an MPU-401-compatible MIDI port. Up to four StudioCards can be installed in a single computer, for 16-track recording. Features include sample-accurate sync via SMPTE, MTC, host clock and external word clock. StudioCard's PLL-based sample clock generator supports sample rates from 6.25-50 kHz. Price is $1,595.

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IMAGEGUARD MONITOR ENCLOSURES

Magnetic Shield Corp's. (Bensenville, IL) ImageGuard II line of video monitor enclosures minimize screen disturbances due to magnetic fields caused by nearby studio speakers. Constructed of mag shielding alloy for maximum attenuation of magnetic fields, ImageGuard II enclosures are available in painted, Formica and wood veneer exteriors. Prices begin at $500.

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DISNEY I.D.E.A.S. SFX LIBRARY

The Disney i.d.e.a.s. digital post-production facility at Disney-MGM Studios (Orlando, FL) has created a ten-volume SFX library and an accompanying sneak-preview 200-sound sampler disk. The newly recorded library is said to include sounds in unexplored categories, with selections based on Disney's post needs.

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AIRWORKS MEDIA AUDIO EDITING SOFTWARE

Airworks Media (Edmonton, Alberta) debuts three audio editing programs for production and post applications. The programs were originally developed by The Synclavier® Company, which was acquired in part by Airworks Media. S/Link 2.1 is a sound file conversion and transfer utility for Windows. AutoConform 3.0 converts EDLs into Digidesign audio sequences, automating sound-to-picture editing. (A print version of AutoConform for the Mac is also available.) EditView 4.0 is a cross-platform graphical audio editing interface that runs on Macs and PCs.

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HOLLYWOOD EDGE CD JUKEBOX

Hollywood Edge (Hollywood, CA) is the U.S. distributor for The Jukebox CD A-100, a software-controlled CD jukebox from The Audio Factory, Germany. The CD A-100's disc-management software comes preloaded with descriptions of the entire Hollywood Edge sound effects library, speeding identification and retrieval of specific tracks from up to 100 CDs. The Mac-based software is easily customized and is network-accessible. Analog and digital (S/PDIF optical or coaxial) outputs are provided, and the system can be expanded to manage 1,000 CDs.

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HHB TIMECODE PORTADAT

HHB (Portland, ME) intros a new timecode PortaDAT, the PDR1000TC/Master Sync, which provides jam synching with timecode film cameras accurate to one frame per ten hours. Another important feature is the ability to pull up from 29.97 fps drop to 30 fps drop with a single switch. The PDR1000TC/Master Sync is compatible with Aaton cameras via standard Lemo sockets. HHB also offers a Master Sync retrofit module for the PortaDAT PDR1000TC.

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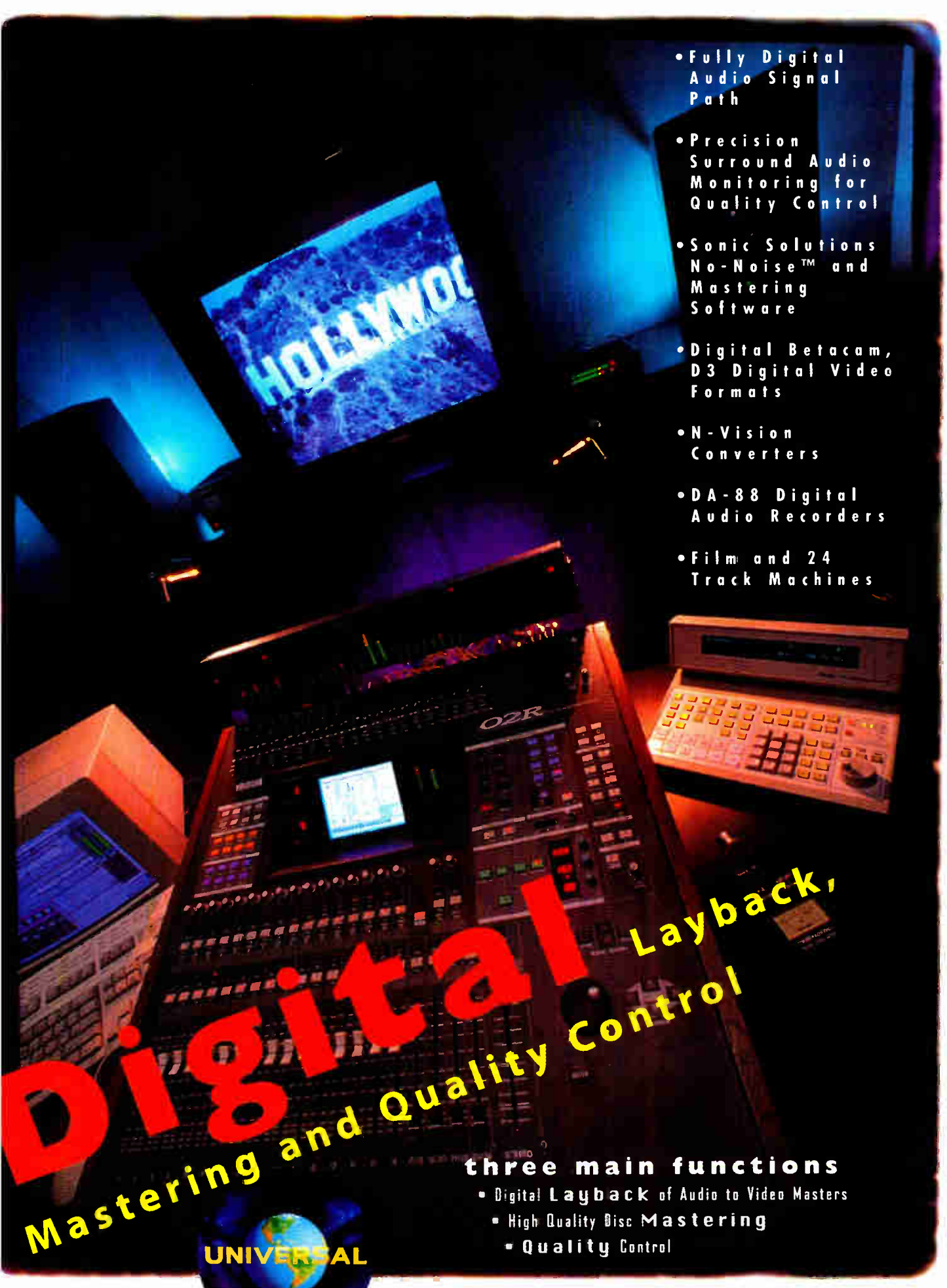
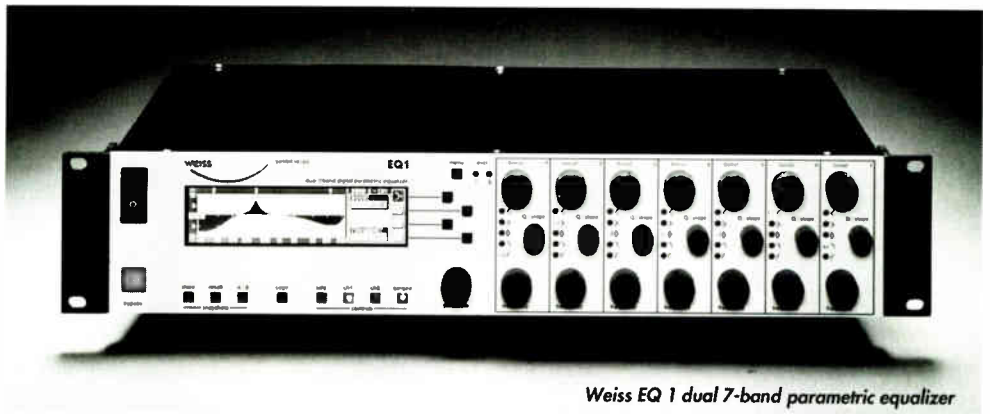




Weiss EQ 1 dual 7-band parametric equalizer

What's New in Equalization

BY LOREN ALLDRIN

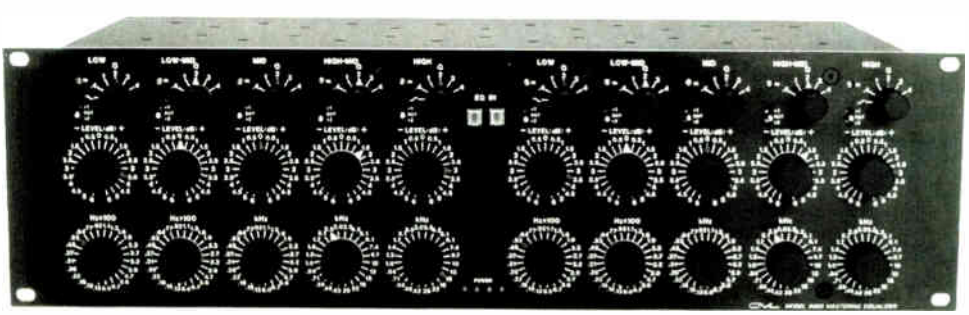
If the theory of evolution applied to electronic devices, the genus *equalizerus audius* would make for a very interesting study. Here is a product class that now bears little resemblance to the earliest passive filters used in audio recording. Available today are digital sound reinforcement EQs that compensate for changing acoustic conditions as bodies fill a venue, studio equalizers that offer tasty tube color or clinical Class-A accuracy, units with 62 bands of constant-Q equalization crammed into two-rackspace packages, EQs that accept their commands only from a computer serial cable and units that look more like high-tech test gear than audio devices.

This year saw the introduction of dozens of new outboard equalizers, many of which push the development of the EQ to the next logical step. What follows is a brief survey of more than 50 EQs released in 1996 from 25 different manufacturers. Note that we're only talking about dedicated hardware EQs here—combination units, such as the ATI Pro[6] or Focusrite's Voice Box, which combine equalization with other functions (mic preamps, dynamics control, gating, etc.) deserve their own study, as do the new class of software-based plug-ins.

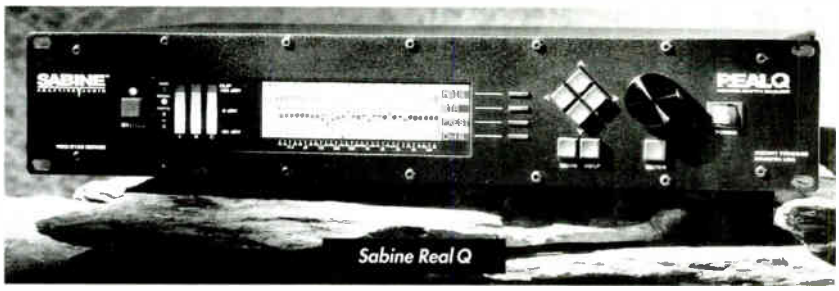
Enough preamble. From Acoustic Control to Z-Systems, from analog to digital—here's the newest generation of outboard equalizers.

ANALOG EQUALIZERS

The T131, T231 and T215 graphic equalizers from **Acoustic Control** (City of Industry, Calif.) all offer variable subwoofer output, "Turbo" function for en-



George Massenburg Labs 9500 5-band mastering equalizer

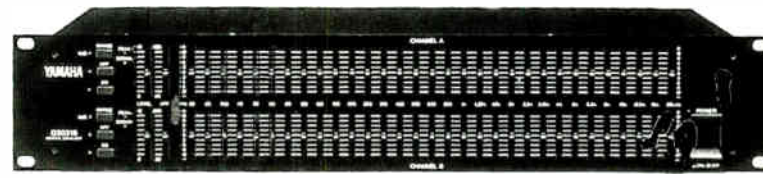


Sabine Real Q

hanced EQ curves, XLR or ¼-inch inputs and outputs and multi-LED input level metering. The T131 ($399) is a mono 31-band design, the T231 ($699) a two-rackspace stereo 31-band design, and the T215 ($429) a stereo 15-band design. The Acoustic T131/2 31-band mono EQ ($479) offers 45mm sliders in a two-rackspace design.

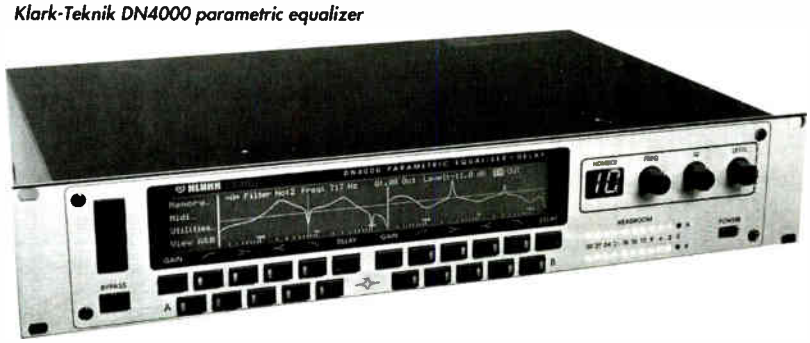
9901's overlapping bands offers a peak/shelf switch as well as ±15dB of gain and variable Q (from 1 to 10). Inputs and outputs are transformerless servo-balanced; published bandwidth is 10 to 100k Hz (±0.5dB). The 9901 EQ, which will also work with the dbx 900 rack, lists for $449.

The stereo 15-band Model 341 and mono 31-band Model 251 are the latest graphic EQs from **Applied Research and Technology** (Rochester, N.Y.). Both single-rackspace units offer selectable ±6dB/±12dB gain range, level control, bypass switch, clip LED, ground lift switch, and ¼-inch, XLR and RCA connectors. Both the 341 and 351 EQs are priced at $249.



Yamaha Q2031B graphic equalizer

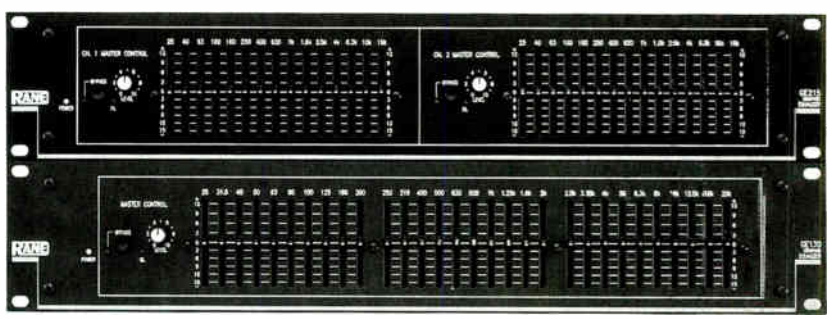
Klark-Teknik DN4000 parametric equalizer



Dedicated to discrete designs and pure Class-A amplification, **Avalon Design** (San Clemente, Calif.) brought two new parametric EQs to market this year. Both the AD2055 and the AD2077 stereo four-band EQs offer two fully parametric mid bands and semi-parametric high and low bands, ultrawide bandwidth (-3dB at 600 kHz and 450 kHz respectively), passive/active filters and +30dB headroom. The AD2055 ($5,200) has two 7-octave midrange bands per channel; the AD2077 ($12,000) adds detented frequency, slope and gain controls for critical mastering applications.

Z-Systems Z-q1 stereo digital parametric equalizer

The **Aphex** (Sun Valley, Calif.) Model 109 EQ is a fully parametric analog design that can switch between mono 4-band or dual 2-band modes. Each of the overlapping bands offers a peak/shelf switch, ½- to 2-octave bandwidth adjustment and ±15dB gain control with unity detent. The Aphex Model 109 EQ, with Aphex's patented Tubessence technology, has a list price of $495. Also new from Aphex is the Model 9901 3-band fully parametric EQ, which works with their 9000 Series modular effects system. Each of the



Rane GE215 and GE130 graphic equalizers

Behringer (distributed by Samson of Syosset, N.Y.) debuts the PEQ 2000 Ultra-Q parametric equalizer ($329). The PEQ 2000 has five overlapping parametric bands with individual and master bypass, variable high/lowpass filters, input level control, parallel filter architecture and bal-

anced inputs and outputs on XLR or ¼-inch jacks.

The new 30 Series graphic EQs from **dbx** (Sandy, Utah) all offer long-throw faders in a two-rackspace chassis; constant-Q filters; XLR, ¼-inch and barrier strips inputs and outputs; optional input and output transformers; preset lowpass and variable highpass filters; level control; and ladder-style LED level meter. Models include the 3231L dual-channel 31-band EQ ($1,200), the 3031 mono 31-band EQ ($750), the 3215 2-channel 15-band EQ ($750) and the 3031C mono 31-band cut-only EQ ($750). All dbx EQs offer switchable ±6dB/±12dB gain (-10dB/-20dB range on the cut-only 3031C).

DOD (Sandy, Utah) introduces five new graphic EQs: the stereo 15-band two-rackspace SR830QX ($240), the stereo 31-band two-rackspace SR231QX ($375), the stereo 15-channel single-rackspace SR430QX ($245), the mono 31-band single-rackspace SR431QX ($245) and the mono 31-band two-rackspace SR831QX ($250). All five offer constant-Q design, ¼-inch TRS and XLR connectors, highpass switch, input gain control and output level metering. SR231QX and SR830QX models are available without XLR connectors (SR231Q, $350; SR830Q, $215).

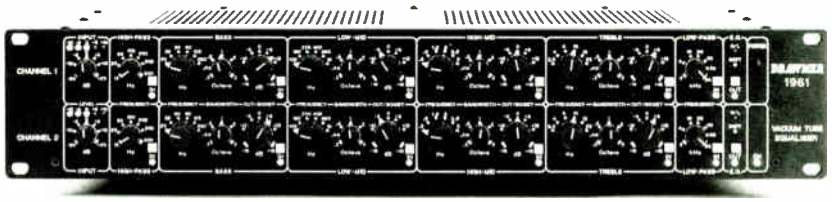
Drawmer's (distributed by QMI of Holliston, Mass.) latest tube EQ, the 1961, uses no fewer than 12 active tube stages in a 2-channel, two-rackspace design. Each channel boasts four fully parametric bands with individual bypass buttons, variable highpass and lowpass filters, input level adjust, stepped frequency control and XLR balanced inputs and outputs. The 1961 ($2,349) also offers two additional tube stages on its output for added tube "warmth" or soft-clip distortion.

The 5-band model 9500 mastering EQ from **George Massenburg Labs** (Van Nuys, Calif.) is similar in design to the GML 8200, with the addition of fully detented controls. The unit's detented controls and strict accuracy (within 0.5% in frequency, 0.1 dB in gain) make it suitable for critical applications that demand a high degree of precision and control repeatability. A three-rackspace design, the 9500 EQ ($9,500) includes two GML 8355 power supplies for separate right- and left-channel power.

Groove Tubes (Sylmar, Calif.) offers the unique EQ1 semi-parametric equalizer, an EQ with passive filtering and a vacuum tube makeup gain stage. Five boost/cut bands interact with four crossover switches to offer 20 dB or more of attenuation and roughly 5 dB maximum gain. A half-rackspace unit, the EQ1 ($695 plus PS2a power supply, $350) offers XLR and ¼-inch inputs and outputs and three-stage LED signal indicator.

The DN3600C from **Klark-Teknik** (Mark IV Audio, Buchanan, Mich.) is a dual-channel, digitally controlled 30-band graphic EQ that emulates the popular DN360 and DN27 EQs. The DN3600C ($3,300) offers a large LCD screen, variable highpass and lowpass filters, two notch filters per channel, 60 EQ memories, memory crossfade, Pro MIDI interface to control up to 64 slave units and ten-segment bar graph level meters.

Drawmer 1961 vacuum tube equalizer



Groove Tubes EQ1

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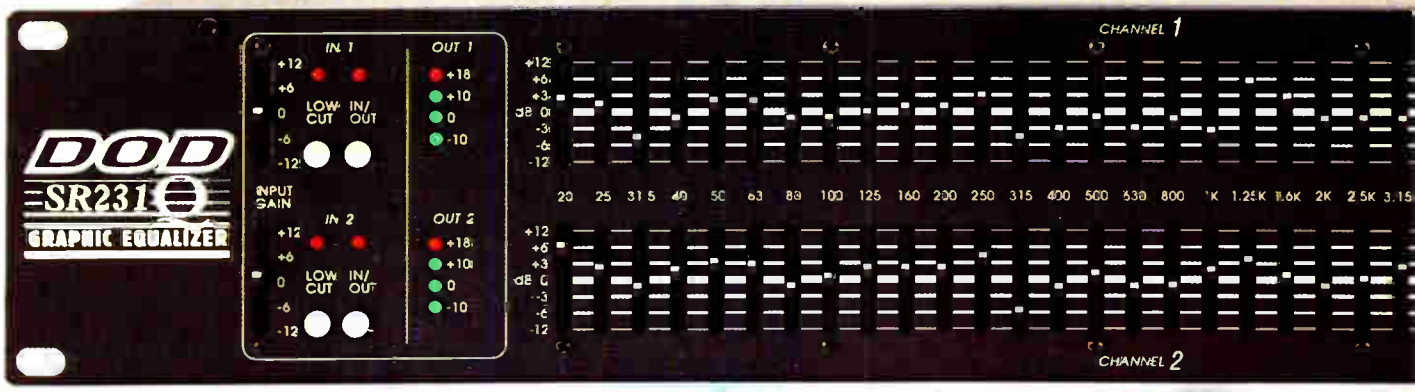

The new DOD SR series EQ's will surprise you with features you thought could only be found in EQ's costing $100's more. Constant Q filter technology ensures stable bandwidth and response at any slider setting. Impeecable THD and noise specs make your job easier by keeping your sound clean and the switchable low cut filter offers instant protection against sudden low frequency overloads. DOD delivers these and other professional features that today's sound engineers demand. Check out the new SR EQ's at your DOD dealer today and let your ears and your budget be pleasantly surprised.

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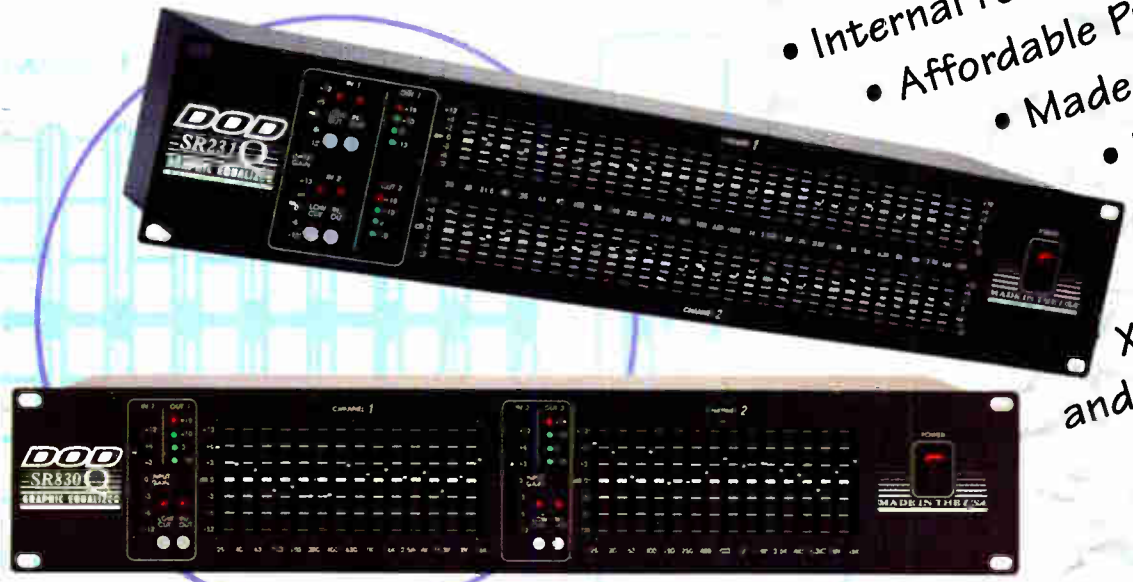

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Night Technologies International (Provo, Utah) introduces the latest incarnation of its EQ[3] equalizer, the EQ[3]Plus. This stereo unit offers five preset-frequency bands with 2.5-octave bandwidth and ±20dB gain adjustment, as well as the NTI AirBand™ Vari-Air shelving high-frequency circuit. The boost-only AirBand filter is adjustable from 2.5 kHz to 40 kHz, with up to 20 dB of gain. The single-rackspace NTI EQ[3]Plus supports balanced or unbalanced XLR inputs and outputs. The EQ[3]Plus' list price, unavailable at press time, will be dramatically lower than the $3,150 of the original EQ[3].

New from **Peavey** (Meridian, Miss.) is the computer-controlled CEQ 280a mono graphic equalizer (price TBA). This single-rackspace, 28-band EQ offers real-time analyzer, automatic room equalization, built-in pink noise generator, feedback finder, LCD screen, nonvolatile storage of 128 EQ curves, XLR and ¼-inch connectors and switchable 40Hz subsonic filter. The CEQ 280a can be controlled from its front panel, or through standard MIDI commands.

Rane (Mukilteo, Wash.) brings four new analog EQs to its line, including the three graphic equalizers and one remote programmable ⅓-octave unit. All offer Rane's constant-Q filter design. The stereo 30-band MQ302 ($399) is part of Rane's new low-cost Mojo line, offering left and right filters on each slider, balanced XLR and ¼-inch inputs and outputs and input level control. The stereo 15-band GE 215 ($559) and mono 30-band GE 130 ($529) offer 45mm sliders in a double-rackspace design; +12dB/-15dB gain range; fully balanced inputs and outputs; infrasonic, ultrasonic and RFI filters; and XLR and Euroblock terminal connectors. The RPE 228 programmable stereo equalizer ($1,249) offers 28 bands of ⅓-octave filters, separate input and output controls, adjustable highpass and lowpass filters, 16 nonvolatile memories and RaneWare serial-control software.

Roland Professional Audio (Los Angeles, Calif.) adds three new EQs to its line for 1996, including the mono 31-band EQ-131 ($295), the stereo 15-band EQ-215 ($345) and the stereo 31-band EQ-231 ($445). All three offer selectable 6dB or 12dB gain range, variable highpass filter, peak LED indicators and balanced XLR and ¼-inch connectors. The two-rackspace EQ-231 also offers a variable lowpass filter.

The **Rolls** (Salt Lake City, Utah) REQ232 is a stereo 31-band graphic EQ in a single-rackspace chassis. Left and

right controls are ganged on a single slider, making it convenient to adjust stereo program material for live sound or studio monitoring. The REQ232 also offers adjustable highpass and lowpass filters; five-segment LED input level meter; and XLR, ¼-inch and RCA-style inputs and outputs.

Symetrix (Lynnwood, Wash.) debuts two graphic EQs and one parametric model for 1996. The 531E graphic ($579) is a mono, two-rackspace 31-band EQ with 60mm sliders; the 532E ($699) offers two channels of 31-band EQ in a two-rackspace design with 20mm sliders. Both are constant-Q designs with 6dB and 12dB gain range switch, variable high- and lowpass filters, input level control and metal shaft sliders with grounded center detents. The 551E five-band fully parametric EQ ($449) offers five identical overlapping bands with a frequency range from 10 to 20k Hz, adjustable low- and highpass filters, XLR and ¼-inch connectors, constant-Q filters and input level control.

TLAudio (distributed by Sascom Marketing, Oakville, Ontario) debuts four new analog equalizers for 1996, including two in their solid-state Crimson range and two in their tube Indigo range. The 2-channel Crimson 3011 ($795) offers high- (8 kHz or 12 kHz) and low- (80 Hz or 120 Hz) shelving filters with 15 dB of cut or boost and two bands of semi-parametric midrange EQ per channel. The 3011 offers front panel-mounted high/low-gain instrument inputs, as well as XLR balanced and ¼-inch unbalanced inputs and outputs. The Crimson 3012 fully parametric EQ ($795) will function in 2-channel 2-band mode or mono 4-band mode. It also offers front-panel instrument inputs and XLR balanced and ¼-inch unbalanced inputs and outputs. The tube Indigo 2011 ($1,295) offers functions similar to those of the 3011, but with 12dB cut/boost on each band. The fully parametric Indigo 2012 ($1,295) is functionally identical to the Crimson 3012, with the addition of vacuum tube circuitry.

The EQ 1A and EQ 1AM from **Tube-Tech** (distributed by TC Electronic Inc., Westlake Village, Calif.) are mono equalizers offering high- and lowpass filters (6 dB or 12 dB per octave), low- and high-shelving EQ, three overlapping parametric bands, individual band bypass switches and floating input and output transformers. Cut filters use unity gain amplifiers, while shelving and bell filters use tube operational

amps. The EQ 1A has a list price of $4,395; the EQ 1AM mastering version (with rotary switches) lists for $5,695.

Vestax (Fairfield, Calif.) has three new units this year. All are rack-mount 31-band graphic equalizers with switchable 40Hz bandpass filters, unbalanced ¼-inch and balanced XLR I/O, and a constant-Q filter design so EQ changes in one band don't affect adjacent bands. The mono GE31 is $440; priced at $799 are the dual-channel GE62 (two sets of sliders) and the GE33S, with one set of stereo sliders.

White Instruments (Austin, Texas) offers two new digitally controlled ⅓-octave equalizers: the mono Pilot 4700 and the stereo Pilot 4700-2. Both offer RS-232 or RS-422 serial control with the supplied Pilot 447™ software, ten curve and ten preset memories, ±10dB gain range in 0.5dB steps and adjustable highpass and lowpass filters. Both the Pilot 4700 ($894) and Pilot 4700-2 ($1,322) use the same one-rackspace chassis. The model 4828 mono ⅓-octave analog equalizer ($750) has 28 60mm sliders in a two-rackspace housing; each band offers 12dB boost/cut on ISO centers. The 4828 also offers variable highpass and lowpass filters, 20dB gain adjustment, EQ bypass switch, seven-LED input level meter and balanced XLR and ¼-inch inputs and outputs.

Yamaha (Buena Park, Calif.) added three new graphic EQs to its line for 1996: the mono 31-band GQ1031C ($399), stereo 15-band GQ2015A ($429) and the stereo 31-band Q2031B ($749). All three offer a gain range switch for 6dB or 12dB of boost/cut, input level trim control, balanced XLR and ¼-inch inputs and outputs, EQ bypass switch and signal present/signal peak LED indicators. The Q2031B offers a variable highpass filter to reduce wind noise or stage rumble; the GQ1031C and GQ2015A offer a switch-selectable 80Hz highpass filter.

DIGITAL EQUALIZERS

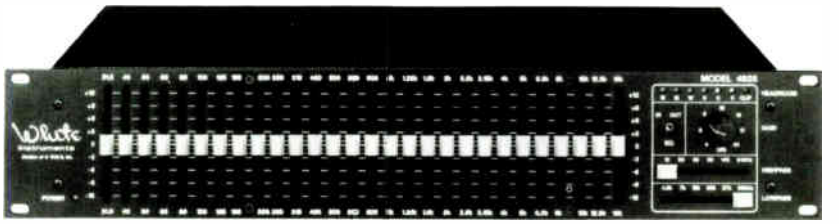
Behringer (Syosset, N.Y.) introduces its first all-digital EQ with the DSP 8000 Ultra-Curve. The Ultra-Curve ($899) boasts 64-bit internal processing, 20-bit converters, dual-channel 31-band graphic EQ, 3-band parametric EQ per channel, variable-slope shelving filter, MIDI automation and snapshot recall, EQ curve crossfade and 100 user memories. Other functions include automatic feedback eliminator, real-time analyzer, multiband limiter, digital noise gate and optional digital delay

memory.

Klark-Teknik's (distributed by Mark IV Audio, Buchanan, Mich.) new DN4000 ($4,600) digital parametric equalizer offers five fully parametric bands, 18-bit converters, high- and low-frequency shelf EQ, highpass and lowpass filters, 340ms delay line, backlit LCD screen, 30 nonvolatile EQ memories, MIDI interface to control up to 16 DN4000s and optional AES/EBU digital interface.

One of the most advanced digital sound system equalizers available, the **Sabine** (Alachua, Fla.) RealQ equalizer injects sub-audible tones into the audio program for real-time system analysis and compensation. The RealQ EQ offers 31 bands of EQ at 20-bit resolution, automatic room equalization, real-time analyzer mode, pink and white noise generators, LCD screen, password protection, multiple presets and inputs for up to three reference mics. The RealQ system is available in single-channel (REQ-3101, $5,450), dual-channel (REQ-3102, $6,950) and triple-channel (REQ-3103, $8,450) versions.

The Gambit EQ 1 from **Weiss** (New York, N.Y.) is a digital fully parametric EQ with seven identical bands, each covering the entire audio frequency range. Each band has dedicated frequency, gain and bandwidth knobs and will operate in high-shelving, low-shelving, peaking, lowpass or highpass modes. The EQ 1 ($4,500) also offers a large backlit, high-resolution LCD screen; A/B compare; snapshot event list memory; serial and MIDI control; and AES3 digital in/out. Future upgrades in development include 88.2kHz/96kHz sampling rates, analog EQ emulation and linear phase EQ.



White Instruments 4828 mono ⅓-octave equalizer

The **Z-Systems** (Gainesville, Fla.) z-q1 is a mastering-quality stereo digital equalizer that offers four bands of peak and two bands of shelving EQ, all implemented with 32-bit precision. Up to 80 EQ presets can be stored, recalled and instantly compared. The z-q1 will handle input word lengths up to 24 bits, and offers several output resolutions with or without dither. Apogee's UV22 16-bit encoding is available as an option ($900), as is a snapshot automation package with built-in SMPTE/EBU timecode reader and computer software front end ($1,000). A high sample rate option (88.2kHz or 96kHz) should be available by press time. The z-q1 has a list price of $3,000; the z-q1m—a special mastering version with dedicated displays for each of the six EQ bands—is also available (price varies with configuration). ■

Loren Alldrin is a Nashville-based freelance audio and video producer.

PREVIEW

OPTONICA ADAT UPGRADE

Optonica Designs (San Juan, Puerto Rico) offers an upgrade for the original Alesis ADAT recorders. According to the company, the ProDatI modification provides faster formatting, improved synchronization, custom A/D and D/A converters and op amps, a separate high-definition power supply for the audio circuitry, switches for peak hold and RMS/peak value metering and a transport control that's up to three times faster in play/ffd/rwd and engage/disengage modes. ProDatI is said to be completely compatible with the XT and other ADATs.

Circle 226 on Reader Service

LEXICON PCMCIA CARDS

Lexicon (Waltham, MA) offers new PCMCIA front-panel plug-in cards that instantly provide new algorithms and effects for the PCM 80 or PCM 90 processors. Artist Series Cards for the PCM 80 include the Scott Martin Gershin Card, with 100 presets for post-production created by the principal sound designer at Soundelux. The David Rosenthal Music FX Card has 100 presets designed for music production and live sound. At last month's AES, Lexicon unveiled Pitch Shift II, with intelligent pitch shifting/harmony creation for the PCM 80, and a new reverb card for the PCM 90.

Circle 227 on Reader Service Card

AUDIX PH SPEAKER UPGRADE

Audix (Wilsonville, OR) has upgraded its self-powered PH-15 and PH-25 loudspeaker systems. A new amplifier (used in both models) provides 40 watts RMS/50 watts peak and automatically goes into Standby mode when no signal is present for five minutes. Other new features include thermal and DC protection, 50Hz high-pass filter and internal toroidal power supply. Shielded models are available for multimedia applications. Prices remain at $429 for the PH-15, $579 for the PH-25.

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DH CONES

DH Cones from Golden Sound (McLean, VA) are designed to minimize vibration and resonances, and may be used to support speakers, preamps, CD transports, and any other signal processing device with or without moving parts. Composed of a non-magnetic ceramic material, the cones reportedly improve sound quality and minimize vibration-induced distortion, and are available in four sizes at prices from $20 to $70 for each set of three. DH Squares ($10 each) are also available.

Circle 229 on Reader Service Card

HHB ADAT, MD & CD-R

HHB (Portland, ME) has added ADAT, CD-R and MiniDisc products to its line of recording media. Other HHB Advanced Media Products include DATs and 5.25-inch magneto-optical disks. Introduced at the AES convention, the ADAT45 tape has a 45-minute recording time; the MiniDisc MD74 has a 74-minute time frame. HHB also introduced a CDR-printable cyanine disc and an updated CDR74 pthalocyanine disc, which is compatible with 4x writers.

Circle 230 on Reader Service Card

JRF IMPROVES 2-INCH, 8-TRACK

JRF Magnetic Sciences (Greendell, NJ) debuts an improved, lower-cost version of its UltraAnalog 2-inch, 8-track head assembly for Studer multitracks. On the new UltraAnalog MkII head stack, the timecode channel is integrated into the record and play heads at the standard track 24 position, and no offset programming is required. Also, the MkII's track layout is playback-compatible with standard 16- and 24-track recorders. JRF claims output levels at least 10dB hotter than possible with a 24-track headstack. A 3-head UltraAnalog MkII head stack (mounted on an existing headblock) is $9,000. Assemblies for the Studer A800 and A827 are available.

Circle 231 on Reader Service Card

PREVIEW

BASF CASSETTES

Reference Maxima TPII analog reference cassettes from BASF Magnetics (Bedford, MA) include new features designed for professional recording applications. A new azimuth system minimizes HF losses, and the high-performance ferro-cobalt formulation provides high signal-to-noise performance. The three-piece assembly is molded from temperature-resistant, high-rigidity materials. BASF Reference Maxima tapes are available in 10, 20, 30, 60, 90 and 100-minute lengths.

Circle 232 on Reader Service Card

AKABAK SPEAKER DESIGN SOFTWARE

Bang-Campbell Associates (Woods Hole, MA) offers the AkAbak® software package for designing/simulating electroacoustic circuits. Running under Windows 3.1 or higher, this design tool models complete loudspeaker systems, from voltage source through to an arbitrary listening point, including all filters, networks and drivers. AkAbak is $950; a demo version is available.

Circle 233 on Reader Service Card

WAVES STEREOMAKER PLUG-IN

Waves (Knoxville, TN) announces the addition of the Waves PS22-StereoMaker™ to the company's line of TDM plug-ins for the Digidesign TDM™/SD II™ system. PS22-StereoMaker creates or enhances stereo imaging and may be used on mono and stereo sources. The interface provides a graphical display of position vs. frequency and allows adjustment of specific sounds within the stereo image. Waves PS22-StereoMaker is $1,169 or (for a limited time) $919 to registered Waves S1 owners.

Circle 234 on Reader Service Card

COREL MUSIC LIBRARY

Corel Corporation (Ottawa, Canada) has released the Corel® Stock Music Library, a ten-CD-ROM set of royalty-free sound clips in CD-Audio and .WAV file formats. The library is aimed at multimedia authors and includes 352 minutes of music clips (created by Leopold Music) encompassing 21 different categories. The 103 tunes are offered in 10/30/120-second versions. The set is $59.

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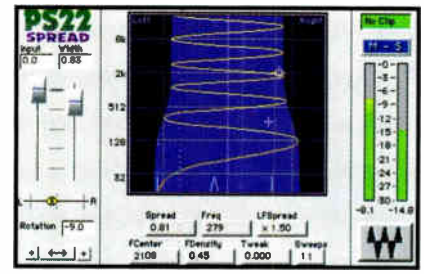


MILLENNIA MIXING SUITE

Millennia Media (Placerville, CA) offers the Mixing Suite™, a rack-mount modular mixing system for critical location recording, submixing, film and stage applications and more. Available modules are mono input with mic pre; stereo line input; stereo (4-bus) master module; and stereo (4-bus) aux master module. Up to 12 modules fit in one 4U Mixing Suite rack. The system is compatible with the Massenburg GML HRT-9100 system and features a transformerless design, sweepable rumble filters on inputs and a 40W talkback amplifier. A standard 20x4x4 configuration (ten stereo line inputs, aux master module, stereo mix master module and power supply) is $15,690.

Circle 236 on Reader Service Card

RAXXESS EQUIPMENT RACKS

The new Elite Series equipment racks from Raxxess Metalsmiths (Paterson, NJ) are available in 4/8/12/16/20/24-rackspace, straight-front models and slanted front 16/20/24-space versions. Made of high-density particle board (black or mahogany finish) and trimmed with solid hardwood, the racks assemble with only a screwdriver.

Circle 237 on Reader Service Card

IQS SAW CLASSIC

IQS (Las Vegas, NV) has re-released its Software Audio Workshop hard disk editor at a new low price of $299. Now named SAW Classic, the Windows-based system allows real-time playback of four stereo 16-bit digital audio signals on any Windows stereo sound card. All editing is nondestructive; features include programmable crossfades and varipitch. Onboard DSP includes EQ, gating, compression and limiting, echo effects, auto-panning and file format conversion. Minimum hardware configuration includes a 386/40MHz CPU with 8 MB of RAM, 16-bit sound card, 640x480 VGA monitor and Windows 3.1, NT or 95.

Circle 238 on Reader Service Card

PREVIEW

FIELD-SERVICEABLE A-T STUDIOPHONES

Audio-Technica (Stow, OH) intros field-serviceable versions of its ATH-M40 and ATH-D40 Precision Studiophones. The new models (identified by the suffix "fs") may be disassembled with a small Phillips screwdriver, allowing elements, cables and earpads to be replaced in the field. Both the ATH-M40fs and ATH-D40fs feature 40mm drivers with neodymium magnets and copper-clad aluminum wire voice coils. The new models are priced at $175.

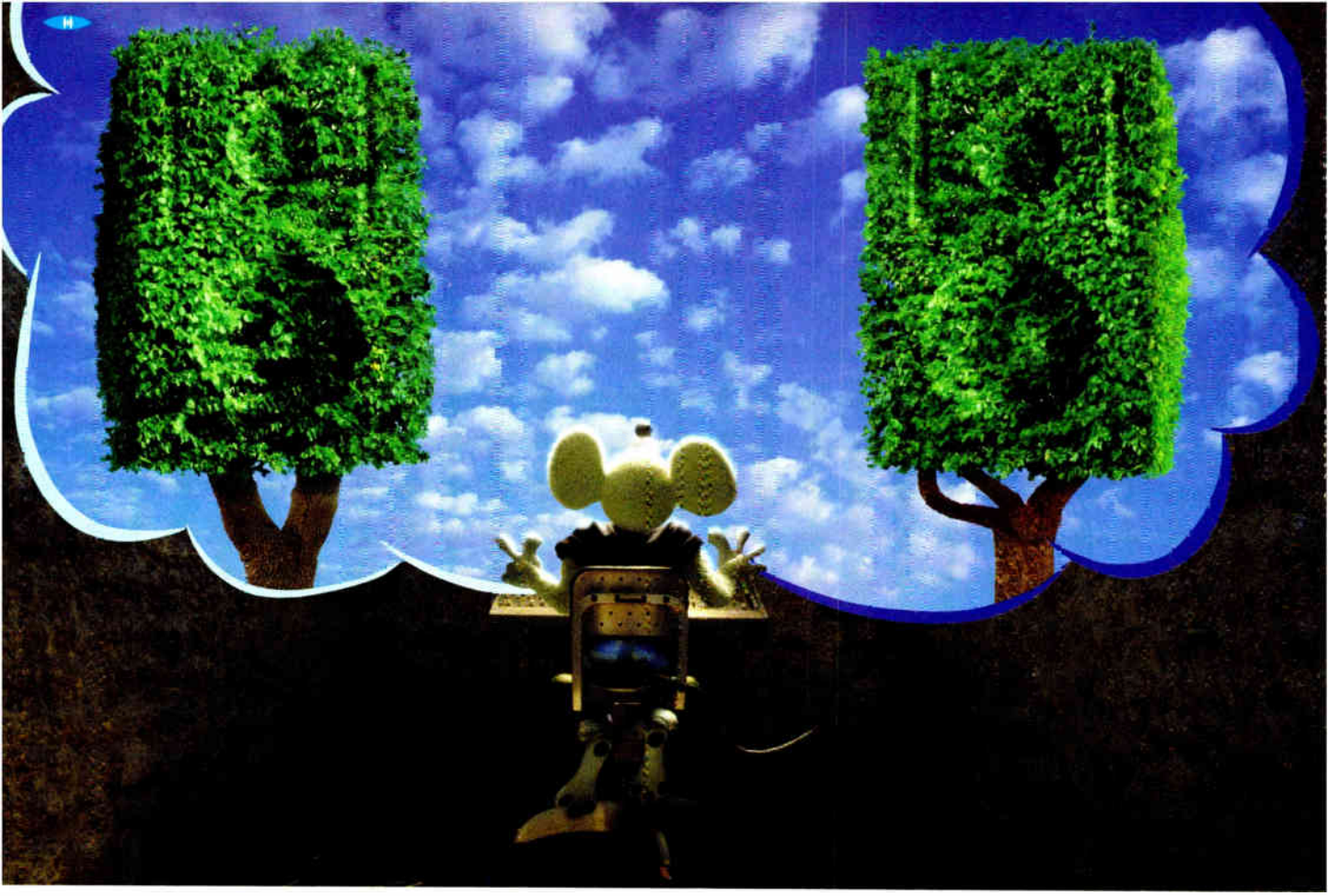
FURMAN IT-1220 TRANSFORMER

The IT-1220 balanced-power isolation transformer from Furman (Greenbrae, CA) supplies 20 amps of 120 60V single-phase balanced AC power for audio applications where low-to-nonexistent levels of hum and buzz are critical. The three-rackspace unit offers two front and 12 rear panel balanced AC outlets, and includes an AC voltmeter, extreme voltage shutdown and a "Soft Start" power-up circuit.

Circle 239 on Reader Service Card

HOT OFF THE SHELF

Glyph Technologies provides **tech support for the Iomega Jaz™ drive**, with a dedicated phone line for digital audio or music production users. Call 607/275-9471 or try www.glyphtech.com…Demo versions of **QSound plug-ins** for Pro Tools and Sound Designer II are now available on the Internet. Download demos of sound field enhancers QSYS/TDM™ and QX/SDII,™ and sound localizer QX/TDM™ from www.qsound.ca. Or call 403/291-2492…The **Who Did That Music? Library's** demo CD has 22 tracks highlighting 20 categories of the company's production music. Call 800/400-6767…**Pioneer's D-9601 96kHz DAT recorder** is compatible with Sonic Solutions' digital audio workstation. Projects originated on the D-9601 may be edited, EQ'd, mixed and mastered on the Sonic system and then archived at the 96kHz sampling rate. The D-9601 also features an onboard sample rate converter for 44.1 and 48kHz output. Call 207/773-2424…**Manhattan Production Music's Apple Trax music library** allows music editors to create unique mixes. The Split Trax feature adds alternate mixes with melody and lead instruments on one track, and rhythm tracks on another, allowing editors to control each mix of the blanket-licensed material; 25 new Apple Trax CDs are scheduled by year's end. Call 800/227-1954…New features from the V2.0 software for the **Fostex DMT-8 8-track disk recorder** include the ability to partition into five virtual reels of up to 64 sections each, slave to MTC, improved edit and paste facilities, digital I/O and subframe MTC offset capability. Current users may upgrade with an EPROM change. Also, a factory retrofit expands hard disk capacity to 1.7 GB for 40 minutes of recording time. Call 310/921-1112…Cakewalk Music Software offers an **interactive CD-ROM demoing the entire Cakewalk 5.0 line.** The disk includes six different demo versions of Cakewalk 5.0 programs, onscreen tutorials, user's guide and three CD audio tracks created in Cakewalk. Call 617/926-2480…CATT-Acoustic announces Version 6.0 of its **room acoustic prediction/desktop auralization software** for Windows. The system allows simulation and measurement of sound sources in acoustic spaces. Drawings may be exchanged with AutoCAD, and a demo version is available. Call +46.31.145154 (Sweden) or surf to www.netg.se/~catt…**Version 1.2 of Opcode's Overture** notation package adds playback of Apple QuickTime™ Musical Instruments, acceptance of General MIDI names, and faster copying and editing of chords and performance parameters. Call 415/856-3333 or check out www.opcode.com…**TRF Production Music adds two** CDs to its 50,000-selection libraries. The new Pyramid releases are titled Acoustic Guitar (PYR 709) and Atmospheric/Science/Technology (PYR 716) and contain full-length, underscore, jingle and sting versions plus alternate mixes. Call 800/899-MUSIC…Durand R. Begault's **The Sonic CD-ROM for Desktop Audio Production** ($44.95), a Windows/Mac-compatible CD-ROM, guides users through the basics of sound, covers tools for desktop audio and provides hundreds of sound examples. Includes a PC audio system test and an award-winning sound manipulation utility. Call 800/3131-APP or surf to www.apnet.approfessional…**Music Bakery** has expanded its library of buy-out production music, with new releases of corporate/industrial, world market, location ambiences, hip contemporary and light underscores. Call 800/229-0313 or visit www.musicbakery.com…A software upgrade for the **New Frontier Electronics DSP 2010-EX Precision Audio Analyzer** allows the control of as many as 250 Rane RPE228 stereo ⅓-octave equalizers. The software displays RTA functions and EQ adjustments in the same window, easing setup. Call 215/862-9344. ■



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SOUNDTRACS VIRTUA

DIGITAL RECORDING AND PRODUCTION CONSOLE

Put simply, the Soundtracs Virtua digital recording and production console is a breakthrough product. At approximately $35,000 for a basic configuration, the all-digital mixing system is destined to redefine the cost/benefits ratio. No other digital console released this year will put so much mixing and processing power into the hands of users around the world.

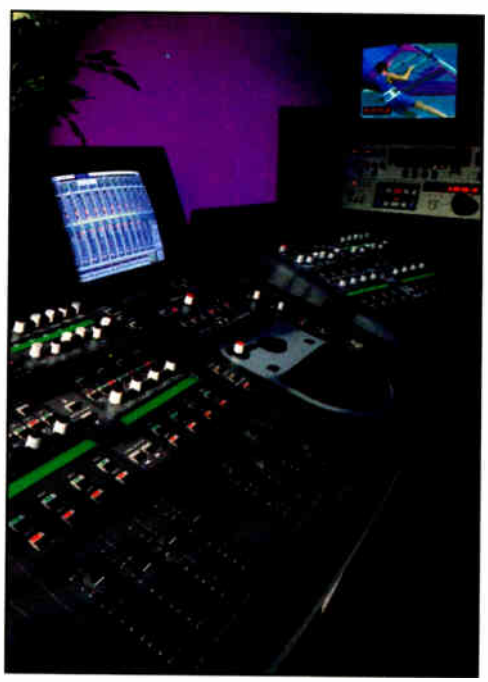
Virtua provides a total of 64 channel inputs during mixdown: 48 with 4-band parametric EQ, dynamics and aux sends; and the remaining 16 channels configured as eight stereo effects or monitor returns with level and mute only. The 48 full-feature inputs can comprise up to 32 analog mic/line-level sources, plus 16 ADAT optical inputs. Additional digital inputs can be accommodated via outboard units. Eight mono/four stereo aux sends per channel are also available.

Two output routing modes are offered: Stereo and Surround/LCRS. In Stereo mode, up to 16 direct and eight group outputs are provided from each input source; in LCRS mode, the user has access to up to four LCRS stems. (Pan format is determined by the console output routing format. For LCRS mode, it's a two-dimensional grid, with audio positioned left/right or front/back.) A 5.1-channel output option is planned.

BASIC SYSTEM CONFIGURATION

The basic system comprises a control surface and a companion rack unit that houses all of the analog inputs, output connectors and A/D and D/A converters. All analog I/Os are balanced, except for channel inserts. Unlike other designs, all signal processing and mixing is performed within the control surface, which houses eight assignable channel faders with pan, mute, solo and automation controls, plus a master fader with similar controls. An angled housing is supplied with the system to provide a stand-alone system; legs are optional. EQ and dynamics control (compressor/limiter plus gate) is implemented from an assignable set of controls, used in conjunction with familiar Access buttons.

The Virtua system will run at standard sampling rates of 32, 44.1 or 48 kHz, locked to internal or external video sync or word clock; in addition, the processor clock can be run in varispeed mode at sampling rate between 24 kHz and approximately 52 kHz.



On the right of the control surface are the various system control elements, including a trackball and pair of "mouse" buttons, control-room monitoring, plus a number of soft keys whose functions change according to displays provided on the companion 14-inch color monitor. If the supplied screen is too small, it can be easily replaced with a larger unit via a standard VGA output. The control surface layout was ergonomically designed to provide equal familiarity for both left- and right-handed operators; the spacing between control elements suggests that few of us would have any difficulty navigating around the Virtua's well-thought-out control elements.

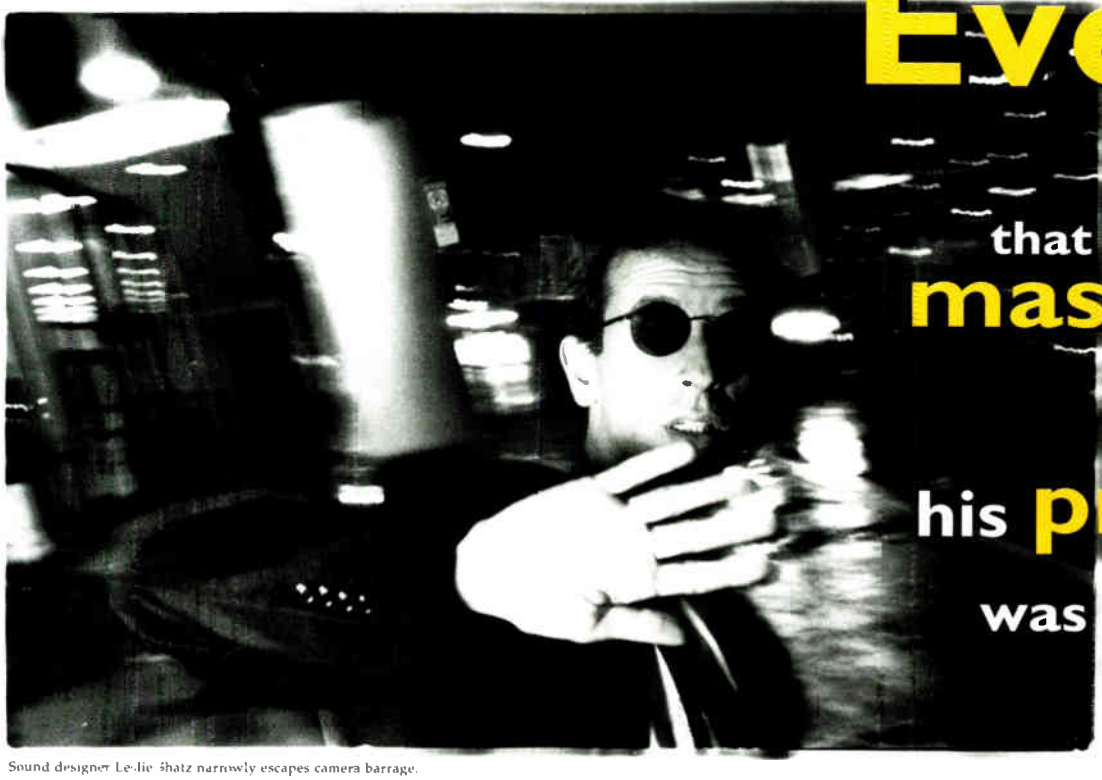
For users requiring simultaneous access to more than eight channel faders—a dual-operator configuration, for example—Expander Banks are available with eight additional faders. Each Expander hooks up to the master sections via a 9-pin serial connection, and adds $7,000 to the base price. A soon-to-be-unveiled update will allow up to four hi-res color screens to be used simultaneously, with each monitor displaying different views and system components.

All commands are implemented via the trackball and mouse buttons, plus a companion adjuster—a "Twiddler" in Soundtracs parlance. Having selected the onscreen control to be manipulated, the Twiddler shaft-encoder now provides direct adjustment of the corresponding rotary control. The system takes a little getting used to (the trackball, in particular, is rather heavy to operate—I'm more at home with an optical mouse or graphics tablet) but can be mastered relatively easily. After a while, operation becomes completely intuitive.

I/O CONNECTIONS

A comprehensive set of optical connectors on the rear of the control surface provide I/O connections to the rack, as well as direct interface to ADAT-format recorders and outboard expansion systems. The control surface and rack interconnect via four pairs of fiber-optic cables. Interestingly, Soundtracs has made extensive use of optical

BY MEL LAMBERT



Ever since that masterful edit, his privacy was all but forgotten.

Sound designer Leslie Shatz narrowly escapes camera barrage.

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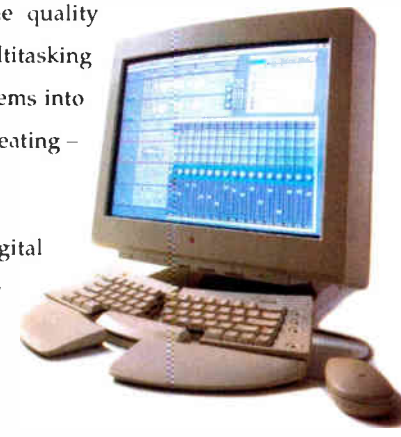

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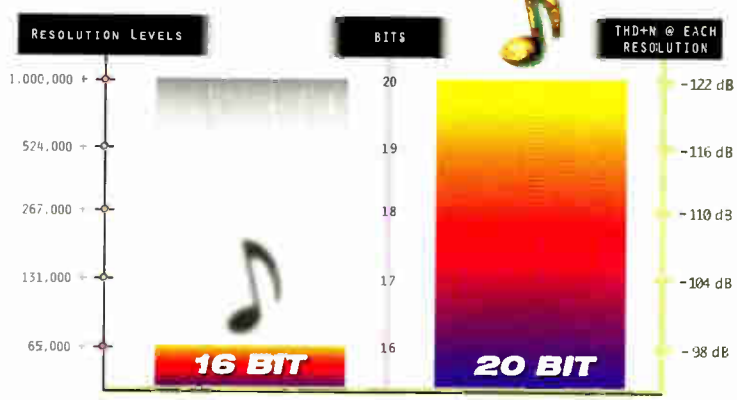

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connectors throughout Virtua. In a system setup page, the user can select either ADAT-format I/O, which provides eight digital channels per connector, or Soundtracs' proprietary I/O protocol, which provides up to ten channels per optical link. Neat.

Also on the rear of the control surface are various 9-pin serial ports for external video and audio desks; timecode I/O; MIDI In/Out/Thru (including MIDI Machine Control for suitably equipped multitracks); a pair of AES/EBU and S/PDIF I/Os for the main 2-track outs; plus word sync in/out (with switchable 75-ohm termination). In addition, the system's main 2-channel digital outputs are equipped with built-in sample rate converters to provide down-sampling, for example, from 48 kHz to 44.1 kHz for CD mastering.

Within the control surface is the heart of Virtua: a master back plane into which plug serial interface and video cards, a pair of optical I/O cards (each housing three input and three output connectors) plus a 9-pin serial expander port for hooking up additional input bank(s). The maximum is four—the main controller, plus three Expanders—for total of 32 simultaneous channel faders. In terms of processing power, Virtua packs a great deal of horsepower. The main DSP board houses an array of six Analog Devices SHARC chips, running in parallel mode at a clock speed of 160 MHz; the total number of computations is estimated at close to 1 GFlops per second!

Analog inputs can be individually remotely switched between mic- (XLR) and line-level (¼-inch) connectors. Mic gain is also remote controlled between +0 and +64 dB; line-level range is -10 to +22 dB. Each path has an analog insert (post-gain adjust, pre-A/D converter) for signal access and patching outboards, plus phase-reverse and +48V phantom power for mic sources. The standard 16 digital inputs use Alesis' proprietary ODI format (ADAT-compatible), with digital gain control.

An optional rack-mount converter from Soundtracs handles eight channels of input and output to TDIF-1 digital format, for direct connection to Tascam DA-88 and similar systems, and/or AES/EBU-compatible formats. (Other formats may be implemented later, according to Soundtracs; a flexible Optical Patchbay is also under consideration, to eliminate the rear-panel repatching that may be necessary between sessions involving, let's say, a number of ADATs, DA-88s or similar recorders, with a tracking date that requires a large number of analog sources being routed from the main rack.)

FLEXIBLE ASSIGNABLE CONTROL SURFACE

Virtua's overall operating environment is a heavily modified shell based on Microsoft's Windows 3.11. (But without the ability to exit to the familiar Kernel, so no using the system for your word processing, accounts or favorite games!) Via a series of easy-to-use display screens, the user is invited to "build" a console within Virtua. When selecting the Inputs icon, for example, it is possible to assign any of the available analog or digital sources to the selected virtual channel strip, as well as its output—a mixing bus, for example, or a control-room monitor if that's what you need. High-resolution, 72-segment metering is available for all full-function input sources.

As will be appreciated from a glance at the control-surface elements, Virtua is based on a traditional all-input console topology, with sources being processed, level-adjusted and then passed to an

output. In this way, during tracking and overdubs you can lay out inputs to buses or direct outputs, and then pick up the tape-machine sends/returns via a separate monitor bank; during mixdown, all inputs can be routed via subgroups or directly to the main L/R or LCRS output buses.

Similarly, we can select Outputs from an onscreen menu of available analog and digital destinations along with other system parameters. Group outputs are provided with level, solo and AFL functions, plus 140-segment meters. Groups can also be named and directed to any of the tape destinations. Direct outputs can also be routed to any of the tape destinations.

Each of these windows can be dragged across the screen as necessary, to provide a visual layout of important I/O and related functions. Each section of the mixer has a vertical screen display that can be double-clicked to open out the target sections; dedicated keys on the control surface achieve the same result for the main EQ, dynamics, gate and aux-send functions. In this way, an entire channel strip can be placed anywhere on the screen and the display opened up or reduced as sections are interrogated or temporarily hidden from view. (Anybody that has used a PC- or Mac-based graphics program with palettes and related functions will immediately recognize Virtua's interface paradigm.)

Having developed onscreen layouts of input, output, auxiliary sends, monitoring, transport controls, metering and other displayed functions from the available palettes, you can save the setup using a bank of Layout function keys. (A Layout, in essence, simply stores the size and positions of various section views of the onscreen display and assignments of the control-surface faders.) To simplify mixing further, eight control groups can be created, using any channel fader as a group master.

All screen displays are sharp and clear, and easy to see from a normal working distance, even on the relatively small monitor supplied with the system. Screen update is virtually instantaneous as you move between different functions, and while displaying real-time system information.

At first glance, it might appear as if Soundtracs has forced the user to work in a specific way. In other words, with access to 64 simultaneous inputs and eight group buses (plus directs), we are directed to lay out Virtua in a number of limited topologies. (There are no dual-source channel paths, for example, so we cannot design an in-line signal flow.) All of which is true and, I would consider, a good thing. Although an all-digital console offers a great deal of flexibility, there is no denying that during this critical transition period—particularly within the lower end of the recording and production market—many users are going to need a helping hand with all that processing power. I think that Soundtracs has done a great job of offering just enough options to get the job done, yet without intimidating us with too many confusing alternatives.

STORING/RECALLING CONFIGURATIONS

Having designed the console I/O configuration and assigned channels to physical faders on the control surface, the entire setting can be stored and recalled as a system configuration to Virtua's internal 500MB hard drive (or off-loaded via a conventional floppy drive). To reduce confusion regarding what signal source is currently assigned to which fader, each path features a nine-character alphanumeric LCD window. Additional 16-character alphanumeric labels can be entered to provide a more detailed description, and can be displayed one channel at a time.

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Once a virtual channel path has been assigned to a system fader, it is brought to the surface using Channel Selector buttons, which scroll the virtual console left or right across the eight (or more) real-time motorized faders and their companion controls. Usefully, double-clicking the selector switches channels in banks of eight.

The only confusing aspect of this exercise is that the onscreen displays may not match those of the physical faders. In the beginning, this arrangement leads to a few minutes of frustration, as you reach for a fader, glance at the screen and expect the controls to change. Maybe they will, but more likely they won't!

However, as soon as you use the faders for mixing the channels assigned to them, and the color monitor for system interrogation, or displaying real-time EQ responses, then you begin taking control of Virtua's enhanced mixing functionality. For example, one Layout might contain various bus-level metering, while another might comprise a page of simultaneous EQ displays, which can be used while adjusting multiple channels. All in all, if you give up thinking of Virtua as an analog design, with the inherent limitations of "one-control-per-function" and "one-function-per control," then you can move to the next level of Virtua "Power User."

EQ AND DYNAMICS CONTROL

Hit the appropriate Access key and controls for a 4-band, fully parametric EQ and Dynamics Section can be assigned to any of the main 48 signal paths. A bank of rotary controls is mapped to provide cut/boost/Q for the four EQ bands, or for similar adjustments of the dynamics sections. A useful Compare button provides one level of undo; it restores the EQ, gate and compressor parameters to the values that were active when the signal path was first accessed. Adjustment values are provided in a companion LCD window, and also via the onscreen display.

Each of the two mid EQ bands can sweep from 20 to 20k Hz, with ±18 dB of gain per center frequency and bandwidth/Q variable from 0.1 to 20. Upper (1 kHz through 20kHz) and lower (20 Hz through 600 Hz) bands can also be set to mimic conventional shelving operations. EQ sections can also be individually bypassed. As there is no resource allocation within Virtua, full EQ is available simultaneously on all full-function inputs.

Dynamics control is also available on all full-function inputs, consisting of a gate and a compressor that can be individually bypassed. Gate parameters include Attack (50 µs to 500 ms) and Decay Time (1 ms to 5 s), Hold plus Range (signal attenuation implemented when the gate is closed). The compressor features five rotary controls: Threshold, Attack (500 ms to 1 s), Release (1 ms to 10 s), Ratio (unity to 50:1) and Gain (up to 40 dB). Onscreen meters display the amount of gain reduction or gating currently in effect.

As with Layouts, favorite EQ, compressor and gate settings (collectively, or separately) can be stored as presets in a user-library. Sectional configurations can also be stored, allowing the user to instantly recall, for example, the ten or more inputs (all with correct routing, EQ and dynamics) required to record a drum kit.

Up to eight Auxiliary Sends can be accessed from all of the full-function inputs, in any combination of stereo/mono or pre/post-channel fader. Each send master has a rotary level control and a 72-segment meter. (Aux mutes can be linked to a channel mute, even if the send is pre-fader.) Aux Sends can also be named (reverb, chorus, headphones, etc.). Control of individual send levels is via the screen icons and the Twiddler, or via the rotary controller per signal path, which can toggle across the various send buses and conventional L/R channel pan. All very straightforward.

While you cannot develop aux sends from the 16 line-level effects or monitor returns—which might be used for off-tape monitoring during tracking and/or overdubs, but later serve as inputs during mixdown—it's easy to set up user-configurable work-arounds.

A single set of transport controls can be assigned to an external MIDI Machine Control-capable tape machine or hard disk recorder, or set to issue standard ATR/VTR commands via the 9-pin RS-422 interface. Finally, a feed-forward limiter assigned to the monitor output can be set to provide speaker protection; variable attack and release times are featured.

SYSTEM RECALL AND AUTOMATION

Entire Virtua I/O configurations can be stored to hard drive, including all the above parameters. A Master mode allows the console to be quickly rearranged from task to task. Snapshots controlling all the channel functions—comprising EQ, dynamics, send levels, fader and mute balances—can be created and triggered manually, or synchronized to timecode. Full dynamic automation of all important console functions, including LCRS panning, aux sends, faders and mutes, is also provided against internal or external timecode.

In addition, offline editing of faders and mute automation data is possible using a graphic interface similar to the Soundtracs' existing Solitaire automation. Using Lasso and related functions, sections of a mix can be copied and pasted to other areas, and/or nudged along a time line in second, frame or sub-frame increments. It is also possible to smooth out stepped fader levels and similar functions. Familiar automation modes include Isolate, Record and Play, plus Trim.

THE BOTTOM LINE

During extensive listening tests and hands-on operation, I had the opportunity to experiment with a variety of system functions. The A/D and D/A converters sound great, and the EQ is smooth and easy to use; the dynamics section is very easy to set up and use, with well-chosen parameters.

Once you get used to the assignable controls, backed up by onscreen display and adjustments, it's quite simple to adjust a selected channel. The snapshot and dynamic automation modes are easy to set up and use, particularly the moving-fader and mute automation, which offer a number of Update and Trim Modes, plus ramp Drop-Out modes. I understand that these are soon to be joined by addition modes that allow the current setting to smoothly transition to the previous values after Update/Write moves.

My only complaints are admittedly pretty minor. I would like to have seen larger control pucks on the channel faders. Also, the servo-controlled moving-fader elements on the unit I used—a well-used demo model, for sure—produced more chatter than I would have liked, but this may be an aberration.

All in all, the Soundtracs Virtua represents a remarkable development. With its basic configuration pricing in the $35,000 range, this cost-effective alternative to analog designs for project studios, tracking rooms and remix suites, as well as video post and sound-editorial suites, is destined to be a dramatic success.

Soundtracs USA, 316 South Service Road, Melville, NY 11747; 516/393-8520; fax 516/333-9108. Web site: www.soundtracs.co.uk. ■

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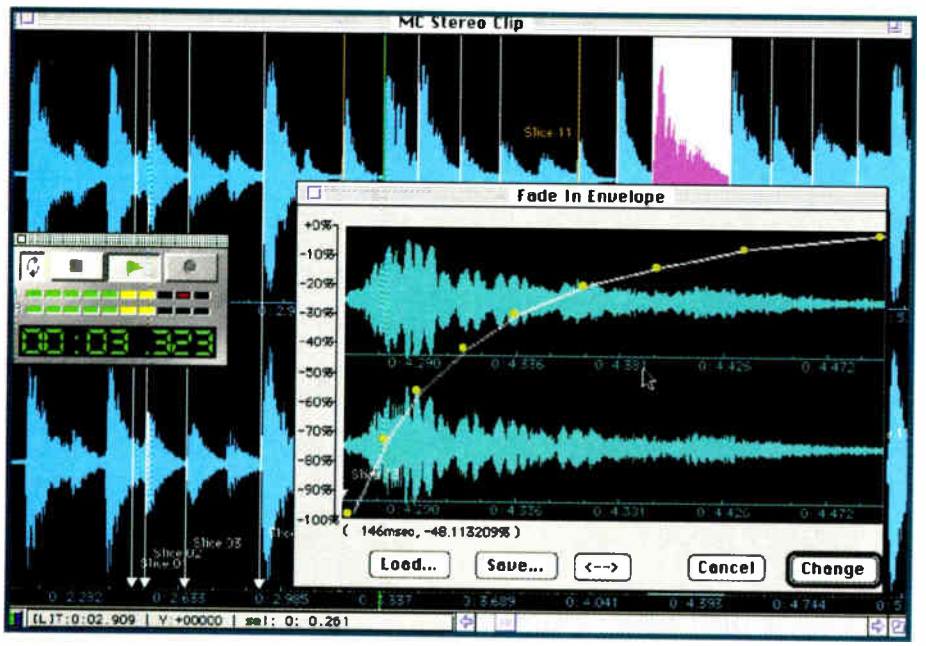
SOUND EDITING SOFTWARE



BIAS Peak's Amplitude Fit function (inset window) lets you impose custom envelopes onto an audio file.

What the Macintosh world needs is a good, new sound editing program. Why's that, you say? What's wrong with the dozens of hard disk recording systems, multimedia sound editors, and sample editors already out there? What's wrong is that they're either too unsophisticated for professional work, like Opcode's Audioshop or Macromedia's Sound Edit16, or they're too old to take advantage of today's computers and samplers. The best of them, Digi-design's Sound Designer II and Passport Designs' Alchemy, are based around technologies that are approaching their tenth birthdays. Besides, Sound Designer II (which long ago dropped sampler support and is therefore of no use to those of us who still depend on those beasts) is soon going to be history, according to the manufacturer, while Alchemy, whose manufacturer has been playing a now-you-can-get-it-now-you-can't game with it for several years, has never gotten (and apparently will never get) past the significant limitations on file size imposed by a RAM-only program.

No, what's needed now is a program that is flexible enough to work comfortably in all sorts of environments, not just samplers, but also workstations, mastering and multimedia; that recognizes that hard disk space is no longer a rare commodity; that works reliably with other hardware and other programs; that has expansion capabilities, which preferably can be addressed by third parties, perhaps using the popular convention of "plug-ins"; and that takes advantage of the blazing speed of the current line of Macs, especially those with PowerPC processors.

Such a thoroughly modern program is Peak, from Berkley Integrated Audio Software ("BIAS"). Peak started shipping earlier this year, and as of this writing is up to Version 1.10. Although in its maiden version it had a few problems, which are being methodically cleaned up with each new revision, even from the start it has brought a wealth of welcome features to the sound editing game. It works with any 68030, 68040 or PowerPC Mac that is running System 7.1 or later, and QuickTime 2.0 or later. On the PowerPC machines, it takes full advantage of their built-in 16-bit 44.1kHz audio circuits. It also works with Numedia or Digi-design Nubus and PCI audio cards. It's file-compatible with just about every other Macintosh (and Windows) audio program, and it speaks SMDI, the high-speed interface for transferring files to and from MIDI samplers.

BY PAUL D. LEHRMAN

THIS EDIT WILL NOT SELF-DESTRUCT

Like Alchemy and Pro Tools, and unlike Sound Designer, all of Peak's actions are nondestructive: The actual file on disk doesn't get changed until you save it, and if you do a "Save As..." and rename the file, the original version stays intact. Thanks to this nondestructive approach, the program allows unlimited undos: Don't like a series of edits? Keep hitting command-Z, and you'll work your way back through all of the things you've done, right back to the original file if you want. You can also redo (command-Y) your way back up to the current edit again, if you like. If you want to jump back to an earlier point in your session, all of the operations you've performed are maintained in an Edits window: Choose the point at which things started to happen that you don't approve of, jump back to it and

—CONTINUED ON PAGE 219

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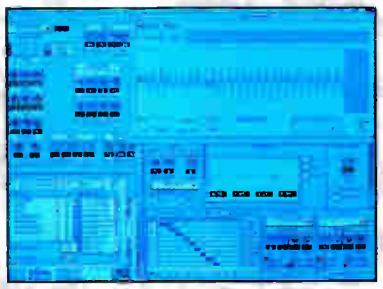

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SOUNDELUX U95

STUDIO TUBE MICROPHONE

To paraphrase a car commercial, "This ain't your father's tube microphone." Soundelux is certainly not the first company that comes to mind when discussing tube microphones. And it's not very often that a cutting-edge, award-winning post-production house such as Soundelux gets into the microphone biz. But when the principals at Soundelux heard designer David Bock's U95 prototype, they were impressed enough with the mic to put their name and resources behind it.

Housed in a hefty, two-pound, machined brass enclosure, the Soundelux U95 combines a large-diameter condenser capsule with tube-based electronics; the outboard power supply runs on 110 or 220 VAC. The system is priced at $2,900, including mic, power supply, cable and shock mount.

The mic is 9 inches long and, at 2⅛ inches, about the same diameter as an ELAM 251. The U95 has a first-class "feel" throughout. For example, there are no screws on the outside of the case, and the quality of the matte gray and chrome finish is impeccable. It's common for high-ticket mics to come in wood cases, but in the case of the U95, both the mic and power supply have lacquered wood cases for storage.

There are no switches on the mic body itself. Selection of the nine polar patterns (omni, cardioid, figure-8 and six intermediate settings) is made at the power supply. As the mic handles sound pressure levels up to 135 dB (at 0.5% THD), the possibility of overload is unlikely, and the mic has no pad or attenuation switches. The only indicator on the mic's front side (the one facing the sound source in cardioid mode) is a Soundelux logo, which is subtly embossed into the case. To gain access to the electronics—such as for changing the tube—one unscrews the large metal ring at the bottom of the mic.

The threads are large and rather coarse, so the possibility of cross threading is essentially zero.

Just visible behind the double layers of chrome mesh windscreen is a 1-inch diameter capsule featuring two 6-micron, gold-sputtered Mylar diaphragms. The electronics design takes a clever direct-coupled approach that uses both sides of the 6072 tube, with a triode voltage amplifier coupled to a cathode follower driving the output transformer. According to designer Bock, this use of the cathode follower as a buffer stage provides a more gentle impedance conversion, for less loss and lower distortion. But this design is also accomplished with a minimalist approach with only 20 components—excluding the tube and output transformer. And those parts that are present are high-quality, with electrolytic caps on the audio pathway and metal film resistors on the plate and cathode loads. The 6-conductor cable linking the mic to the power supply uses high-performance Gotham cable and Switchcraft XLRs. No corners cut here.

Most tube gear performs better after a warm-up period, so I began testing the U95 by letting the mic warm up for 15 minutes. I later discovered that the U95 only needs a minute or two to reach optimal performance, but you can never be too careful.

The U95's shock mount is a simple affair. It won't win any beauty contests, but it effectively isolates the mic from stand vibrations, and hey, it's free. The mount I tested secured the mic angle via a couple of lock washers, which didn't inspire confidence. However, according to Soundelux, the U95 mount now has a ratcheted angle adjustment that is more secure.

Although the chromed, double-layer mesh windscreen is effective at distances of about a foot, there are instances—such as voice-overs—where you have to get closer. The addition of my Popper Stopper mic screen took care of any breath noise.

Speaking of up-close, I liked the U95's cardioid proximity effect on vocals; it added a nice fullness without being overbearing. The pattern is rather tight at the cardioid setting, which is great for achieving rejection and isolation from other instruments or sources in a multimiking situation. However, if you have a vocalist who moves around a lot when performing, an intermediate setting—a click or two toward omni from the cardioid position—is ideal. I had excellent results using the U95 on male and female vocals, both on lead tracks and backups.

When switching polar response patterns, the U95's level drops sig-

BY GEORGE PETERSEN

nificantly and then comes back up a couple seconds later. Soundelux says this is due to capacitor recharge time, the idea being that a couple seconds of signal drop during pattern switching is preferable to a loud audio thump. I like that.

Few engineers ever use figure-8 settings anyway, but for myself and those seven of you who are into MS or Blumlein miking, I was interested in the mic's figure-8 response. In this setting, the back side of the mic was noticeably darker than the front-facing "logo" side. In cardioid, the U95's off-axis response is linear, and sounds coming from the sides or rear are merely attenuated, and there is no major frequency shifting in the off axis. The omni response was even and free of any "hot spots."

Unlike most high-end condensers, the U95 has no built-in bass roll-off switches. In the studio, I generally find such controls of little value in reducing breath noise on vocals, as the preset highpass filter slope never seems to fall where the problem lies. However, many engineers depend on bass roll-off switches when using two mics for cymbal overheads or on hi-hat in a multimiked drum setup, particularly in sound reinforcement situations.

I would characterize the U95's sound as being bright, yet full and warm. This brightness brings a nice sheen to percussive instruments—bells, triangles, cymbals and tambourine—and provides greater articulation and clarity to vocals. And I never encountered any situations where the mic's 130+dB sound pressure level handling was inadequate. This is not to say that the U95 is the perfect mic in every situation. Close in on solo violin, it was somewhat shrill, yet the same miking distance on cello was rich and rosinous. As a room mic, a distance back from the violin, the U95 shone, adding just the right compensation for the HF damping in the room. Although I didn't test a stereo pair, a couple of U95s should be excellent for miking string sections.

Overall, the Soundelux U95 is an excellent candidate for most studio miking applications. At $2,900, it's not exactly inexpensive, but its bright response, clean 18dB(A) self-noise performance and clear articulation set it apart from many of the "me-too" tube mics on the market; it has a personality that may find many engineers reaching for it as their first choice when going to the mic cabinet.

Soundelux, distributed by Group One Ltd., 80 Sea Lane, Farmingdale, NY 11735; 516/249-1399; fax 516/753-1020. ■

EMPIRICAL LABS DISTRESSOR

COMPRESSOR/LIMITER

Every once in a while a product comes along with "classic" written all over it. And in a certain sense of the word, this product actually is a classic already.

Let me explain. The Distressor is a digitally controlled analog device developed by Dave Derr, a former Eventide designer. Derr wanted to create a device to emulate classic tube and solid-state compressors of the '60s and '70s, such as the LA2A and the 1176LN. He also wanted the device to generate "musical" forms of distortion to simulate tube warmth and analog tape saturation. The result was the DIST(ortion) (comp)RESSOR.

Each Distressor is hand-wired using high-grade components and housed in a single-rackspace chassis. The black front panel has large gray knobs for input level, attack and release times, and output level. (If you need "something extra," the knobs can be cranked up to ten-and-a-half.) Four sturdy switches select compression ratios, detector and audio circuit functions and bypass. LEDs indicate the status of the various functions, as well as gain reduction and distortion levels. The rear panel has ¼-inch and XLR inputs/outputs, along with send and return jacks for stereo linkage. The ¼-inch input is balanced, while the output is not.

OPERATIONAL STUFF

Controls are arranged in three groups or "modes." The Detector mode modifies the way in which the Distressor reacts to audio signals. It provides a highpass filter for cutting the low (80Hz) "sum & difference" frequencies that can cause pumping; a sidechain 6kHz EQ for attenuating harsh mids; and a link function for connecting two units in stereo, or using an external controller. The Audio mode switch engages two types of distortion and/or another highpass filter, this one directly in the audio path. The Ratio switch cycles through the eight ratio modes.

In order to limit the number of switches, all (except Bypass) cycle through several selections or combinations of selections. Some users may find this arrangement a little awkward, particularly while attempting to A/B two selections on the same switch, but the alternative would be to enlarge the unit or have 15 switches crammed together. I adapted by learning to push the switches very rapidly.

The Bypass mode is a true hardwired bypass, with no internal audio components. As such, it's useful for comparing dry and processed signals, but it makes an annoying pop when engaged.

Triode distortion in tube circuits produces lots of second and third harmonics. As these harmonics are at the octave and twelfth (octave-and-a-fifth) above the fundamental tones, they are actually "musical" forms of distortion. The Dist 2 mode emphasizes the second harmonic, the warmest and most consonant harmonic distortion, with THD specs in the 0.05% to 3% range. The Dist 3 mode emphasizes the third harmonic, which gradually flattens out the tops and bottoms of waveforms, much like magnetic tape saturation does; THD is in the 0.1% to 20% range. The normal (clean) mode adds no distortion, yielding THD between 0.025% and 0.30%. Front panel LEDs indicate 2% distortion and "redline" conditions. Clipping begins at 3 dB past redline.

There is no Threshhold control on the Distressor per se. Each of the eight Ratio settings actually sets both the compression ratio and the threshold, and each has its own unique release curve. So, although there are switches and LEDs marked Ratio, they actually indicate what the manual refers to as Ratio modes, which act almost like presets. The eight Ratio modes are:

- No compression (1:1): warms signal with 2nd harmonics.
- Long knee (2:1): +15 dB where ratio gradually increases (can be as long as 30dB)/Parabolic knee: Gentle curve, separate detector circuitry.
- Long, parabolic knee (3:1): gentle curve.
- Long, steeper knee (4:1): gradually moving toward limiting.
- All-purpose (6:1) ratio: easy slope at first until after the knee; steeper knee, gradually moving toward limiting.
- "Opto" (10:1) short-knee limiting; separate detector circuitry; a special Ratio mode that is used to emulate vintage opto-VCA tube compressors like the LA2, LA3, DeMaria and Meek units.
- Hard limiting (20:1).
- Nuke: "brick wall" limiting, developed for room mics; medium threshold; release curve is logarithmic.

IN SESSION

The more I used the Distressor, the more I liked it. Besides sounding great, it proved to be capable of a surprisingly wide variety of appli-

—CONTINUED ON PAGE 221

BY BARRY CLEVELAND

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SOUNDCHECK

WORKING WITH DOWN TIME—SCHEDULED MAINTENANCE FOR SOUND REINFORCEMENT SYSTEMS

What does a sound company do in its off season, when things slow down? A brief survey reveals that the image of sound technicians warming themselves around a butane heater while re-stenciling cases, re-taping snakes and retouching the 421s with Sharpies no longer fits the reality of professional companies that are poised for success in the '90s. An ongoing program of maintenance provides a high level of service to clients all year, while maintaining the company's reputation by keeping the equipment working well and looking good. If things do slow down this winter, perhaps that is the time to initiate a regular, systematized approach to the upkeep of inventory and to secure the commitment from personnel to put in the extra time—both in the shop and on the road—to prevent repairs from piling up.

Entertainment Sound (Silver Springs, Md.) has stayed away from touring and focused on providing sound reinforcement for special events. "Washington D.C. is not a rock 'n' roll market," owner Ed Beeson comments. "We do a wide variety of industrials." Typical shows include fund-raisers, private parties and special events, both indoors and out, along with traditional industrial shows. Recently Entertainment Sound provided services for the annual Black Caucus, a job that required a combination of "industrial-style" distributed sound and musical entertainment; that event called for two 40-channel consoles and is typical of the kind of work the company specializes in.

"Our slow season is usually in February and then again in the middle of the summer," Beeson explains. Every four years, the presidential inaugural events soak up much of the available production on the East Coast. "It's like the Olympics in that there are not enough sound companies to meet the needs during the inaugural week," Beeson adds. Anyone with extra capacity who is not going to the NAMM show might give him a call. "When things slow down, we do the usual sort of maintenance," he continues, "but we're always looking for opportunities to rebuild and tighten up multipair connectors, to paint cases and sweep speakers, although we haven't gotten a chance to polish the mic stands yet this year."

Spectrum Sound (Nashville, Tenn.) has diversified into touring, retail sales, case manufacturing and installations. And, thanks to these other profit centers, Spectrum owner Ken Porter claims not to have as weak an off season as other vendors. "Also, country music

—CONTINUED ON PAGE 164

BY MARK FRINK

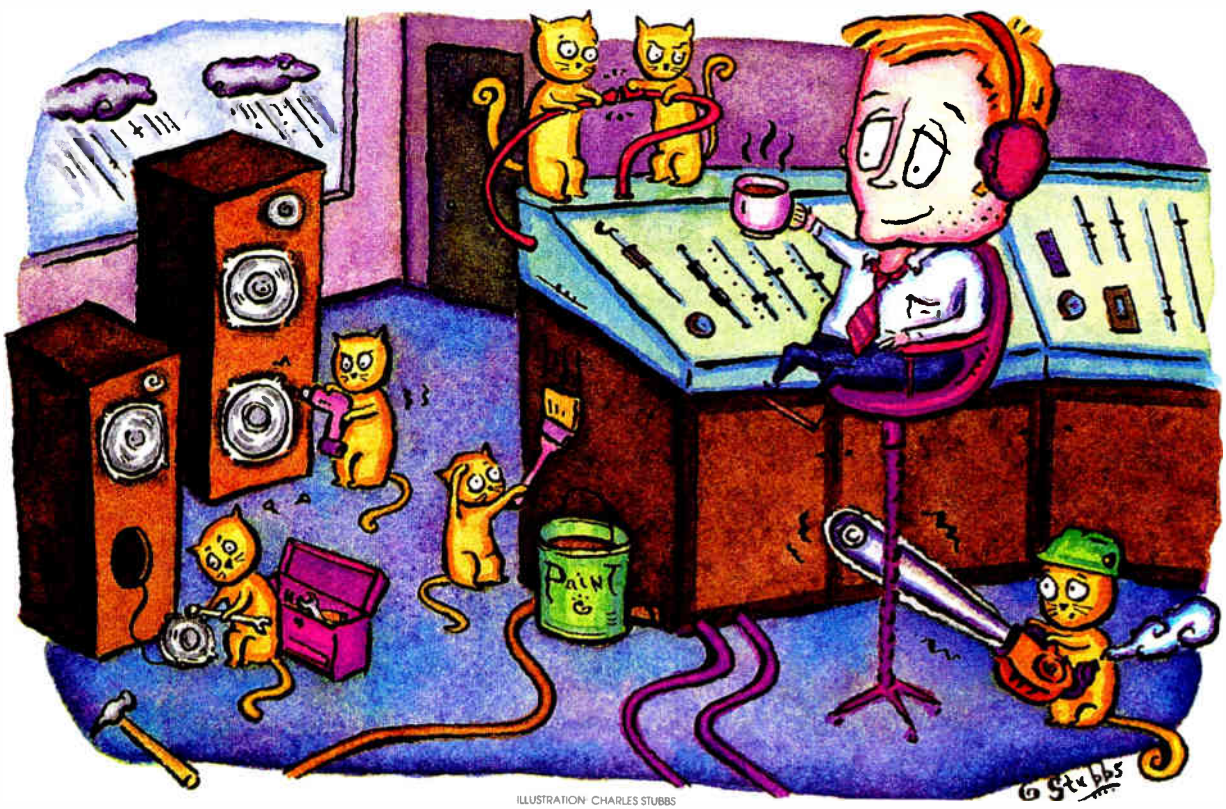

ILLUSTRATION: CHARLES STUBBS

WYNONNA'S ROAD REVELATIONS

PHOTOS: PHOTO RESERVE, INC.

Front-of-house engineer John Cooper

It's 11 a.m. Eastern—almost time to get to work. So John Cooper is wrapping things up on the telephone in between bites of his breakfast. "I'm talking about an all-star Nashville cast here," he says with an affable drawl amid the sounds of silverware in motion. "Steve Potts on drums, Willie Weeks on bass, and Jim Horn and the Southside Horns. Eleven supporting performers in all, including three background vocalists."

The party on the other end of the line conducting the interview is duly impressed. "The music drips with R&B and soul," Cooper says as the clinking sounds grow quiet. "It's definitely a departure from her roots, but the feel of it still echoes country."

Cooper is seated with the phone stuck to his head before a room service tray in a hotel somewhere not far from Wolf Trap, the Vienna, Virginia, shed where he'll soon be working. He has spent the past hour and some odd minutes painting a vivid verbal portrait of the music and behind-the-scenes production efforts on his current tour of duty as house engineer for Wynonna's Revelations Tour. Having kicked off on March 15 with three sold-out dates at the Universal Amphitheatre in L.A., the tour will shut down temporarily after the Wolf Trap show. After a break lasting about two months, during which time Wynonna will give birth to her second child, they'll hit the road again starting in August.

Cooper is no stranger to Wynonna's act, nor for that matter to that of The Judds, the successful country duo that included Wynonna's mother, Naomi, who bade their public farewell in 1991. A native of Bloomington, Ind., Cooper has been working out of Nashville for the past 17 years and has been on the pro audio touring circuit since 1979, when he put all of his belongings into storage and hit the asphalt with the Charlie Daniels Band as system engineer. One of the most sizable acts of its day, with four trucks logging 250-plus dates a year, the CDB tour ultimately deposited Cooper at The Judds' doorstep.

A RECONFIGURABLE SYSTEM

The stops along Wynonna's Revelations Tour are an eclectic blend of sheds, arenas and multipurpose facilities. To deal with these acoustic challenges, Cooper assembled a versatile, extremely

BY GREGORY A. DETOGNE

—CONTINUED ON PAGE 168

—FROM PAGE 162, SCHEDULED MAINTENANCE

has a longer season than other types of touring," Porter adds. "Many tours start preparation and rehearsals after the first of the year and then go out until Thanksgiving." Spectrum's touring staff are offered hourly pay in the shop doing system maintenance. First come cleaning and service, thinning out the cable repair pile, rewiring racks and systems, caster replacement and chain hoist service. "Then come capital investment projects, like last year we built a bunch of fly-mults," says Porter. "I want the engineers to take pride in the gear, plus be able to service it on the road with confidence." After maintenance, they take a look at shop work involved in major purchases for work coming up in the next season.

Dave Shadoan, president of Sound Image (Escondido, Calif.) says that his company's off season is just the month of January; they have two- and three-week windows to turn around entire million-dollar rigs for the next year. "Everything has to go out 100 percent and ready to work for a long while," says Shadoan. Sound Image cleans and services every amplifier and every rack. All speaker components are tested with sine waves; testers sweep several hundred Hertz past each crossover point to make sure there are no fatigued drivers that might go out during a show. All cases are repainted, and all casters are checked. Multipin connectors are opened and checked back to the shrink-wrap and boot. "Once it leaves the shop, it has to be right and look sharp," Shadoan comments. He feels that the key to keeping clients year after year is that every tour should go out as if it were their first date together. "There's no excuse for pieces that need paint or have tattered grille cloths."

Once each year, every one of Sound Image's 30-plus large-format consoles are stripped down, tested and rebuilt. Belly pans are cleaned out, PSUs are serviced, every module is checked, and every fader is cleaned according to the manufacturer's recommendation. Maintenance in the shop and on the road is the other side of the service equation. "In order to facilitate the kind of clients we want, we have to be extra careful everything is correct, because we may not see that system for another nine or ten months," Shadoan explains. Second and third, as well as lead, engineers work in the shop to turn around and prep systems. "The technicians who operate the system should be responsible for maintaining it," Shadoan continues. "If service is number one with the client, then maintenance has to be a priority for the equipment." Shadoan further points out that the enemy the entire industry faces is the ongoing price-based competition by too many companies. Even though a system may have little to be repaired, a good company needs to be able to afford a program to inspect and detect small problems before they go out the door. "If prices aren't maintained, then equipment can't be either," he points out, "and eventually this will eat a company alive."

Showco (Dallas, Texas), arguably the largest touring company in the world, has a full-time staff with "thoroughly codified" procedures for the testing and quality control of all the pieces that make up a touring rig. "In each area, we have experts who concentrate on their equipment specialty," explains Showco senior VP/sales and marketing Robin Magruder, "whether it's amps, speakers, cable, electronics, mics or rigging." The tour crew and system engineer are part of this process, and shop supervisor Ken Hercenrader, who has been with Showco for ten years, oversees all this. In addition to all the regular procedures, final assembly of systems occurs before it leaves the shop. "Service begins with the design and development of the hardware," Magruder continues. "The implementation of maintenance and system preparation is a key part of our system design." Magruder declined to go into the details, saying he didn't want to "provide a blueprint for other companies to follow."

"Our story is an open book, and we don't have any secrets, as such," Electrotec's Pierre D'Astugues reports. "Anyone is invited to come look at our facilities and procedures." Electrotec (Westlake Village, Calif.) has a perma-

NEWSFLASHES

Beyerdynamic served as one of the official microphone suppliers for this year's **Montreux Jazz Festival**, supplying wireless, dynamic and condenser mics for events in both the Stravinsky Auditorium and the Miles Davis Hall...Symetrix reports that five of the company's 471 SPL computers and one 528E voice processor will be used in Moscow's new **Planet Hollywood**...China's **Shanghai Grand Theater**, which is scheduled to open next summer, is being built on a 5.5-acre site at the northwest corner of People's Square. The theater's 2,000-seat performance center and four rehearsal rooms are being fitted a JBL sound system, including JBL Array Series clusters, EON loudspeakers, DSC 280 digital controllers and MPA amplifiers...An EAW system is being used for **Disneyland**'s new "Festival of Fools" attraction—a 28-minute interactive film "event" based on Disney's animated *Hunchback of Notre Dame*. The speakers include 15 AS300e-WPs, eight UB82-WPs, four SB250Ps, 12 JF0-SPs, two JF80-WPs, four SB528s and 5 FR122-WPs (WP = waterproof). The system is powered with Crest CKS and Contractors Series amps. In other EAW news, the company supplied speakers for each of this fall's presidential and vice presidential debates. The sound reinforcement company for these events was **Best Audio** (Mar Vista, CA), headed by Larry Estrin. Estrin is the audio director for the Commission on Presidential Debates and designed sound reinforcement systems for the '92 and '88 debates as well...The sound system for the **Prince Edward Theatre**'s (London) production of the musical *Martin Guerre* was designed and installed by **Autograph Sound Recording** (London). The system includes a 93-input Cadac J-Type FOH console and an assortment of Meyer Sound loudspeakers...This year's **Newport Jazz Festival** employed a Soundcraft SM-24 console, supplied by ShowTek of Anaheim, CA...SGA Inc. formed a new sound reinforcement company, SGA Audio Design & Services, based in Orlando, FL. Bob Owens, former audio director for Walt Disney World Creative Entertainment is the company's director of design...The 1996 **SEAMUS conference** (Society for Electro-Acoustic Music in the United States) was co-sponsored by Bag End Loudspeaker Systems, Mackie Sound Designs, Conneaut Audio Devices and Stewart Electronics. All of the companies donated the use of equipment for the event, which featured performances by electro-acoustic artists and ensembles from all over America. ■

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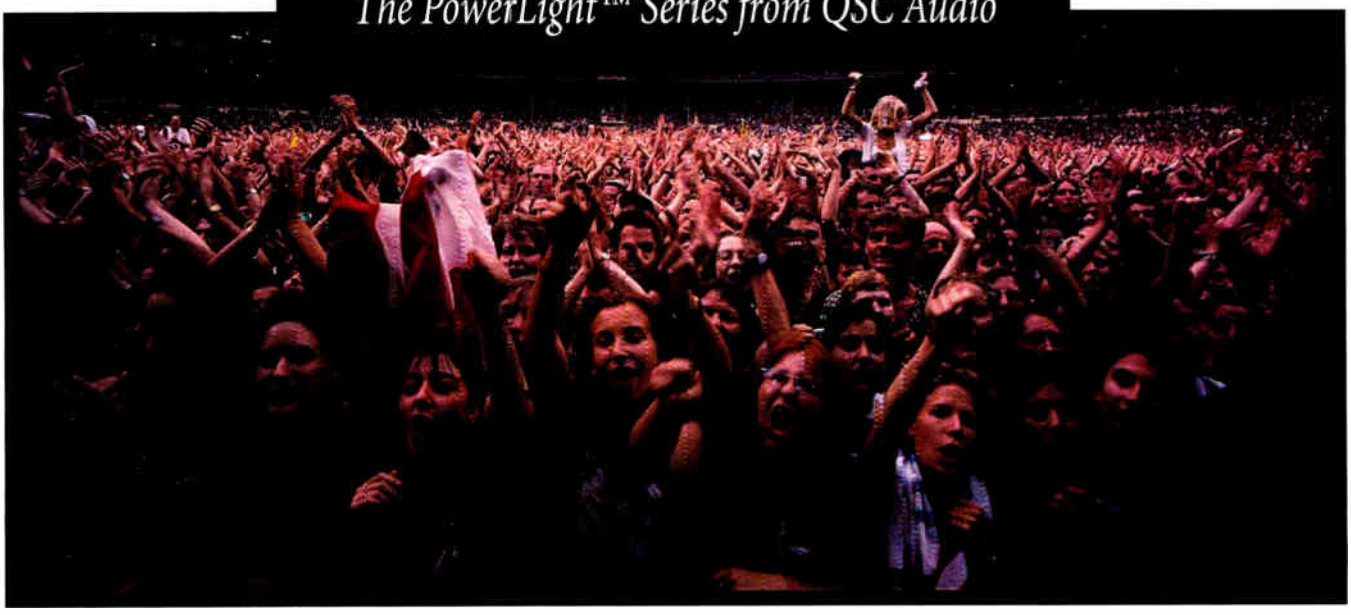

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nent staff in Los Angeles, Nashville and in Cambridge, England. Their job is to go through every aspect of a system upon its return. "We have a standard policy of checking everything, no matter how long it's been out," D'Astugues explains. "For instance, every speaker is checked as it comes off the truck as a matter of course." Often a system has less than 72 hours to be loaded onto a truck and on its way. "What little time you have to get ready for a tour is often necessary just to customize the system for the client," D'Astugues continues. "We endeavor to maintain all inventory so that it's ready to go out at any time."

Electrotec strives to provide services for clients who want something other than a standard packaged system and experiences no particular time of the year as slower than any other. "We are continuously building and fabricating equipment on a regular program," says D'Astugues, "particularly in the cabling and wiring side of things." Bought last year by speaker manufacturer Aura Systems, Electrotec is currently engaged in an R&D program with their new parent company that is expected to bear fruit next year. "Ted Leamey heads that program," D'Astugues continues. "You cannot stand still in this business. It's the nature of the beast that it is an ongoing process, and it's very exciting in that regard."

Sound companies finding their inventory under-employed in January will be well served to plan now for the labor and materials to implement companywide maintenance and upgrades before things get busy again. What better time to go through and inspect pieces that may have been neglected,

starting with the parts of the system that are potential safety hazards. Motors and electrical distribution should be on a regular program throughout the year, but now is the best time to give them the extra attention they deserve. These are the items that can easily be taken for granted and hastily loaded at the last minute, yet not only can they be "show-stoppers," they can also threaten both lives and the welfare of the company.

Particular attention should also be paid to nonredundant parts of a sound system. Any item that isn't normally immediately available on the road as a spare should be cared for as if it's the last one in the shop. Snakes and multipin connections are usually not attended to until they break, although a little extra attention can often catch a problem before it is a catastrophe. The small "bits and bobs" of hardware that can keep a flying system grounded should have a special home if they are not captive to the rig, and any tools necessary for setup and teardown need to be located in a secure place.

Winter is also the time to make a list of those little refurbishments and improvements to the system that, though time-consuming, can make the system better and easier to operate or maintain. Ask all company touring technicians for improvement ideas. Although not all suggestions may be practical, keeping an open dialog with the engineers in the trenches shows that everyone takes pride in the gear. There may be simple modifications or ways of repackaging components that can make the equipment easier to protect, repair or to use, and these projects can be built into the maintenance plans for the coming year. ■

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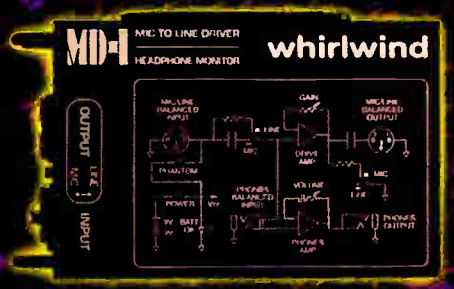

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PM

—FROM PAGE 163, WYNONNA

compact system that doesn't take excessive amounts of time to rig and can be configured daily to suit specific venues.

"The entire crew laughed for the first six weeks because we never rigged the system the same way twice the whole time," he recalls. "I assumed that was going to happen, so that's why I provided myself with building blocks which could meet the needs of any situation. Wherever we go, I always want to make sure we have enough tools in the tool box."

Cooper's system is based around 48 AAlto loudspeaker enclosures supplied by Audio Analysts (Colorado Springs, Colo.). Operating without the benefit of supplemental sub-bass in a true three-way fashion, the trapezoidal AAlto boxes are divided into individual low-frequency and mid/high arrays, all of which are flown. For near-field coverage, Audio Analysts provided another trapezoidal AAlto enclosure using a JBL 12 and a compression driver coupled with a 60x40 horn. This type of cabinet is flown left and right directly beneath the main arrays.

The AAlto system meets Cooper's criteria for flexibility and quick rigging: A simple interlocking system allows the crew to snap any size array together like Legos. After the cabinets are arranged on the ground, they are interlocked via sliding pieces of I-channel hardware that slip into matching tracks fastened to each box. In order to fly the system, each column is attached via a master lift track similar to the interlocking members, and the entire array is suspended from the fly grid. A rear-panel, lever-operated function permits the low-, mid- and high-frequency sections to be tilted 20° from their normal straight-ahead position. "With this feature, regardless of whether you fly the boxes with the high-frequency section at the top or bottom, you always have extra degrees of articulation," Cooper notes. "This arrayability is one of the things which sold me on AAlto. Typically, I fly the bottom rows upside down, so now I simply tilt the mid/high sections into the down position to achieve the desired coverage angle."

The design philosophy behind the AAlto holds that smaller, lightweight enclosures with narrow horn patterns will minimize overlap and deliver even coverage and highly intelligible sound. "There's not this enormous wash of audio that you can get when one component interferes with another," Cooper says. "Each of these cabinets is designed to work with the next. Therefore, you need less of them, and you obtain high directivity and good pattern control, to boot."

Power for the AAlto system is provided by Crown MA-3600VZ and MA-1200 amps, which roll off the trucks packed in four amp racks. Three 3600s and a single 1200 reside in each of the racks, with the 1200 feeding the high-frequency sections, one 3600 powering the midrange, and two 3600s fueling the bottom. Each rack powers eight enclosures.

Supporting John Cooper on the Revelations Tour is veteran monitor engineer Brooks Thomas. From his Yamaha PM4000, he keeps tabs on a system that includes 18 1x12 AAlto wedges. Other touring personnel include audio tech Bob Bussiere, and systems engineer Derk Offeringa.

CROWN'S IQ

For amplifier control, monitoring and troubleshooting, Cooper uses Crown's IQ System. While providing a graphic representation of whatever kind of system arrangement Cooper devises, the PC-based IQ System allows for a multitude of functions to be performed at the FOH mix position—functions that traditionally had to be made at the racks themselves or couldn't be done at all. And because touring amp racks are frequently shunted into some kind of cramped, poorly lit hole under the stage, Cooper and crew appreciate the IQ System's remote-control capabilities.

On the control end, IQ adjustments can be made to different P.A. zones; there are also onscreen attenuator and scale controls. Cooper also uses the IQ for system analysis and as a troubleshooting tool; it can be used to detect problems such as a power outage, or an overheated amp or a dead short in a loudspeaker line. Crawl with the house snake back from the stage and you'll find further examples of Cooper's economical and effective design. Drive racks were kept Spartan-like and ready for business. Central to this collection of components are a pair of Omnidrive system processors from BSS. Two Klark-Teknik DN-3600 graphics smooth out the bumps, and a K-T DN-60 real-time analyzer serves as a reference tool to provide Cooper with an overall idea of SPLs in given frequency ranges.

Cooper's collection of effects and inserts, however, leaves behind the minimalist approach. In addition to an Eventide H-3000S processor used exclusively for thickening the horns in a pitch-change mode, three Lexicon PCM 70s are used for vocals and acoustic guitars, and a pair of Yamaha SPX-990s add a little more flavor to the percussion and horn sections. Twenty channels of Drawmer DL-241 gate/limiters are employed for dynamics control and auto-muting, and eight channels of Drawmer DS-201 noise gate/expanders are used for snare bottom, on three toms, and as an expander/ducker on a Shure VP88 stereo microphone used to make board tapes. Complementing these components are a pair of DPR-901 EQs from BSS, and eight channels of Summit tube limiting for Wynonna's two vocal mics, the horns and backing vocals. "I'm a big dynamics control guy," Cooper admits. "That's why I use so much input processing. The setup at my console requires six racks. That makes a big footprint, especially in places like Wolf Trap, where mix position space is limited anyway. I want my dynamics managed within a very specific window so that my mix will be stable across the board. The last thing I want are problems with headroom. By keeping the dynamics consistent, I avoid all that."

TUNING THE P.A. WITH A VOCAL MIC

Cooper's PM4000 is wired for 14 effects returns and 50 channels from the stage. "The stuff on my console hasn't changed since the day I walked out of rehearsals," he says. "I re-tune the system to make it respond the same way every day. Then my console settings just fall right into place. With tools like the Omnidrive, IQ System and my third-octave EQs, the whole retuning process doesn't take long to accomplish."

Cooper tunes the system before each show using a mic out front and his own voice. "I will listen to certain program sources to get a feel for overall balance and coverage, but I essentially rely upon my own voice. The first time many people see me tuning the P.A. with a vocal mic, they ask me if it works. I just tell them to listen to the show. I believe it does, and I've had a generally good response over the years."

Cooper strives for a sound system balance that produces a musical mix, and is fearless when it comes to making board tapes. In fact, he feels so confident about their quality that he has given them away to everyone he has ever mixed for. "The console sound should be full and rich when you put it to tape," he explains. "There shouldn't be a huge amount of exaggerated compensation for vocals, drums or anything

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else. You've got to get the source right."

WIRELESS REVELATIONS

Getting the source right for Wynonna and the rest of her 11-piece band starts with input. For the heavily visual and choreographed Revelations Tour, most of the deck has gone wireless. An entirely Shure affair from front-line to back-line, the input list is highlighted by a number of their new Beta mics, as well as their new UHF wireless products.

Having tested a Shure U24S/Beta 87 UHF wireless system in January and February of this year, Wynonna ultimately settled upon a Beta 58A capsule once the production models were ready (she also uses Shure's WCM16 headset for two songs). Various other Shure wireless systems were used on virtually everything except the drum kit, keyboards, and select guitar cabinets.

For kick drum, Cooper chose the new Beta 52 mic, while the Beta 56—which combines the same style of articulating base as found on the Beta 52 with the capsule of the Beta 57A—is used on snare. SM98As are used at snare positions, hi-hat and across the toms. He uses Beta 56s on electric guitars, as well as in two Leslie simulators from Motion Labs.

As for the look-ma-no-wires portion of his input list, Cooper believes that "frequency agile UHF units like we're using on Wy's vocals and across the rest of the stage have really changed the overall scope of what we can do with wireless systems. There have been no wireless-related problems to date on this tour, and the capsules sound natural. Overall, I'm pleased with the cosmetics as well as the functional aspects of these new Shure units."

The most relaxing part of a show for Cooper is when the house lights go out and the music begins. "That's because everything coming at me from the stage is always consistent," he says. "From the back-line guys, the monitor mixes, the sidefills...I know what to expect. There's a balance and harmony which complements the way I mix. The sound I'm seeking to create is what Wy's public is accustomed to hearing. It's layered very nicely, there's room for everything. If I look at a particular individual onstage, I want to be able to hear his or her instrument or voice distinctly. That's a sign of the best mix anyone can deliver." ■

Greg DeTogne is a freelance writer based in the Chicago area.

[This approximates the amount of noise found in a *Topaz* console.]

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New Sound Reinforcement Products

ACOUSTIC CONTROL TEST SYSTEMS

Acoustic Control, a division of Samick Music Corp. (City of Industry, CA) offers the PHI-3 Absolute Phase and Polarity Test System for quickly identifying reversed polarity and out-of-phase conditions in amplifiers, cables, speakers, processing equipment and other sound system components. The system comprises two units: The PHI-3G is a wideband pulse generator that covers the audio spectrum from 20-20k Hz; the PHI-3D detects pulses and indicates polarity via multiple LEDs. The MCT-7 Cable Test System allows users to quickly verify correct cable wiring and accepts any combination of XLR, ¼-inch, ⅛-inch, BNC, RCA, Neutrik Speakon (4-pole) and 5-pin MIDI connectors.

Circle 212 on Reader Service Card

QSC POWERLIGHT UPGRADE

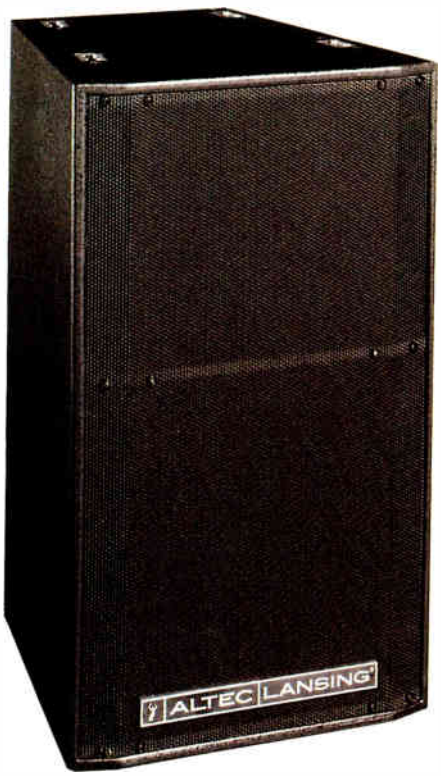
QSC Audio Products (Costa Mesa, CA) adds new features to its PowerLight Series amplifiers. An HD15 "data port" interface to QSC's MultiSignal Processor (MSP) allows for digital signal processing and remote amplifier monitoring and control by computer over an Ethernet network. Clip limiters are now standard on PowerLight amps; limiters may be independently bypassed, and 2-ohm performance has been improved, along with signal-to-noise ratio (105 dB unweighted). QSC also announced that its USA 900 and USA 1310 amplifiers have been THX™-approved, along with the CX6 and CX12 Contractor amplifiers. QSC offers 15 THX-approved amplifier models.

Circle 213 on Reader Service Card

ALTEC LANSING DTS

Altec Lansing (a division of Mark IV Audio, Buchanan, MI) adds five new models to the DTS line of speakers. The DTS-640 is a two- or three-way system with a 15-inch woofer, a horn-loaded, 10-inch mid and a 1-inch neodymium driver coaxially mounted on a 60°x40° constant-directivity horn. The DTS-941 two-way system features a 12-inch woofer, horn-loaded 6.5-inch mid and a 1-inch HF driver on a 90°x40° rotatable horn. Both systems are constructed from 14-ply birch and include hanging systems. The DTS-200 has a lightweight, injection-molded enclosure with a 12-inch woofer and coaxial 1-inch HF driver. The DTS-94 and DTS-99 are under-balcony systems; the DTS-99 has two 6.5-inch woofers and a 1-inch HF on a 90°x90° horn; the DTS-94 has two 8-inch woofers and a 1-inch HF on a 90°x40° horn.

Circle 214 on Reader Service Card



AZDEN UHF

Azden Corporation (Franklin Square, NY) introduces its first UHF wireless microphone system, the 411 Series. The 411UDR is a dual conversion superheterodyne true diversity receiver featuring crystal control, PLL synthesis, and 63 user-selectable frequencies between 794 MHz and 806 MHz. Outputs are ¼-inch and XLR, with level adjustment. Transmitters include the 41HT handheld microphone and the 41BT body pack. A NiCad battery-charging station is optional. The 411UDR/41HT system retails under $1,000.

Circle 215 on Reader Service Card

ROLLS TINY TWO-WAY CROSSOVER

The SX21 Tiny Two-Way crossover from Rolls Corporation (Salt Lake City, UT) measures only 4x4x1.5-inches; four units may be mounted in a 19-inch rack tray. Controls include input level, frequency select for the 24dB/octave crossover, and output level controls for the high- and lowpass signals. LEDs indicate power-on and clip conditions. The unit is powered via an included AC adapter and is priced at $99.99.

Circle 216 on Reader Service Card

TURBOSOUND IMPACT POWER AMPLIFIER

Turbosound (Partridge Green, England) introduces its IA-1400 power amplifier for use with the Impact range of sound reinforcement loudspeakers. Capable of producing 600 watts/channel into 4 ohms, the IA-1400 is equipped with output limiters to eliminate amplifier clipping. Additional protection is via power on/off muting circuits. Inputs are balanced XLR and outputs are Speakon NL4 connectors. An optional two-way active filter card can be installed for bi-amping. The Impact Series includes the Impact 80 and Impact 120 full-range systems and the Impact 180 bass enclosure.

Circle 217 on Reader Service Card

It's 1:00 A.M.

Do you know where your feedback is?

The MAQ™ 300 and MAQ™ 600 monitor amps do!

The record company A & R man you've been bugging for over a year picks tonight to visit your house band gig. The club owner has gone home, you are well into the last set and really starting to cook. As you turn up your monitors trying to keep up with several hundred watts of guitar amps cranked to 11, it happens... "brain darts." Before everyone can cover their ears and dive for the door, you casually reach over to your MAQ 300 and pull down the slider with the red LED glowing above it. The feedback is gone so quickly, you don't miss a beat. You get a record deal, marry a Baywatch hard-body and live happily ever after.

We can't guarantee the record deal and fringe benefits, but we can make feedback problems a thing of the past. The MAQ™ Series of dual monitor amps have two 15-band graphic equalizers with our Feedback Locating System (patent pending) built in. A LED above each EQ slider illuminates when that frequency band has the most energy present. Under feedback conditions there's no more guesswork, just pull down the offending band. Save time, save speakers, save your ears... all for less than the cost of buying separate equalizers and power amps. In addition to 15 bands of graphic EQ, each channel has an adjustable low cut filter to pull rumble and power-robbing low bass out of the monitors. The MAQ 300 delivers 2x150 W @ 4 ohms while the MAQ 600 puts out 2x300 W @ 4 ohms.

- FLS Feedback Locating System (pat. pending)
- Bass roll-off filter, adjustable from 25 Hz to 300 Hz
- Dual 15-band graphics with 45 MM sliders 500 Hz to 4 kHz 1/3 octave bandwidth 160, 250, 400, 6.3 k and 10 kHz 2/3 octave
- Balanced XLR input, bal/unbal 1/4" TRS input
- 1/4" TRS thru out jack (only on one channel)
- 1/4" EQ Out and Power Amp In insert points
- Stereo/Mono link switch
- MAQ 300-2x150 W @ 4 ohms in an XR type top box
- MAQ 600-2x300 W @ 4 ohms in a 5u x 19" steel chassis

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BY BLAIR JACKSON

RECORDING NOTES

PHOTO: SCARLET PAGE

Four Men and a Dog (L to R): Gino Lupari, Cathal Hayden, Gerry O'Conner and Kevin Doherty

AARON HURWITZ
ON RECORDING THE BAND AND FOUR MEN AND A DOG

by Blair Jackson

We first met Aaron Hurwitz in these pages two years ago, after he completed work engineering and co-producing The Band's triumphant return to recording, *Jericho*. Since then, the Woodstock, N.Y.-based producer/engineer has been busy on a number of projects, including two of my favorite records of 1996, The Band's *High on the Hog* and a wonderful album by the Irish band Four Men and a Dog, titled *Long Roads*.

The Band's record is the first by the group since its six-man lineup (which includes original members Rick Danko, Garth Hudson and Levon Helm, plus Randy Ciarlante, Jim Weider and Richard Bell) solidified into a potent touring band. *High on the Hog* powerfully showcases the group's R&B side, while still remaining typically eclectic (there are covers of tunes by Dylan, J.J. Cale and Foster & McElroy, among others).

If there is something familiar and reassuring about hearing The Band, then Four Men and a Dog's disc is a real revelation. Like The Band's record, it was cut at Levon Helm's studio in Woodstock, with some additional work at NRS Recording in nearby Hurley, N.Y., and mixed at Bearsville, also a stone's throw from Woodstock. While Four Men and a Dog play some traditional Irish music, most of *Long Roads* is made up of original acoustic tunes that sound like Buddy Holly and, yes, even The Band, transplanted to the Irish countryside, played on fiddles, guitars and the evocative Irish hand drum called bodhran. Hur-

—CONTINUED ON PAGE 182

PHOTO: ELLIOTT LANDY

The Band (L to R): Jim Weider, Randy Ciarlante, Garth Hudson, Rick Danko, Richard Bell and Levon Helm

AT POLLYWOOD WITH MICHAEL WOLFF

by Maureen Droney

It was his five-and-a-half-year stint as music director for *The Arsenio Hall Show* that brought Michael Wolff's name into the spotlight, but he'd already made his mark as a respected jazz musician long before that gig, playing sideman to living legends like Cannonball Adderley, Sonny Rollins, Cal Tjader and Nancy Wilson. In 1995, after the demise of Arsenio's show, he formed the Michael Wolff Trio, featuring bassist Christian McBride and drummer extraordinaire Tony Williams. Since then, the trio has released three CDs, the latest one titled *2 A.M.*, on Cabana Boy/Wap Records, and these days he divides his time between his own recording projects, performing with his trio, and composing for film and television.

Mix visited with Wolff at his home studio, Pollywood (named for his wife, actress Polly Draper, one of the former stars of TV's *thirtysomething* series). Between tour dates in Cleveland, Tucson and Washington D.C. supporting *2 A.M.* ("I have to support it," he laughs, "It doesn't support me!"), he was working with his musical collaborator Nic tenBroek on the score for a new Fox television series titled *Dark Angel*.

Pollywood has more the feel of a music room than a recording studio. Wolff's 1906 7-foot Steinway B piano

PHOTO: MAUREEN DRONEY

and a copper-toned Sonar drum kit take up more than half the space, with natural lighting coming from large windows and a skylight. "I've been here four years now," he explains, "but I'd previously had a studio in a garage behind my wife's house, so when we bought this house and remodeled, I knew how I wanted my studio to be. I wanted a room with a view and a really bright space, and a great air conditioner! Before, my friends on sax would be out working in the garage with no air conditioning, and we would have to stop in the afternoon because their horns would get too hot."

In a twist, Wolff does a reverse on the norm. Most project studio owners seem to record at home and opt for a mothership-type studio to mix in. Instead, he records his distinctive brand of acoustic jazz at a commercial facility (*2 A.M.* was recorded by engineer Tom Size at Fantasy Studios in Berkeley), then overdubs and mixes at home. "One nice thing about mixing at home," he says, "is you can go play the mix on a bunch of systems that you are familiar with. We put it on cassette, then get the boom box. I also have two car systems, a setup downstairs in the living room and one in the bedroom. We just listen to all of those and we really know what it's sounding like everywhere."

Wolff's favorite monitors, though, are his Sony headphones. "I have the little red ones that you can't buy anymore. I can fly to New York, and if I have the Panasonic 3800 DAT recorder, which is pretty standard, I can put on the headphones and always know what I'm hearing.

Equipment at Pollywood includes a Mackie 64-in console with sidecar, 16 tracks of Digidesign Pro Tools III, Hardy preamps, a Lexicon 224 reverb, SampleCell and Akai samplers, Korg and Oberheim synths, a Fender Rhodes 73 suitcase and a Wurlitzer electric piano. Asked for his favorite keyboard, Wolff lists Korgs and Rolands but adds, "The truth is, I'm a piano player, and when I sit and play, it's on the piano. I love to orchestrate with the electronic keyboards; I love the Oberheim particularly, the old analog stuff. But I really am an old-fashioned guy. Like when I compose, I go with the score paper. I like real big paper where I can see everything, because I like to go on little side trips with the music. I don't write in a linear way. And you can never get a computer monitor that's big enough—you'd need a whole wall! You can just flip through the score and find it so much more quickly."

Despite Wolff's being "old-fashioned," Emagic's Logic Audio software is a new favorite tool for him and for tenBroek, who says, "It's digital audio with very sophisticated sequencing. You can see the music, punch a button, then print it out like a score without hav-

—CONTINUED ON PAGE 190

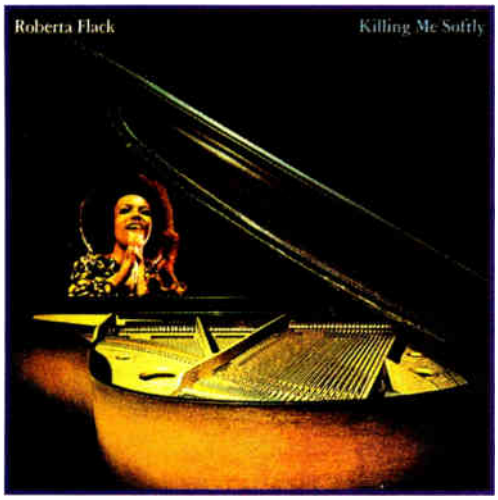
ROBERTA FLACK'S "KILLING ME SOFTLY WITH HIS SONG"

by Blair Jackson

Okay, all you young whipper-snappers, today we're going to talk about a time when a singer named Roberta Flack ruled the pop and R&B radio airwaves, sold millions of records and won armloads of Grammys and other awards. Perhaps you already know The Fugees' popular hip hop version of "Killing Me Softly With His Song." Well, if you haven't heard Flack's definitive early '70s reading of the tune, you haven't heard the song the way it was *meant* to be sung.

PHOTO: MICHAEL OCHS ARCHIVES

Roberta Flack was born in Asheville, North Carolina, at the foot of the beautiful Blue Ridge Mountains, in 1939, but spent her formative years in Arlington, Virginia, outside of Washington, D.C. The daughter of a church organist, she grew up singing and playing piano, and there were many who believed that she had the pipes to become a classical singer. In the late '50s, she



landed a music scholarship at Howard University in D.C., but after a couple of years, she changed course and moved to Farmville, North Carolina, to become a music/math/English teacher (!) in a segregated high school. By the mid-'60s, though, she'd moved back to D.C. to work as a teacher, while pursuing a career as a performer on the side. Evenings, she fronted her own trio and landed a regular gig at a club called Mr. Henry's Upstairs, where she was "discovered" by the popular jazz keyboardist Les McCann in early 1969. An excited McCann called up his producer at Atlantic Records, Joel Dorn, who remembers, "I had just recorded 'With These Hands' with him, which Les had heard Roberta sing in Washington. Les called me up one day and said, 'You've *got* to record this chick.' 'Who is it?' 'Don't worry about it. Just come down and record her.' Actually, about a year before that, Rahsaan Roland Kirk [whom Dorn also produced] had told me about her, but for some reason I never followed up on it. But Les was so insistent, I had to follow up on it. So I heard a live tape and signed her immediately."

For a jazz-influenced singer like Roberta Flack, Atlantic Records was the perfect place to be in the late '60s and early '70s. Not only was the label's jazz legacy impressive—Coltrane, Mingus, Rahsaan, Keith Jarrett & Eddie Harris, Les McCann, Ornette Coleman, etc.—Atlantic was also home to established pop/jazz/gospel crossover artists like Ray Charles and Aretha Franklin. Joel Dorn was one of four major in-house producers for the label in 1969 (the others were Ahmet Ertegun, Jerry Wexler and Tom Dowd—what a group!), and Flack's debut album, *First Take*, was the beginning of a long, very fruitful relationship between the producer and artist. Flack's appeal was easy to understand: She had impeccable taste in material (which producer Dorn credits almost entirely to her); a breezy but emotive vocal style that was particularly effective on ballads (the title of her third album sums up her style: *Quiet Fire*); and Dorn's productions successfully highlighted her as a singer with jazz, pop and R&B leanings at a time when "crossing over" was still a relatively new idea.

"In those years," Joel Dorn says, "music wasn't as pigeon-holed as it is now, so there were artists who were played on R&B and pop and jazz radio, and there were a lot of acts who could go a lot of different ways. If Cannonball Adderly had a hit or Ramsey Lewis had a hit, jazz people weren't the only ones who would come out and see them play. Pop fans would show up, too. There were a number of singers, too, like Nina Simone, Etta Jones, Lou Rawls, Oscar Brown Jr., who were true crossover artists." Flack wasn't as jazzy as any of those artists, but there were vocal inflections and elements of her always-inventive piano playing that strayed into jazz. "I've been told I sound like Nina Simone, Nancy Wilson, Odetta, Barbra Streisand, Dionne Warwick and even Mahalia Jackson," she

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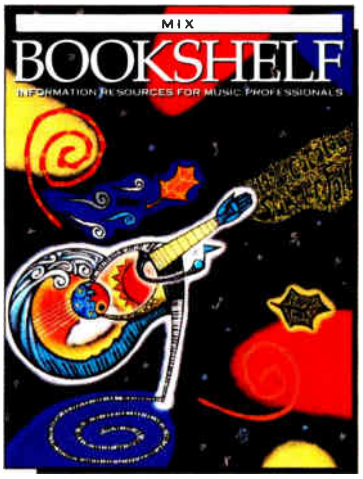

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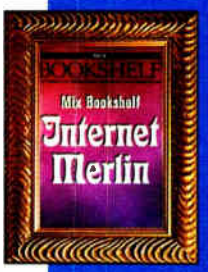

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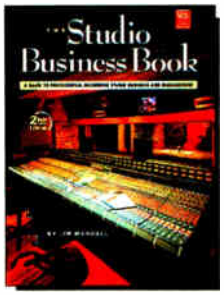

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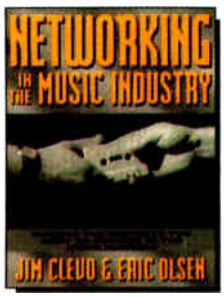

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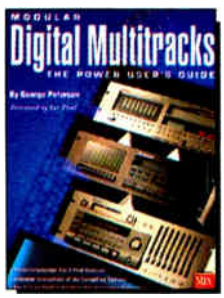

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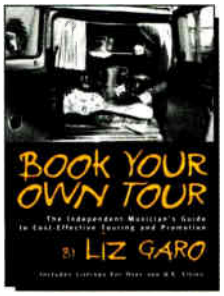

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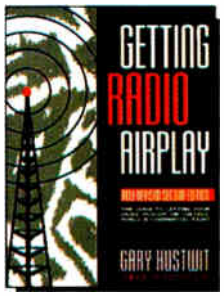

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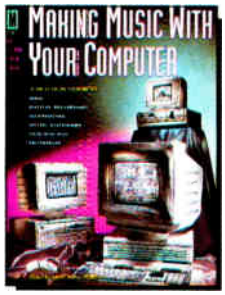

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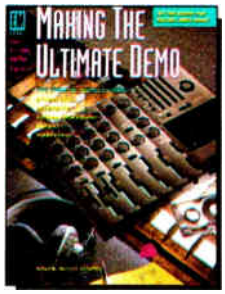

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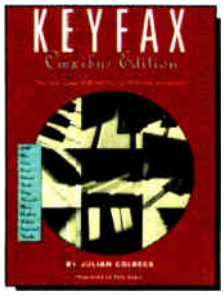

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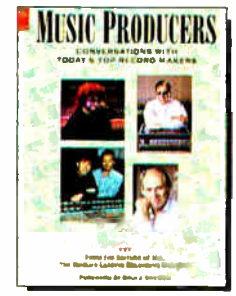

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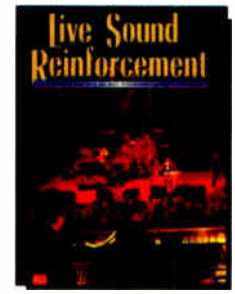

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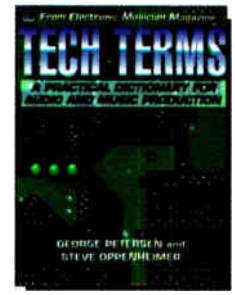

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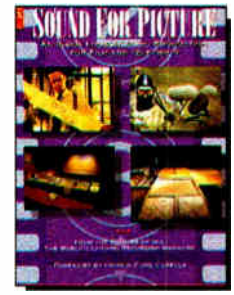

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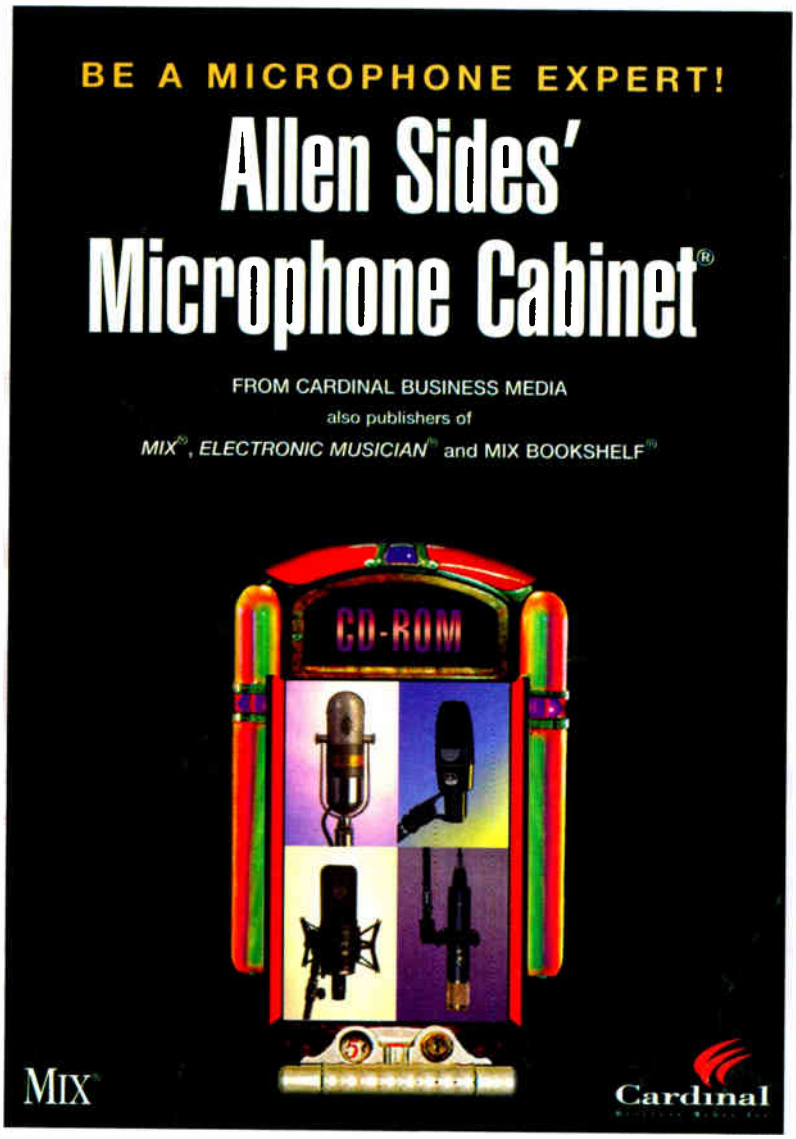

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once said. "If everybody said I sounded like one person, I'd worry. But when they say I sound like them all, I know I've got my own style."

First Take and the follow-up, *Chapter Two*, both sold well, but it was when she teamed up with a former Howard University classmate of hers named Donny Hathaway for an album in 1972, that she scored her first hits. Later that year, a song from her first record, the soft, beautiful ballad "The First Time Ever I Saw Your Face," was featured prominently in the Clint Eastwood thriller *Play Misty for Me*, and the song became a bona fide smash, hitting Number One and earning her a Grammy. Another duet by Flack and Hathaway called "Where Is the Love" made it as high as Number 5 that year.

Which brings us to "Killing Me Softly With His Song." Dorn picks up the story: "A fine singer named Lori Lieberman, who was working on a record with [songwriters] Charlie Fox and Norman Gimble, went to see a performance by Don McLean [of 'American Pie' and 'Vincent' fame], and somewhere in a conversation she had with them, she said she was incredibly moved by having seen McLean the night before, and she said McLean had 'killed me so softly,' or something to that effect, with his songs. So Gimble and Fox were inspired by this and they immediately wrote this song for her, which appeared on Lori's first Capitol record. That record had been out about a month, and it was starting to break in Boston. Meanwhile, Roberta flew from New York to California for something, and she heard Lori Lieberman's version on the plane—one of those 'Capitol Records presents the hits of September!' type things. Well, she went nuts for this song. She called me from the airport and said, 'I've got it! I've got the one!' And she started to describe it and sort of halfway sing it, and she said, 'Go find me the right rhythm section. We've got to cut this.'

"So I put together what is really kind of an unusual rhythm section: Ray Lucas, who was Dionne Warwick's drummer and had just the softest touch, played drums; Ralph MacDonald played percussion; Hugh McCracken played guitar because I thought he'd have the perfect feel for that song; and Ron Carter played electric bass—that was the wildest piece of the whole puzzle. So it was kind of a strange crossover rhythm section of jazz and pop guys. But it ended up being perfect for that song."

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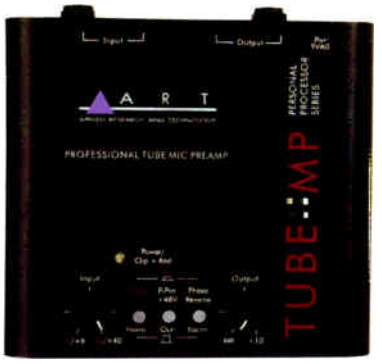

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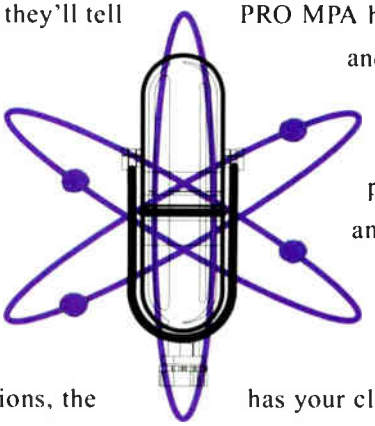

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Like almost everything cut by Atlantic's in-house producers, the session took place at Atlantic's famous studios on 60th Street in Manhattan. Gene Paul, son of guitar great and recording pioneer Les Paul, was chief engineer. A staff engineer since '69, he'd worked with Dorn and Flack on earlier records, too, and was widely respected as one of the best in the city—great at capturing performances but also inventive when he needed to be. Paul, who now works at dB Plus in New York, says that Atlantic Studios "were always kind of primitive. They were always behind the times technologically, but the focus was never on the equipment—it was always on the music. Their style was that once everyone had had 16-track for about four years, someone finally said, 'Hey maybe we should do that, too,'" he adds with a laugh.

"The room itself was delightful. It was a very natural room. All the success they'd had in there made them reluctant to change much, so when we were working with Roberta, it was still more or less the same room that Ray Charles and Aretha and many others had recorded in. Later in the '70s, it changed quite a bit, but in that period it was pretty close to the original. It was a very comfortable room, and musicians just loved it."

When "Killing Me Softly" was cut in the late fall of 1972, the control room was equipped with a pair of MCI 16-tracks—which Dorn often used as a single 32-track—and an MCI console. The tracking session for the song was completely live and only took an hour or two to lay down the instrumental bed. The vocal session was more complicated, however. First of all, like most singer-pianists whose vocals and playing are mystically intertwined, Flack always wanted to put down a vocal during the instrumental tracking, too. As Dorn notes, "If she'd sung a great track and you missed it by not recording it, you'd be kicking yourself." So Paul would have a Neumann U47 on Flack's vocal, "and then we'd bury the hell out of the piano and put in a couple of those little Sony mics [probably C37s] inside so we could get the piano and the vocal without a lot of leakage. The piano might not have sounded quite as good as it could have, but we had to be ready for the moment when we'd say, 'Well, we got the vocal on that one.'" This was not an issue on the song in question, however, as Flack played electric piano.

When it came time to try to nail a lead vocal, Gene Paul says, "I think it took an hour or so of Joel Dorn and Roberta talking in the studio by themselves, about the track. Then Joel gave me a wave and said 'Let's cut it,' and he stayed in there with her, and she got the vocal fairly quick, remarkably well, and it was done. But I said, 'Gee, I'm playing with some echo in here—Roberta, would you mind singing some loose tracks?' We had some open tracks. So she went back and sang some loose tracks, and then when we went to mix it, I only played the echo feed and return, so you never heard the primary of those vocals. So between that and a lead, it became this strange, interesting sound. We all loved it, and that's what you hear at the beginning of the record." Indeed, the dreamy collage of voices floating in the ether that opens the song is one of its masterful touches. Typical of the era, the reverb was created using EMT plates, which Paul says were 'noisy, crappy, *boing*! But absolutely perfect for what we needed."

The other notable element on the track is the *very* prominent bass drum line. "I can remember going through it and making a mix and Joel taking it to Ahmet and Jerry Wexler and them saying, 'What's with *the foot*? Get rid of that!'" Paul says. "They'd never heard something where the bass drum was so loud and dominant. But Joel thought it worked."

"We had tried earlier, on a Ray Bryant record, to feature the foot—the bass drum—and we weren't that successful," Dorn adds. "Gene kept saying, 'If we could get the warm, rich sound out of a bass drum, that would be a great lead for the right record.' So when Roberta sat down at the piano and sort of laid down the feeling of this song and it started to happen, Ray Lucas had the biggest, softest but most *present* foot you've ever heard. He kind of *floofed* it, if that's a word, and got this great sound. Gene built that whole record around that foot."

After the criticism from Wexler and Ertegun, "We went in and did some more mixes, and when we finished, there were alternate concepts," Paul says. "But when it was all said and done, we went with the original. It just had something...as 'wrong' as it was, it was *right*." To capture "the foot," Paul used an unusual mic on the bass drum—an SK46 ham radio mic about which he jokes, "The more you beat it, the better it sounded." Generally speaking, Paul's favorite mics were the usual Neumann's—47s, 67s, 87s.

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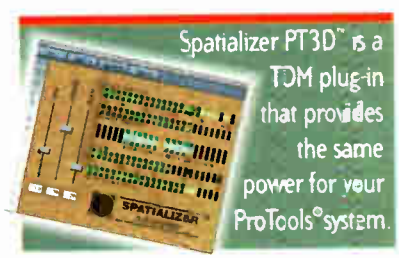

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Both Dorn and Paul say that they knew instantly that they had a hit on their hands when they'd finished "Killing Me Softly." Says Dorn, "I've made close to 3,000 songs in 35 years, and in my whole career I've only known I had a hit two times: One was 'Do You Wanna Dance' by Bette Midler, and the other was 'Killing Me Softly.' There was no question, especially after 'First Time [Ever I Saw Your Face]' had won the Grammy." Paul adds, "I remember Joel standing in the studio when we were cutting it throwing money up in the air. We all knew it was a hit. We all felt the magic. Roberta, too. It was special."

The song did rocket all the way to Number One in the winter of '73, and it won Grammys for Song of the Year and Best Pop Vocal Performance (Female). There would be more hits from Flack over the next several years, including "Feel Like Makin' Love," "The Closer I Get to You" (with Donny Hathaway), "Making Love" and "Tonight, I Celebrate My Love," and in more recent times, duets she sang with Peabo Bryson brought her back onto the charts. She's also continued to tour successfully, occasionally even doing shows backed by a symphony orchestra. And of course having The Fugees cover "Killing Me Softly With His Song" has led to renewed interest in Flack's artistry.

Gene Paul and Joel Dorn have both thrived since this early '70s triumph. Paul stayed with Atlantic into the mid-'80s, and Dorn became a very successful independent producer working with a broad range of acts, from Leon Redbone to the Neville Brothers. The two have continued to work together occasionally on various projects, including the massive, acclaimed Rhino/Atlantic John Coltrane box, *The Heavyweight Champion.* ■

—FROM PAGE 174, AARON HURWITZ

witz plays keyboards, including accordion, throughout the record, and there are guest appearances by several members of The Band. But the core Dogs—Kevin Doherty, Gino Lupari, Gerry O'Connor and Cathal Hayden—are a force to be reckoned with, true originals with deep, beautiful roots. I recently chatted with Aaron Hurwitz about these two fine projects.

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for video and audio. It's got different areas with different ceiling heights. There's one place where there's a stone floor, a stone fireplace and a wood ceiling that's probably around 12 feet high, so that's a lively spot we use for piano, because it gives you just enough delay time and a natural reverb. Then there's another area, which is the main playing area, where the walls are all wood, and the ceiling goes up a good 25 or 30 feet, so that's a spot where we can hang the room mics. The section where I put the two sets of drums also has a really high ceiling, and a stone wall. We use gobos to divide each section off: I've made all different sizes that are about 8 feet to 10 feet high—half of them are Plexiglas, half of them are insulated, and what we can do is build rooms around where some of the lower ceilings are. I even have a top I can put on one [of the "rooms"] if I need to. So what I'll usually do, say with The Band, is build two iso booths if we're recording live, and put the live-est instruments in there or isolate the drums from everything, depending on what's going direct or not going direct.

The control room is above all this, and there's no glass; it's completely open, so we can communicate really easily. The control room's also a good recording space. We use it for vocals and acoustic guitar, things like that.

What does having no glass do to your monitoring?

Well, you have to use headphones for sure, because while everybody's playing, you're hearing more of the room and you don't want to crank the [control room] speakers so loud that it bleeds into the overhead microphones you might have 15 or 20 feet in the air, even within the control room. One effect of having no glass is it means the engineer and the producer are more part of the music. I can work much more on the musical arrangement and be part of the music and know what's going on, without having the glass and the total separation. Or if we want to stop and talk about the arrangement, you can just talk over the console; no talk-back button.

How live was* High on the Hog, *in terms of the tracking?

There were a few songs that were completely live. "Forever Young" was nearly all live, including the vocals. We overdubbed a little accordion on that and a little bit of vocalizing. But the guitar solo, the original accordion solo, the drumming—all that was live, seven guys playing, including Colin Linden on acoustic guitar. That was a great night. We did a few takes and cut it all in about three hours. "Love You Too Much" is a fairly live track, too. "Stand Up" was pretty live.

Which is the least live?

Well, we always had at least three or four guys playing at the same time—drums, bass, guitar, some keyboards. The least live was probably "Free Your Mind," because it was such an oddball song for Levon, who came in and said he wanted to do it. I wasn't sure which way to track it. I didn't know how the hell we were going to pull that off, to be honest with you.

What did you learn about recording The Band between the making of* Jericho *and* High on the Hog*? I know the* Jericho *sessions were spread out over a much longer period...

That's right. One of the things that was really different about this album is that when The Band went in to record *Jericho*, they had not recorded as a unit really, so if you look at the credits, there are more outside people involved. But now that the guys have been playing for a couple of years together and really sounding great live, they're more of a band in the studio, too. They've all gotten better during that time, and they're all really growing together and getting along so far.

Probably the main thing I learned from *Jericho* is, let's let the six members make the record, and not bring in a bunch of outside people, unless someone—one of the members—has a special friend they want to bring in; as opposed to a producer bringing in outside musicians for the sake of names or whatever. This way it comes out sounding more like a band.

Did anything change from a technical standpoint between the two albums?

Yeah, big time. What I did this time is I used a lot more preamps to track with. The console I have up there, which I used mainly for playback, I like a lot. It's a Soundcraft 1600 Series, which was the series before they sold out to JBL. It sounds great; it's really warm and it covers a large frequency range. I used to have the 24-track that matched it, but the transport was not reliable enough, so we ended up getting an MX Otari machine. The preamps I used were, to start with, some old Gately Electronics Model EM-7s. Garth [Hudson, The Band's keyboardist] had them in his basement, and that's what [they used when] they made the brown album [the group's second record, called *The*

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Band, 1969]. He had eight of them. They were the first transistorized discrete preamps. So I cleaned them up. They have a really big sound. I was going straight from the mic through the preamp into the Otari. Then I also got some newer things—but tubes—like the new Focusrite mic pre/EQ, the new red one: *excellent*. I also used a couple of the new Rupert Neve Amek [EQ/preamp]—the 9098; and the Demeter tube mic pre's; and the TLA dual-valve preamp, which is a compressor and a mic pre. And that was enough mic pre's for variation in sounds, programmed directly into the tape machine. I had it normaled every day, although I did change it for every song; the drum sounds are different on every song. But I mostly changed microphones or changed where I placed the drums in the room for different sounds, as opposed to changing preamps.

What were the main mics you used?

PHOTO: MARIE SPINOSA

Aaron Hurwitz at Bearsville Recording Studio

Besides the stock 421s and RE-20s and D-112s, 57 on the snare, I experimented with the new Audio-Technica line—the 4050, the 4033 and the 4031—and that worked really well. They're good mics. Then I used a lot of 67s and 87s, because with The Band's sound—actually with anyone—the Neumann mics really hold up.

Another thing I did that's kind of interesting is I had an ADAT locked up to the MX-80, so what I'd do is for Jimmy [guitarist Jim Weider], whose got an ADAT studio at home, I'd make him a slave reel. He'd go home and work on some of his parts and then come back, and I'd either fly the part back in or we'd retrack it with his conception of how he thought it should go. A song like "Free Your Mind" was three sets of drums—a lot of drum overdubs, a lot of Garth overdubs, plus the horn section; it ended up being 44 tracks. So what I'd do is make a slave reel bouncing down to the ADAT and then bounce that back to the 2-inch, and then I'd record analog on the 2-inch. And every once in a while, I'd go over to Bearsville and make sure everything was locking right.

Was the quality difference between the two media very noticeable to you?

Oh yeah, absolutely. Which is why most of the recording was done on analog, and all I would use the ADAT for is the slaving. Not that I mind the

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ADAT sound; it's just a completely different sound. I've made a lot of records on ADATs. On the parts from the ADATs that we kept, in the mix I ran them through the Pultecs in Bearsville to warm it up a little bit. But actually, as soon as you put it on the analog, it gave it a warmer sound.

Like* Jericho, High on the Hog *has a track with [late Band keyboardist] Richard Manuel on it. How did that come about?

That was a live track that Richard did at the Lone Star [a N.Y. music bar] during a Band gig, but it was just Richard singing and playing piano, and Rick comes in and sings on part of it. It was just on a cassette that they made from the show. Garth loved the performance, so he bounced it over to 24-track and then put real strings behind it and some synthesizer strings, saxophone, got a string bass player to be on it, and kept building like that, always keeping Richard's vocal out front. Garth and I have been working on that through the years.

I see that your keyboard work is all over the Four Men and a Dog record. What have you learned about keyboards from Garth Hudson?

Everything! [Laughs] Luckily for me, Four Men and a Dog like the way I play and want me to play, because I never go in trying to play on records I produce. I'm really not into that, unless I'm asked, or there's something I've just got to fix. Four Men and a Dog don't have a keyboard player or accordion player, and there I was...

In terms of Garth, he's such a musical genius. Just seeing him play a show or listening to a record you have no idea how deep his knowledge goes. He's a genius as an improviser. In the studio, he'll play something, listen to what he's played, he'll erase or clean up certain notes, and from there he'll usually write out what he has played and start building a piece from that—going to another track and filling in some of the spaces he left open with more fills and then coming back and writing that out, until he's got a complete orchestrated arrangement written out note-for-note. I was lucky enough to go through the old 8-tracks of *Big Pink* [The Band's legendary first album, 1968] and the brown album, and Garth was doing it the same way back then. On an 8-track recording, he might have manipulated three tracks. The thing with him is, if it's not working on the organ, he can try the accordion or the saxophone, the *family* of saxophones. He is so aware of what you can do with musical colors, and that's something I try to think about, too, though certainly I can't compare myself with him.

How did you hook up with Four Men and a Dog?

I was touring live with The Band in Norway, and Four Men and a Dog were playing at the same festival we were; they were opening for us. They happen to be the nicest guys in the whole world; they're unbelievable. Great guys. Anyway, they're big fans of The Band. They'd put out a couple of records on their manager's label. They landed a deal with Castle Records, which is the same label The Band is on in Europe. We ended up jamming with the guys until six or seven in the morning, and of course Levon, with his generosity, said, 'You've got to come and record at my place in Woodstock.' So when they landed this deal they called me and said they wanted to come to Woodstock; this is a couple of years ago. So they came over, and we did that album in about a month—almost the same process I used on The Band record in terms of recording at Levon's and going to mix at Bearsville and mastering at Bob Ludwig's. The first record came out and everyone liked it. It did pretty well in Europe, so Castle said, 'Yeah, let's do the same thing again.' And we're talking about going in this winter and doing another one; and maybe a new Band record, too.

I'm assuming the Four Men and a Dog records are mainly live, too...

Right. They're not really studio musicians in the same way the guys in The Band are. It's better for them to work out the arrangements first and then get as much live as we can. It worked well.

Are you doing close-miking on fiddles and some of the traditional instruments and combining it with overheads?

Exactly, because I don't need a lot of tracks for them. With them, I put the bodhran player, Gino, in the main part of the room. He's like the bass player and percussionist at the same time. On the bodhran I put like a 421 on one side or a C-60 or a 57, depending on which bodhran he was playing and if he's playing like a bass and a drum or if he's just playing it like a drum.

When you're playing Hammond organ or accordion with the Four Men, are they overdubs, and if they're not, how do you produce and play at the same time?

Well, on a track like "She's on My

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Mind," I had The Band's production manager, Al Pierse, running the machines for me. One thing I did on the record is I kept my parts—and if we used a bass player, his parts—a little softer so the Four Men are really featured, because they have to go out and play it live, and I don't want them to feel that there's something missing every time they play the songs.

They have an interesting vibe on a few songs that's almost Buddy Holly-ish.

Some of it is the percussion, and a lot is from the fiddles. In a lot of traditional Irish music, you'll find two fiddle players, and one of them is playing the backbeat or on "the ups." Those guys love rock 'n' roll, too, but to keep it in the frame where they'll be accepted at home—especially since they're making these records in America, which could be a little touchy—they don't want to go too far from the traditional sound. As you can tell, though, they're by no means just a traditional Irish band. They make a really good living playing all over the world, so what we need to do next is have it so that it makes sense economically for them to come to America.

Would it make sense to pair them up with The Band?

Sure. We just got back from a tour of Europe where Four Men and a Dog opened every show for The Band, and it was great; it was a really good mix. The Band loved it. The funny thing for me was I was playing with the Four Men and a Dog and then going back and mixing for The Band. I'd love to do that in America, too, but the problem I run into is every promoter has his own idea of who should open for The Band. The other thing is how much the opening acts get paid; it becomes a little sticky, because they have to come over here from Ireland and all. What I'm working on is maybe have them open some of the big Band shows that we have planned for the spring, and then that will make it worth their while to also go around and do their own touring around that. I know that when they tour here people are going to like them. They're a great live act. American audiences are going to love this band when they see them. ■

—FROM PAGE 175, MICHAEL WOLFF

ing to go to another program. It will even transpose the chord changes. That used to be the 'gotcha' with computer notation, because it would print the notes out, but you still had to go through by hand and print the chords out. Also, if you play a mono line into it, like a sax, it will transcribe the audio by analyzing the frequency. And another thing it does is, it will quantize a whole track. So, if you record a track and then you hire a drummer, you can quantize the whole track to play with the live drums."

Although part of the Pollywood studio arsenal includes the Motown Studios 3M multitrack on which Marvin Gaye reportedly recorded "What's Goin' On," Wolff usually finds himself recording on rented ADATs or DA-88s. "I used to think you had to buy everything, but in L.A. you can rent everything you need," he comments. "I'd love to own the ADATs; I love working on them, but at this point, we do some projects on DA-88, so it makes more sense to rent. Also, with the computer, I have 16 tracks of digital. I'm doing this whole project [*The Dark Angel*] recorded just to that, because it chases, it's right with the screen, and there's no rewinding."

Wolff comes down heavily on the digital side of the A/D war. "I just think there is no comparison," he says. "And my ear is very critical. I don't think anyone's ever said about my albums, 'Oh, it sounds digital.' They just sound like you're in the room while we are recording. But I don't record anything live that doesn't go through a good preamp, and that gives it warmth. I have a Hardy preamp, made by this guy with a little shop in the Midwest, that's amazing. When you call him up and want to buy a preamp, it's like an hour-long conversation: He wants to know why, and who are you, and how are you going to use it! He's a very careful builder. He designed this product, he makes it, that's all he does. It's great—you can even disengage the VU meters if you don't want to go through that circuit."

Wolff gave us a preview of the soundtrack that he and tenBroek are currently working on. "*Dark Angel* takes place in New Orleans, one of the few places left that still has a unique musical sound," he says. "In the old days, cities had their own signature sound—Kansas City, Chicago, New York—people had a way that they played that was different. Now, we all listen to the same records and hear things the same way. But New Orleans still has unique influences, like Haitian voodoo, with drums and vocal things, and Dixieland. Then they have these marching bands—these really young guys who all live in this area called Tremaine, playing funk on tubas, and it is *so* bad! So I'm using all those ideas."

The *Dark Angel* soundtrack also employs "prepared" piano style techniques, using the inside of the piano for eerie chords, glissandos, knocks and strums—a sonic environment guaranteed to cause chills. "Of course, being a pianist, I bring in the piano as much as I can, strumming on the strings or maybe hitting it with a ball peen hammer. We make samples of it. It's something I always liked to do in my jazz: play the inside of the piano. It can be very cool, and we mix that in. The producer/writer of the show, John Romano, is really an artist, and he wants the music to be creative, so it's a great project.

"I'm not an engineer," concludes Wolff, "but what I've learned from all the engineers I've worked with is that you don't need 64 tracks of all kinds of outboard gear. What you need is a clean board, and then you decide where the magic is. I try to explore around in the studio, like it was a gig, and I'd say my gut interprets what my ears hear. Until it's right, I just get the weirdest feeling in my stomach. It's just like composing for me, I go through the same thing then also. Because it's got to be right." ■

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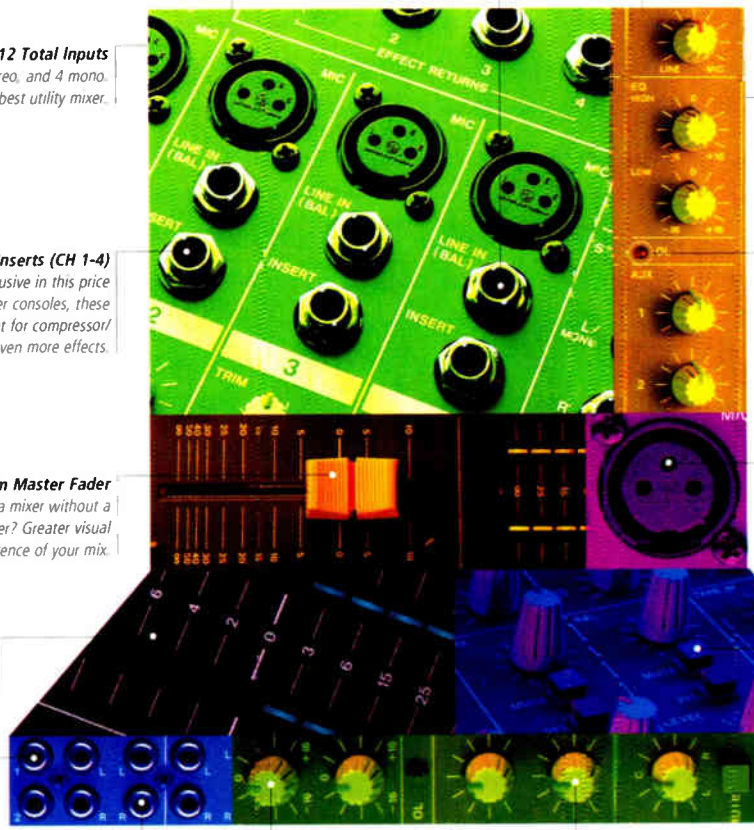

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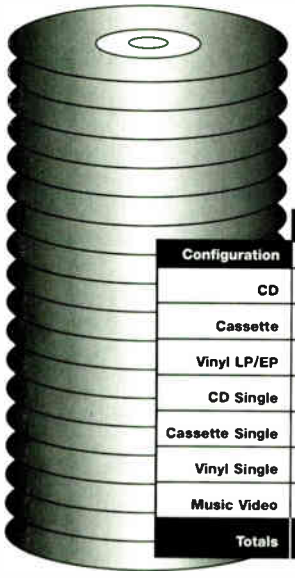

1996 RIAA Midyear Statistics

Recording Industry Association of America, Inc. (202) 775-0101

January-June 1995 vs. January-June 1996

Manufacturers' Unit Shipments in Millions (Net After Returns)
Dollar Value in Millions (Suggested List Price)

	January-June 1995		January-June 1996		Percent Change	
Configuration	Units	Dollar Value	Units	Dollar Value	Units	Dollar Value
CD	311.8	3,885.7	361.7	4,335.6	16.0	11.6
Cassette	126.5	1,037.4	101.9	866.0	-19.4	-16.5
Vinyl LP/EP	1.0	10.0	1.2	14.3	20.0	43.0
CD Single	5.9	36.0	13.5	63.4	128.8	76.1
Cassette Single	32.9	114.0	30.4	95.3	-7.6	-16.4
Vinyl Single	5.7	24.0	5.5	25.6	-3.5	6.7
Music Video	4.5	93.7	7.3	101.7	62.2	8.5
Totals	488.3	5,200.8	521.5	5,501.9	6.8%	5.8%

MODEST REBOUND IN RIAA MIDYEAR STATS...

A modest upturn in prerecorded music sales for the first half of 1996 suggests that 1995 RIAA figures, which showed the industry stalling after years of solid growth, may have been an aberration rather than the start of an ominous trend. Comparing the January through June shipments of its member companies with the same period in 1995, the RIAA reported an increase in overall net units shipped (after returns) of 6.8% to 521.5 million. The list price value (in dollars) of those shipments rose 5.8% to $5.5 billion. The report covers CDs, cassettes, vinyl and music videos shipped by RIAA members—thought to account for about 90% of the overall prerecorded music market—to record retailers, mass merchants and record clubs.

The strongest growth was in unit shipments of CD singles—a configuration that has performed unevenly over the years—which rose 128.8%. Other winning formats include music video (up 62.2%), vinyl LP/EP (up 20%, to a still-tiny 1.2 million units) and album-length CDs (up 16% to 361.7 million units).

The outlook for audio cassettes, meanwhile, continues to be worrisome. The mid-year figures show the number of cassette albums shipped slid to 101.9 million, a 19.4% decline in units, while cassette singles fell 7.6%.

...AND SOLID GROWTH FOR CD-ROMS

The Internet has replaced CD-ROM as the media-hype technology flavor of the day, and many CD-ROM developers and publishers have run into financial trouble. But industry analyst Infotech recently announced in its Optical Publishing Industry Assessment (8th annual edition) that 1995 sales of CD-ROMs topped 400 million in 1995, an increase of 167% over 1994.

Infotech also reported that aggregate worldwide industry revenue from CD-ROM title sales and production increased 112% to $24 billion and that commercial CD-ROM titles in print around the globe now total 15,955, up 115%. The company estimates that another 11,000 or more in-house or promotional titles were produced during 1995.

These figures, along with a previously reported 130% rise in the worldwide installed base of CD-ROM drives, hardly suggest a dying industry. But they do not necessarily mean that everything is rosy for developers of informational or entertainment CD-ROMs. Two important factors contributing to the rise in CD-ROMs are the migration by software companies toward CD-ROM (instead of floppy diskettes) as the delivery media of choice for application software and the increasing use of CD-ROM for giveaways. Infotech estimates that one of every ten CD-ROMs made in 1995 was a catalog, brochure, manual, demo disc or direct-mail premium.

BY PHILIP DE LANCIE

KODAK PROMOTES MELNYCHUK, WRITABLE CD

After 12 years at Kodak Research Labs and three at the company's Digital & Applied Imaging Unit, Paul Melnychuk has been promoted to director of new business development for Professional Motion Imaging and senior vice president and general manager of Recording Media Products at FPC Inc., a Kodak company. One of his early goals is to promote writable CDs as a common standard in handling audio materials in post-production, and then in archiving and long-term storage of finished mixes.

BLANK MEDIA MARKETS SLUGGISH

A 38% jump in unit shipments of blank pancakes for VHS duplication (measured in T-120 equivalents) was a bright spot for 1995 blank recording media sales, but declines in other areas held industry growth to 3% over 1994, according to figures released by recording media trade group the ITA. Despite the small rise in over-

all units sold, dollar volume was down 4%, reflecting the continued price erosion that has caused some of the best known names in the tape business to pack up and head for greener pastures. Blank VHS cassette units were down 18%, perhaps reflecting a shift toward high-speed duplicating in the home video industry. Audio cassettes were also down by 5% to 415 million, while sales of audio pancakes (measured in 8,000-foot units) fell 7% to 35.3 million.

SPLICES

Chief engineer Paul Stubblebine mastered the compilation CD for the 1996 Further Festival at **Rocket Lab** (San Francisco, CA). The facility also mastered the Nelson Rangell album *Glory Bound* used by NBC for their coverage of the 1996 Summer Olympics...Also used for the Olympics was a music library compiled by Elias Associates and mastered at **Trutone** in Hackensack, NJ. Trutone also recently mastered the Bruce Springsteen CD *Before the Fame*...Guitarist Jesse Cook mastered his *Gravity* album at the in-house mastering facilities at **Narada Media** in Milwaukee, WI...Engineer Jonathan Wyner worked on projects by Richard Thompson, Gerard Schwartz and the Seattle Symphony Orchestra, plus a Windham Hill compilation and a James Taylor reissue at **MWorks** in Cambridge, MA...Mastering engineer Ryan Foster has joined the staff of **Super Audio Digital Mastering** in Portland, OR...**Nautilus Mastering** has opened in Milan, Italy, with two rooms

Rumba flamenco guitarist Jesse Cook (L) mastered his new release, Gravity, at Narada's in-house mastering studio with mastering engineer Trevor Sadler.

featuring SADiE workstations, AMS Neve Logic 3 and Audiofile systems, Focusrite compression and Sontec EQ... Gauss (Sun Valley, CA) introduced the Micro MAX digital master reproducer for high-speed cassette duplication at selectable ratios from 32:1 to 160:1. The system features either CD-ROM load

Nautilus Mastering

(effective 16-times speed) or DAT load (two-times speed), and has available RAM capacities ranging from C-50 to C-101. The first installation of Micro MAX is at Sound Communications Publishers in Leeds, England. Gauss has also announced the sale of CD-9002 and CD-9000 loaders to 15 cassette duplicators overseas, as well as five U.S. duplicators. Fellow Mark IV company **Electro Sound**, meanwhile, has been busy selling duplication slaves, with first time sales to the **Tape Factory** (Nashville, TN), and **Super Duper** (Portland, OR), as well as reorders from the **Aaztec Group** (Phoenix, AZ), **Audio Source** (Northbrook, IL) and **Domain Communications** (Carol Stream, IL)...**Telemetrics** (Campbell, CA) reports sales of its DB-1000 digital bin to Los Angeles-area

V-Corporation president Peter Villar and treasurer Sandra Villar with the compony's new Telemetrics DB-1000 digital bin and Versadyne 1000 Series slaves.

duplicator **V-Corporation**...Seven cassette duplicators in Portugal, Australia, Taiwan, Israel and Indonesia have purchased ferrite high-speed duplication heads from **Saki Magnetics** in Calabasas, CA...**Allied Digital Technologies** opened an office in Nashville, TN, to handle Southern Region sales of CD, cassette and video duplication services. .**Nimbus Manufacturing** expanded its West Coast operations with the addition of CD replication to its facility in Sunnyvale, CA...**Integral Vision** shipped a system for simultaneous double-sided inspection of DVD media. The company says its DVD 10 system is the first of its kind. ■

COAST TO

L.A. GRAPEVINE

by Maureen Droney

Westlake Audio Inc. has redesigned Studio B at its Beverly Blvd. location. The successful installation in 1993 of an SSL 4056 G Series in Studio E at the Santa Monica location led to the decision to also upgrade B, which had previously been fitted with a Trident 80C console. One of the oldest tracking and mixing rooms in town, Studio B has over the years been the site of many classic record-

Studio B at Westlake Audio, featuring an SSL 4072 G Series

ings, among them Quincy Jones' legendary solo outing, *The Dude*. The studio now features an SSL 4072 console with G Series computer and VCA-based automation, and studio manager Phillip DeRobertis tells us that the room has been booked solid since reopening.

As part of the renovation, the control room was acoustically and physically redesigned by Glenn Phoenix, owner of the Westlake conglomerate that includes Westlake Audio Studios, Manufacturing Group and Pro Audio Sales, and Hanson Hsu, Westlake's chief engineer, who also coordinated the project with help from Gene Hacker, facilities manager.

Challenges included incorporating the much larger console into the control room while dealing with the structural limitations of a fixed outer wall. "A lot of planning went into the design," says Hsu. "We sat down and said, 'What do we need to accomplish?' A larger console to fit the needs of our market was a given, but B has an acoustic signature that we wanted to maintain as close as possible to a reference listening environment. And we wanted to leave enough

—CONTINUED ON PAGE 196

NY METRO REPORT

by Dan Daley

Console Mania!!! New York's top-end music studios have been making significant console changes in the last few months: The big surprise is that **Right Track** removed its (relatively) new SSL 9000J in favor of the next generation Neve VR desk debuted at AES last month; **Chung King** replaced an older SSL with a Capricorn digital board; any mourning by SSL was quickly mitigated, though, as **Electric Lady** and **Quad** installed new 9000J boards, with Quad taking its second. **Sony Music** and **Hit Factory** both took deliveries of new 9000Js earlier in the fall.

Right Track, which in February 1995 took delivery of the first 9000J in New York and one of the first in the world, encountered the not-uncommon problems of early adoption, says studio manager Barry Bongiovi. "The software problems were largely fixed later, but in the interim, we realized that as more 9000Js come online in New York, we have to stay one step ahead to differentiate ourselves. Differentiation is critical in the New York market." The studio's response was to install the first of Neve's next generation, the VR-X, a 48-channel console with switchable EQs that allow engineers to choose between VR and vintage 1078 mic pre's and EQs. The VR-X joins Right Track's Capricorn, which was installed earlier this year. The studio's SSL 4000 G Plus, which Bongiovi calls the mainstay of the studio, will also remain.

Chung King owner John King replaced an SSL G Plus in his new Vestry Street facility with a 72-input Capricorn. "The Capricorn is a serious music machine," King says, adding that the room in which it's installed was booked out two months ahead before it arrived. "I don't think it's going to be a problem to sell the room to music with that board. It sounds very analog, is easy to work and has a very short signal path."

Quad Recording, on the other hand, had its second 9000J installed on December 2 in a new fourth studio that owner Lou Gonzalez says is virtually identical to his first 9000J room. "The control room is exactly the same, and the studio space is practically the same," he says. "The point is that the 9000J clients have been overflowing, and I needed a second room to keep them in and let them switch rooms as needed for projects." Gonzalez adds that Quad will almost certainly expand with a fifth music room in 1997.

—CONTINUED ON PAGE 201

COAST

SESSIONS & STUDIO NEWS

During recent sessions at Sony Music Studios in Santa Monica, jazz saxophonist Kirk Whalum and engineer Hal Sacks (R) posed with staffers (L to R) Peter Barker (associate director), Troy Gonzalez (assistant engineer) and Lee Ann Paynter (studio manager).

SOUTHERN CALIFORNIA

Warner Bros. artists The Muffs co-produced tracks and overdubs with Rob Cavallo at Mama Jo's (North Hollywood). Sally Browder engineered and Erich Gobel assisted...Sound City (Van Nuys) had Warner/Reprise artists Drill Team in overdubbing in Studio A with producers Clive Langer and Alan Winstanely. Greg Fidelman assisted...In Studio D at Westlake Audio (Los Angeles) Ladysmith Black Mambazo tracked with guest performers including Bonnie Raitt and Dolly Parton...Star Song recording artist Kim Hill completed work on her upcoming release *The Fire Again* at her producer David Kershenbaum's studio outside of Santa Barbara...Producer Larry Hart mixed new Sisterella material at Sony Music Studios in Santa Monica with engineer Mark Endert and assistant Troy Gonzalez...In Image Recording's Studio A, guitarist Kazu Matsuo was tracking for D.O.D. and Naoto Kine album releases with producer Tetsuya Komuro, engineer Terri Wong and assistant Stephen Fitzmaurice...Sparkler tracked for Revolution Records on the vintage Neve at Grandmaster Recorders in Hollywood with producer Keith Cleversley...Saturn Sound recently relocated into the former Johnny Yuma facilities in Burbank. Saturn inaugurated its new Euphonix 96M studio with a session for Rod Stewart, produced by Patrick Leonard and engineered by Michael Verdick...Shaquille O'Neal tracked and mixed for his new Twism/Interscope release with producers Spyda & Dave, D.J. Quik and George Archie. Chris Puram mixed, assisted by Lacreatia Brown...Producer/songwriter Jorge Martin was in tracking at Artisan Sound Recorders in Hollywood with vocalist Sanetta and engineer Jon Lowry...Patti Rothberg recorded her single "Treat Me Like Dirt" at NRG Recording in North Hollywood with producer David Greenberg and assistant Steve Mixdorf...

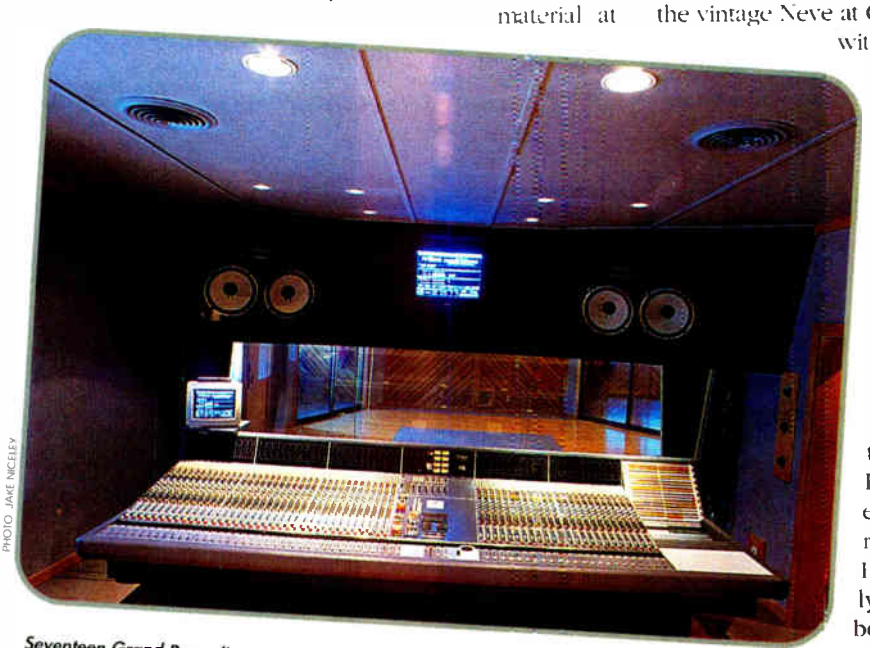

PHOTO: JAKE NICELEY

Seventeen Grand Recording in Nashville recently celebrated its first anniversary. The studio features a Neve VR-60 Legend, Studer D827 and Mitusbishi X-850 digital and Studer A827 analog recorders, and custom monitors by the studio's designer, Steven Durr.

NORTHEAST

Producer Jack Douglas recorded basic tracks for New York rockers 33 on the Euphonix CS2000 in Studio A at Apres midi Studios (Paramus, NJ) with studio chief engineer Roy MacDonald...Joan Osborne took a turn behind the board at Pie Studios in Glen Cove, NY, collaborating with producer/engineer Tom Fritze on mixing sessions for gospel singer Bethenia...George Clinton docked his

—CONTINUED ON PAGE 203

—FROM PAGE 194, L.A. GRAPEVINE

human space in the room for clients to be really comfortable.

"We literally opened up the entire room, and every step of the way things were acoustically isolated. There were already two floating slabs in the floor from the original construction [a rarity: according to Hsu, Westlake Beverly is one of the few studios in the world where you might find this]. Then, when we rebuilt the walls, we isolated all of them. They are built on machine rubber, which is actually how all of our rooms are done."

One of the solutions the team came up with to achieve more space involved removing the bass traps and changing the ceiling structure to compensate for absorption capabilities. "We modified the ceiling from partially hardwood and absorptive to fully absorptive," explains Hsu. "We filled it with acoustic treatment, then gave it an acoustically transparent covering. That gave us more room, and we were also able to move the outboard gear into the wall."

A separate room was fitted to house the power supplies for the console and automation, a move that helps twofold to keep the noise floor in the CR low—it reduced the need for additional air conditioning, as well as isolated the somewhat noisy power supplies. Speakers were refurbished, too—rebuilt, rewired and retuned. The mains, which are completely discrete left and right, are Westlake Audio HR1-X monitors, powered by Crown PSA 2 amplifiers for the lows and mid lows, and Westlake-modified Boulder 102 amps

SCHOOL SPOTLIGHT

IAR EXPANDS

With its enrollment on the rise, leading New York audio engineering and production school the Institute of Audio Research increased its facilities by 50% earlier this year. The school expanded onto the fourth floor of the building it now wholly occupies in Greenwich Village, adding lecture rooms, lab rooms, a new student lounge and other amenities, bringing the facility up to 20,000 square feet.

PHOTOS: GEORGE KANATOUS

The school's new MIDI room has ten MIDI sequencer/synthesizer stations, each of which has a PowerMac 7100, JV-880 synth, 8-channel mixer, and a full patchbay, both MIDI and audio. Half the stations have an Akai S-2800, and the other half have a hard-disk editing format using Sound Designer II. The ten stations are used by students who go through the 16-class lab course called "MIDI Synthesis and Computers."

In conjunction with its expansion, IAR beefed up existing facilities with new equipment, including new playback/demonstration gear for all classrooms and three Tascam DA-88s with remote and SY-88 card in Control B. The school also added a series of student mixing stations, which include a Mackie 1604, DA-88, DAT machine, Tascam MK 122, dbx 900 rack with other gates, Hafler Trans•Nova amp, Tannoy PBM-8 monitors and headphones. The stations have a distributed line system that allows mixes to go to DAT, cassette, 2-track, 'scope and a +4 output simultaneously, rather than via multing. The stations also have extensive patchbays, with 200-point patch fields. (The school emphasizes the importance of signal flow and patching—if you can't patch, you're not of much value as an assistant engineer.)

IAR students working at two of the school's new mix (above) and MIDI stations.

"The expansion has given us more design and installation work than we imagined," says IAR faculty chairman Noel Smith, "but it's work that results in more hands-on student involvement, and that's definitely the direction we want the school to go in. The degree of student satisfaction and excitement the expansion has generated is just great to see." ■

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for the midrange and high-frequency drivers. Studio B is also surround sound-capable, incorporating Westlake BBSM 6 monitors in the rears. Other upgrades include the addition of a Lexicon 480L and 224, both controlled from a LARC mounted in the console; a TimeLine CCU (Console Control Unit); and GML EQs.

Projects in since the renovation include vocals with Lionel Richie, mixing for Vanessa Williams (engineered by Humberto Gatica, with Chris Brooke assisting) and contemporary Christian artist Brian Duncan mixing his latest Word Records release with Steve Macmillan engineering and Tim Gerron assisting.

Stopped over at Beverly Hills Video Group to meet with busy sound designer/re-recording mixer Tom Orsi where he was ensconced in Audio I working on the Cable Ace Award-nominated Discovery Channel series *World of Wonder*. Orsi is among that new breed of audio professionals who find themselves creating complete soundtracks from start to finish. "There is a small group of us coming up now who do almost everything," he comments, "and I think there is no real title for us yet. For virtually every project I do, this is a one-stop room where I build the entire thing. There was a movie recently titled *Naked Souls*, starring Pamela Anderson, David Warner and Dean Stockwell, where I did everything except compose the music. I did the Foley [digital Foley], the ambiences, the people backgrounds—made, by the way, to clear German and Scandanavian M&E's, which are very tough, as they don't want to hear any English at all but they still want it to sound loud! I've also done a number of Showtime movies that way. It's a rewarding process—it's exciting to see it come together so fast when in the past it took you days and days. Now, in a pinch you can do the basics in no time flat."

The speed and efficiency of digital systems have blurred the line between cutting and mixing, and Orsi, who was in on the ground floor of digital editing, has spent years perfecting his setup. "Things are entirely miniaturized now," he laughs. "This studio is the size of the main bathroom in my old studio!" Orsi's console is an 88-channel Trident that has been modified by Westlake Audio, and his controller is a three-machine Micro Lynx with VITC. About the Lynx he says, "It has ballistics for dozens of machines. It learns as you go and changes its ballistics so that it becomes custom. What that means is, the longer you work on a certain machine, the faster it gets."

Orsi has worked with manufacturers on R&D in the past, notably with Digidesign for Pro Tools I, and with Opcode. "But now," he says, "I'm so busy I don't really have the time. And really, so much of the equipment has come of age. It's there, it's running, it's rock solid. And, most important, it's stable and reliable. My clients want bulletproof—they don't want beta. But, everyone (really) wants both bulletproof and beta, and I like to try to get it in the real world. That's why people come here.

"Another reason people come here is that my partner and I have licensed the sound mags from 224 films, from *The Winds of War* to *The Ten Commandments*. We've remastered them to DAT and made them into something called Founder's Edition Library, a CD-ROM for professionals. It has ambiences and effects, and much more than that. So my core library consists of that as well as everything I've culled from my years of experience—I've been doing this since 1973! So the 1.2 million sounds in this room on DAT are also on these hard drives—12 gigs of hard drives—and 95 percent of my sounds are drawn from that. I rarely have to go out of house except for extremely specific Foley."

One beta testing project Orsi has been involved with lately is for the product named Vocalign, designed to be used with Pro Tools for dialog replacement. Vocalign can tighten up ADR or foreign dialog replacement tracks, improve the sync on less-then-perfect backing vocals and double-tracking, and also modify the timing of one music track to another. For example, with Vocalign, an actor in ADR would not have to match lip movement perfectly with the visuals. If he or she matches somewhat, the software will do interior expansion and contraction of the recorded sample to fit the lips on screen.

"We have something else here that is rare," says Orsi. "The MIDI in this room is locked to house sync. Usually MIDI is a free-standing thing which kind of drifts and lags and can give you a little bit of a problem. But locked to house sync, it never drifts. So you can play your piano part locked to picture, and when during the mix the client says, 'That's great, can it be flutes instead?', I press a button and the horns are flutes—bringing us also to digital

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Foley, where we can even change the actual footsteps in the mix.

"The beauty of this kind of flexible system is that during the mix, cutting occurs. We change things around so much during the mix, it's like offline/online sweetening—it's all turning into one. Really, it's whatever needs to be done. You throw the ball, we'll catch it, we'll make it fly. And producers get addicted to that. To work this way is not for the faint-hearted, though, because everything has to be wired and appropriately set up, so that it's one button away. You have to think about all aspects of production at once, bringing system design from deep in your wishes on a midnight to the actual light of day. It has to work throughout.

"Also, clients have to be somewhat astute—sometimes, as I describe the system, I see the glazed look in someone's eyes and I know to stop. When I say there's 600 musical instruments here, from a Nigerian medicine drum to the London Philharmonic Orchestra, or a hundred different types of Cadillac hubcaps, and all the little movements of the leather Cadillac seats, you've got to think about it for a while!"

Immediate and random access is great, but someone has to know what they are looking for. How does Orsi keep track of all those sounds so that he knows what he wants to use at any given moment? "It's really all in my head," he laughs. "That's why they keep me locked up in this room, to keep the rest of America safe!"

Audio Rents and Hollywood Sound worked with Pacific Bell to present an ISDN demonstration (that's Integrated Services Digital Network for those of you who have forgotten what the acronym stands for) at their joint facility. The event featured demonstrations by systems manufacturers APT (Audio Processing Technology), Dolby Laboratories and Telos, with contributions from EDnet's Tom Scott. Titled "How can my session be in two places at once—when the talent is nowhere at all?" the demonstration explored the fundamentals and numerous options available to the growing group of ISDN users. The participating manufacturers, although competitors with noncompatible formats, all seem to have found a basic niche in the marketplace.

Scott explains that one of the basic things that EDnet, a system integrator and network provider, does for clients is to sort out what they really do, in order to advise them on the appropriate hardware. For instance, Telos' Zephyr, probably the simplest and least expensive system, can operate with only one ISDN line and is popular with many commercial (both radio and TV) audio houses. The Dolby Fax system, which only works in stereo and requires two ISDN lines to provide very high-quality audio, is catching on in the feature film world. The APT-x is what Scott calls "a real tool kit," using one, two or three lines, with a separate line for SMPTE. Those lines can be used by separate studios in a facility independently at the same time, or, combined together for high-quality stereo. APT-x is currently used primarily in television production and for commercial voice-overs.

Watch for more demos and seminars put on by the joint efforts of Audio Rents and Hollywood Sound—this informative presentation was the first of a series they plan to offer to the recording industry. ■

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—FROM PAGE 194, NY METRO REPORT

which will likely house an all-digital console. "I think that right now [New York] is about a year or so away from all-digital music console demand," he says. "The technology needs about that much time to mature to the point where people trust it and know it."

On the next level down, **Pyramid Recording Studios** has picked up the vintage API board that became a casualty of Seattle's Bad Animals market shift from music to post-production. Installed in Pyramid's main control room, the 32-input API becomes the only such vintage desk in the city, according to studio owner Todd Hemleb. "The only other API in town is a new Legacy," he says. The board, which was used to track records in Seattle for the Spinners, R.E.M. and Heart, has a new monitor section and uses DiskMix moving fader automation. "With all the new consoles going in, this board broadens the base of vintage diversity in New York," Hemleb says. Pyramid also enlarged its recording room by trimming back a machine room that cut partly into the studio.

A shared thought to end the year with. Here is a description from David Denby's digital audio piece in *The New Yorker* (September 2 issue) on high-end consumer audio:

"High-end audio can best be understood as a very strenuous and peculiar

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Dan Daley is Mix*'s East Coast editor. You can reach him at danwriter@aol.com.*

—FROM PAGE 195, SESSIONS & STUDIO NEWS

Mothership at new Manhattan facility **The Cutting Room Studios** (which opened in May) to record and mix a remake of "Flashlight," featuring Busta Rhymes, Q Tip and Ol' Dirty Bastard. **John Hopkins** recorded the sessions and **Ken Lewis** mixed, assisted by **Nastee**...At New York's **Sear Sound**, **Don Fleming** produced an editing and mastering session for Australian group **Rail** with engineer **Bil Emmons** and mastering engineer **Fred Kevorkian**...**Noteworthy** Studios (Granville, VT) was awarded the audio post-production contract for the internationally syndicated series *Showtime at the Apollo*. Acts recently appearing on the show include Da Brat, The Braxtons and Hootie & the Blowfish. Noteworthy's **Roger Stauss** is the audio director for the live-to-tape production...**Paula Cole** tracked at **The Magic Shop** (New York City) for her upcoming self-produced Warner Bros. release with engineer **Roger Moutenot** and assistant **Joe Warda**...The infamous **Preacher Jack Lincoln the Entertainer** recorded his boogie-woogie piano and vocals for a future Rounder Records release at **Sound Techniques** in Boston. **Julianna Hatfield** was also in mixing tracks in the Neve suite with engineer **Dave Cook**...**Christine Ohlman & Rebel Montéz** worked on their second album for Deluge Records at **Trod Nossel** in Wallingford, CT...At **Bass Hit Recording** (New York City), **Nu Yorican Soul** tracked and mixed for GRP with engineers **Dave Darlington** and **Steve Barkan** and assistants **Phil Pagano**, **Dan Yashiv** and **Oscar Monsalve**...Composer **Elliot Goldenthal** worked on his Sony Classical debut recording with producer **Joel Iwatake** at **Cassone Digital** in New York City...**Antonio Hart** mixed for his next GRP release at **BearTracks Recording** in Suffern, NY. **Alain Mallet** produced, **James Nichols** engineered and **Steve Regina** assisted...

NORTHWEST

Faith No More completed tracks for an upcoming Slash release at San Francisco's **Razor's Edge Recording** with engineers **Jonathan Burnside** and **Atom**...Alligator Records artist **Mike Clair** recorded and mixed at **Sound Trax Studios** (Gooding, ID) with engineer **Randy Quigley**...Cola overdubbed for an upcoming Arista Records release with producer/engineer **Andy Wallace** and assistant **Adam Munoz** at **Different Fur Recording** in San Francisco...

SOUTHEAST

Nashville act **Joe, Marc's Brother**, cut and mixed demos for Virgin Records at **Ardent Studios** in Memphis with producer **Rick Clark** and engineer and mixer **Skidd Mills**. **John Hampton** mixed tracks on Capitol newcomer **Dean Miller** with **Gregg Brown** producing and **Matt Martone** assisting....**Mcmix Recording** (Atlanta) had A&A Records artists **DJ Wen and the Mack Pack** in recording vocals and mixing a new album, produced by DJ Wen. Motanian Records artists **Organized Rhyme** were also in recording and mixing with producer **Steve Roln**. Both sessions were engineered by **Don McKinzie**...**Robin Finck** of Nine Inch Nails tracked for a new project at **Synical Labs** in Atlanta with engineer **Brian Haught**...Island Records artists the **Isley Brothers** were at **Doppler Studios** in Atlanta working on Christmas songs for a new release with producer **Stanley Brown**, engineer **Darin Prindle** and assistant **Mike Wilson**...Garage rockers **The Woggles** mixed their new Telstar LP with producer **Jeff Walls** and engineer **Mark Williams** at **Reflection Sound Studios** in Charlotte, NC...**The Hellbillies** self-produced overdub sessions for their next BMG Norway release with engineer **Carl Meadows** at **Sound Emporium** in Nashville...**Code of Ethics** recorded material for their upcoming ForeFront release at **Secret Sound** in Franklin, TN, with producer **Tedd T.** and engineer **Julian Kindred**...**Full Spectrum Studios** in Greensboro, NC, had rapper/producer **Big Daddy Kane** in working on new ma-

terial with engineer/studio owner **Bradley D. Hinkle**...**Hal Ketchum** tracked for his new album with producer **Stephen Bruton**, engineer **Dan Bosworth** and assistant **Mike Purcell** at **The Castle Recording Studios** in Nashville... **Megadeth** tracked for Capitol with producer **Dan Huff**, engineer **Jeff Balding** and assistant **Mark Hagen** at **Masterfonics** (Nashville). Also in was good ol' boy **Charlie Daniels** mixing a Sparrow release with producer **Ron Griffin**, engineer **Pete Greene** and assistant **David Boyer**...Recent activity at **Criteria Recording** in Miami included producer **Bebu Selveti** recording basic tracks and 40-piece string dates for renowned tenor **Placido Domingo**. **Joel Numa** engineered, and assistants **Chris Carroll** and **Chris Spahr** split time behind the board... ■

—*FROM PAGE 116,* THE ENGLISH PATIENT

part from synth tracks, as the orchestra hadn't the time to record it. Finally, because a player is visible roaming around the shot, bagpipes were recorded at Fantasy Studios. But, bagpipes can't play the melody to "Silent Night" because it doesn't fit into the scale. To improvise, Randles wrote out the harmony on the spot and popped it in.

The music is very European, epic in scope, and at the same time it's intimate—a simple piano note from a Bach aria, a spotlighted oud or doumbek that leaves an emotional trail. In many cases, it was a solo clarinet. "The clarinet solo was kind of a surprise," Randles explains, "in that Anthony said if Gabriel had told him he was going to write a clarinet solo or clarinet accompanied by harp, Anthony said he probably would have told him that's not what he was hoping for. But when he heard it, he said, 'Bob, make sure you sprinkle that liberally throughout the picture, because this is the voice of the movie.'"

THE MIX

The mix schedule was not particularly short by today's standards, but it did get congested because of the length of the film. Temps were being put together by Murch for preview screenings in New Jersey and California (often just the 4-channel Avid output) as dialog and effects premixes were put together by Berger and David Parker, often on the night shift, sometimes on a second stage. Murch had premixed the first seven reels of dialog, but as he became busy with picture changes for screening number 2, Berger took over while Parker did effects. Then Berger may have spent a day on loop groups or ADR, while Parker continued with effects. "Every possible combination of time and function was involved in getting ready for the final," Berger says.

The film was mixed against video (the Avid output) on Stage 3 at the Saul Zaentz Film Center, on a 96-input Otari Premiere console. Music was played back directly from the Sonic Solutions system on the stage, which was fiber optically linked to Randles' editing room. Dialog, which was recorded 4-track on the Nagra-D, was edited in the Sonic and played back from 6-track mag film. Foley, which was traditional in that there was 100% coverage ("There was a lot of attention paid to the gritty sound of walking instead of the click-click-click of a sterile floor," Berger says. "There was a lot of dirt thrown down."), was recorded to 2-inch, 24-track, loaded into the Sonic, edited and loaded out to mag. Effects also were edited in the Sonic and loaded out to mag. At any time, however, the mix team could access any bank of effects, ADR lines or dialog lines from the online Sonic systems residing in any of the 18 rooms at the Film Center.

But for all the ease of access, both Murch and Berger are adamant that it is irrelevant where the sound is coming from, and it in no way changes their approach to a mix. Sure, some operations are faster, and when you need to search for "scrabbly air" to fill out a ballroom scene, it can be flown in and essentially edited at the mix. But the approach is the same. And they don't distinguish between premixes and final mixes.

"I don't distinguish between premixes and the final mix—you are mixing," Murch says. "It's just that in the premixes, you're focused on a certain area of the orchestra. If you were talking about orchestral rehearsals, you would be rehearsing the strings section, and so you're just focused on the strings and how they're working to each other, although in the back of your mind, you have to know that they're going to have to work with the woodwinds. The premixes are a good example of that paradoxical state you find yourself in in films a lot, which is extreme attention to detail, but at the same time trying to maintain an idea of the big picture. You can get into trouble if you wander to either side of the road." ■

Tom Kenny is a Mix *associate editor.*

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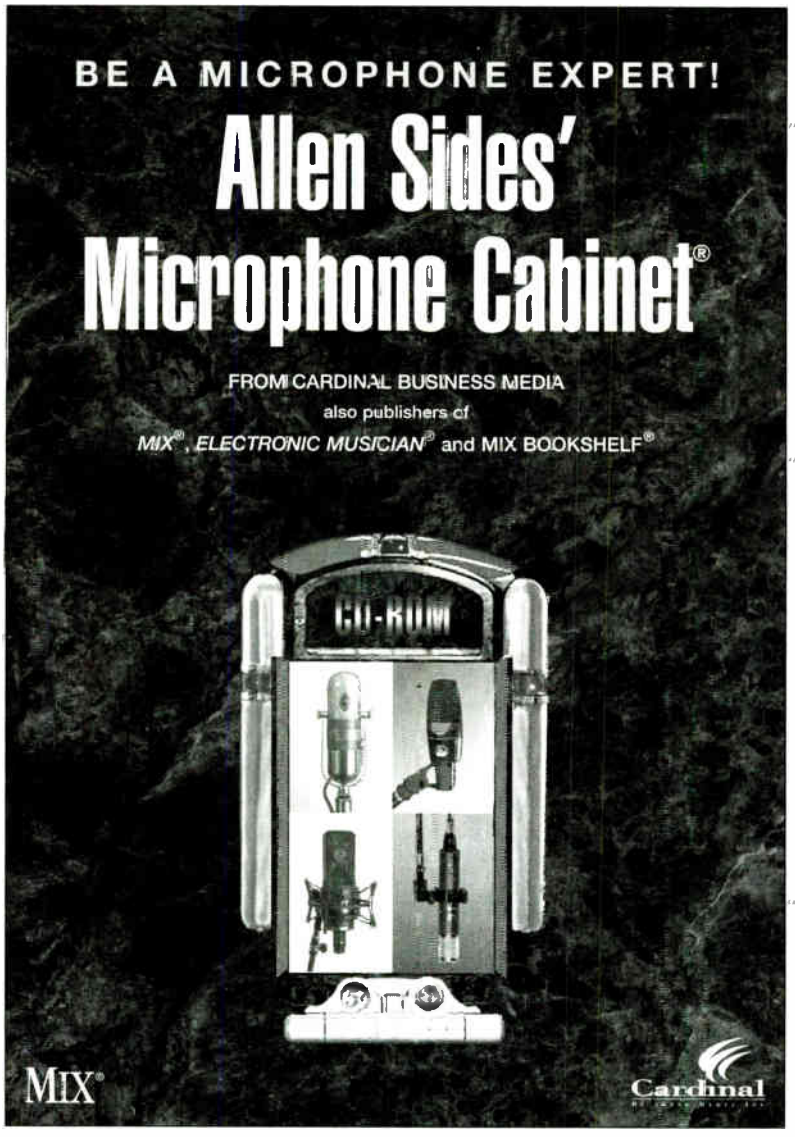

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Recent projects feature former Rolling Stones guitarist Mick Taylor, Sasha, Carlos Alomar, Lenny Pickett, Robin Clark, Steve Ferrone, T.M. Stevens, Vivian Cherry and Tawatha Agee. The engineer is Nenad Gracanin, and the producer is Sasha. Studios feature SSL 4064 G Series computer, Studer A827, Sony PCM 3324, Sony PCM 800s, state-of-the-art recording, mixdown and mastering. Highest possible quality is our main concern.

Gallery Recording Studios

132 West 22nd Street, 6th Floor
New York, NY 10011
(212) 366-6640; Fax (212) 727-7187
e-mail: gallery@bbhinc.com

It's a recording studio and an art gallery! A beautifully designed new, spacious facility with outstanding acoustics, based in the heart of Manhattan. The best in vintage/modern gear and an inspiring atmosphere enhanced by ever-changing exhibits of striking modern artwork. Built to spoil the most demanding engineer, producer or musician. Some names: 148-in Trident 90 console with moving faders, Studer 827s, Lexicon, Quested, Pro Tools, DA-88s, Focusrite, Neve, Summit, Pultec, TC, Neumann, Steinway.

The Santa Fe Center Studios

933 San Pedro, SE
Albuquerque, NM 87108
(505) 265-2511; Fax (505) 265-4714

Santa Fe Center Studios in Albuquerque, New Mexico is uniquely qualified to offer the most flexible audio production facility in the Southwest: 2 control rooms, 6 isolation chambers, each with varied qualities running the gamut of acoustics from no influence, small, medium, large live reflective influences to a delay/reverberant chamber. MIDI/dubbing production suite also available. Equipment from Focusrite, Lexicon, Apogee, Digidesign, Amek, Eventide, Sony. Escape the big city and give your next project the attention it deserves.

Ocean Lab Studios Ltd.

James Fort Bldg.
Hincks St., Bridgetown
Barbados, West Indies
(246) 431-0865; Fax (246) 431-9156
e-mail: dginniss@coribsurf.com
http://www.angelfire.com/pg1/ocean/index.html

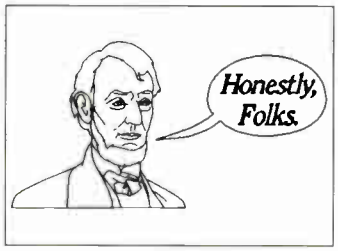
Located on the Caribbean Island of Barbados, Ocean Lab Studios offers a relaxing atmosphere for creativity. Our control room features a custom 48-input Harrison console, analog and digital tape machines and standard mics and outboard gear. Situated on the West Coast, the studio is near restaurants and watersports activities. An attractive package, including accommodations and transportation, is available to suit your budget. Relax on a tropical Caribbean Island and "let your creative juices flow!"

▪ STUDIO SHOWCASE ▪

The ClubHouse

Box 373
Germantown, NY 12526
(518) 537-6305; Fax (518) 537-5829

The ClubHouse recently installed a Neve 8058 MkII mixing desk. Vintage Neumann tube microphones and Telefunken preamplifiers have been added to the collection. Our large studio is 50'x25'x20', and the smaller room is a more intimate 19'x16'x8'. Located on the scenic Hudson River only two hours north of New York City, The ClubHouse provides a large selection of fine equipment in a relaxed country setting.



Yaking Cat Studios

3107 Butte Drive
Santa Teresa, NM 88008-9509
(505) 589-6111

Five minutes from El Paso, Texas... Five minutes from Juarez, Mexico...Convenient flight destination...Southwest weather, privacy, shopping...Hotel and transportation arranged. Remember why you got started...Music! Enjoy our new, loaded, Synclavier 9600 with keyboard, guitar, sampling, synthesis, DSP and sound library on a fast hard drive, for an unbelievable rate. Be creative, enjoy life, vacation, leave the world behind. Cook in our kitchen; crash on our couch. Call for more information.

The Hook Studios

12623 Sherman Way, Suite B
North Hollywood, CA 91605
(818) 759-4655; Fax (818) 759-0268

"The best overdub facility in L.A."

With a focus on vocals and overdubs, The Hook is a facility dedicated to serving one client. Our goal is to provide a no-compromise microphone choice for each vocalist and instrumentalist. We feature a Neve 8068, a Studer A827, and 50 microphones including AKG C-12s, C-24s, Neumann U47s, U67s, M-249s, SM-2s, 582s; Schoeps C-221s, Telefunken Elam 250, 251. We are confident that we can meet your needs.

MCA Music Media Studios

5161 Lankershim Blvd., Suite 201
North Hollywood, CA 91601
(818) 777-9200; Fax (818) 777-9235

Client-oriented mastering suite. Full 24-bit digital audio path with many flavors of down-conversion available. Many digital and analog music processors on site, featuring the db Technologies AD122 A/D, TC Electronic M5000, vintage and modified Sontec Disk Mastering EQs, and GML EQ and dynamics processing. Mastering is CHORD and AVALON powering Dyn-audio M3 monitors through an in-house designed and constructed mastering console.

MUSICLANE INC.

Specializing in compact disc and cassette mastering, sonic restoration

MusicLane Inc.

110 Konrad Crescent #6
Markham, Ontario L3R 9X2
(905) 479-7560

Located on the outskirts of Metro Toronto, MusicLane has been serving independent artists and major record labels for five years. Featuring two studios equipped with Sonic Solutions, including NoNOISE, Harmonia Mundi (Weiss Engineering), Sony, Studer, State-of-the-Art and Stax gear. Full digital mastering services available, in 16- and 20-bit, to PCM 1630, DAT and CD-R from analog and digital sources. Contact Ted Carson for further information.

Atlanta Digital audio

Atlanta Digital

500 Means St., Suite E
Atlanta, GA 30318
(404) 522-4277; Fax (404) 522-3723

Atlanta Digital is the Southeast's newest high-end mastering facility, featuring a fully expanded Sonic Solutions workstation including NoNOISE and CD printer. Outboard gear includes Focusrite ISA 215 EQ, Manley Variable-mu compressor, TC Electronic M5000/MD2 and Apogee converters. The room was specifically designed and professionally tuned for audiophile mastering. The system is capable of 24-bit 96kHz audio for the new DVD format. Recent clients include Arrested Development's Speech and Headliner, Vagabond, D.A.R.P., Doppler and Crawford.

▪ STUDIO SHOWCASE ▪

Carmel Digital
PURE SOUND

Carmel Digital

PO Box 2834
Carmel, CA 93921
(408) 622-0522; Fax (408) 622-0660
e-mail: rmasson@carmeldigital.com
http://www.carmeldigital.com

Total Digital Environment
Pristine Acoustical Design
Mastering, Restoration, Rescue
Sound Design, Foley
Surround Sound Mixing
Jingles, VO, Radio/TV
Enhanced-CD Development
Audio for CD-ROM
Remote Recording
Multitrack Recording
Full Automation
Premium mics/outboard gear
Visa/Mastercard accepted
Recent work: sound design for "Inside Independence Day"—20th Cen. Fox

CHICAGO MASTER WORKS

Chicago Masterworks

11 Maple Street
Crystal Lake, IL 60014
(815)356-9005; Fax (815)356-9066

Chicago's source for quality CD and cassette mastering and manufacturing. From digital transfers and pre-mastering to complete manufacturing services, we have the expertise to net the highest-quality results. Featuring Sonic Solutions, TC Electronic, award-winning graphic design, printing and packaging. We work closely with our customers to meet their artistic vision, budget and deadlines.

Sound/Mirror

76 Green Street
Boston, MA 02130-2271
(617) 522-1412; Fax (617) 524-8377

We are a fully digital location recording, post-production and CD-mastering company specializing in classical and acoustic music. We do extensive field recording around the world and have been involved in complete recording projects for nearly every major classical label over the past 20 years. Full location recording with PCM-9000; post-production with Sonic Solutions, Lexicon Opus and Sony DAE-3000 and more. Your recording may be our next Grammy nominee.

TRICLOPS

TRICLOPS RECORDING

▼Neve 8088 MkII Console, 48 in, all discrete, Flying Faders Automation▼
▼48 Tracks: *two* Studer A800 MkIII 2" x 24 Analog Recorders▼
▼9ft Concert-D Steinway, B3, C3, Leslies, walls of Vintage Amps/Cabs▼
▼World Classic Neve/Studer Recording Facility▼

▼One Studio, 5500 sq. ft., 4 iso., always "lockout" privacy▼

up-to-date information available
call or e-mail to: triclops@mindspring.com
for fax-back of studio bio, rate sheets, and equipment list

ATLANTA ▼ (770) 955-3550

120 Interstate North Parkway East, Suite 164, Atlanta, GA 30339

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If you're taking your audio products on the road to Latin America, *Mix—Edición en Español* is the only Spanish phrase you need to know.

With approximately **20,000 copies** per **bimonthly** issue, *Mix—Edición en Español* is the most widely-distributed professional audio and music publication in the Spanish-speaking world!

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SUBSCRIPTION INFORMATION 510•653•3307

TASCAM

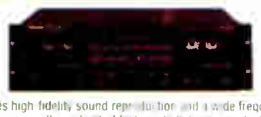
102 MKII / 103
Stereo Mixdown Cassette Decks

Best values for musicians, studio operators and production houses, the 102 MKII and the 103 consistently produce only the highest quality tape recorded output.

They Feature:
- 60dB signal-to-noise ratio and wide frequency response using any type of cassette tape
- Dolby B/C noise reduction and Dolby HX Pro extends high frequency performance up to 6dB and minimizes distortion
- Bias -sensing electronics automatically chooses best recording settings for the type of tape you load – Normal, Metal or CrO2
- Record/Mute autospacer automatically inserts 4 seconds of silence between songs or broadcast segments
- Independent L - R stereo level and master record level controls

Tascam 103 Advanced Features:
- 3 head system allows you to record on a tape and monitor it at the same time, without rewinding
- MPX filter button eliminates pilot and sub carrier broadcast tones that can interfere with Dolby noise reduction

202 MKIII
Dual Auto Reverse Cassette Deck



Provides high fidelity sound reproduction and a wide frequency response, as well as a host of features to help you easily dub, edit, record or playback onto/from one or two cassettes.
- Normal speed and high-speed dubbing
- 4-second autospacer
- Dolby HX Pro sound extends high frequency performance and minimizes distortion on Normal, Metal and CrO2 tape
- Create a professional-sounding composite tape from several sources. Functions like Intro Check, Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks you want
- Twin two-head cassette decks in a durable rack-mount housing that can be used separately or in tandem during recording and playback for total flexibility

302
Double Auto Reverse Cassette Deck

All the features of the 202 MKIII, plus more recording and playback flexibility. That's because the 302 is actually two independent cassette decks, each with their own set of interface connectors, transport control keys and noise reducing functions.
- Auto reverse capability on both decks
- Individual/simultaneous record capability, both decks
- Independent RCA unbalanced in/out for each deck
- Cascade and Control I/O let you link up to 10 additional machines for multiple dubbing or long playing record and playback applications

112 MKII
Stereo Cassette Deck

The classic "no frills" production workhorse, the 112 MK II is a 2-head, cost effective deck for musicians and production studios. Extremely rugged and reliable, the 112 MK II is ideal for production, mastering and mixdown. It also features a parallel port for external control and an optional balanced connector kit means it is flexible enough to integrate into any production studio.

112R MKII
Bi-Directional Stereo Cassette Deck

The 112R MKII is a sonically uncompromising, auto-reversing and continuous play cassette deck. It offers the finest independent head auto-reverse design at this price level, plus it has extra dubbing and editing features for long program recording.

All the features of the 112 MK II *plus*—
- Three-head transport with separate high-performance record and playback heads. The heads combine with precision FG servo direct-drive capstan motors to provide the highest standards of reproduction quality and performance.
- Hysteresis Tension Servo Control (HTSC) virtually eliminates wow and flutter by maintaining consistent back tension on the tape all through the reel, combatting inconsistencies brought on by extreme temperatures and humidity.
- Auto Reverse mode plays or records in both directions before stopping; switching sides on the fly.
- Continuous Reverse mode allows you to loop the tape during playback up to 5 times, or record in both directions without pausing to flip the tape and re-engage the record mechanism.

marantz

CDR620 Compact Disc Recorder

The CDR620 is a next-generation stand-alone write-once CD recorder. It offers a truly comprehensive set of features for a wide range of applications including recording studios, mastering facilities, post production, broadcast and more.
- Includes a sample rate converter, a DAT start ID/CD track converter, auto-increment mode, an ISRC encoder, programmable digital fade-in/out and an index recording capability
- SCSI-2 interface for connection to popular hardware/software and virtually any PC for use as a CD-ROM recorder
- High oversampling 1-bit A/D (64x) and D/A (128x) converters
- Subcode sensing or adjustable level sensing for automatic track incrementing. Also supports manual track incrementing
- Wired remote provides control and status of all CDR620 operations. Both index and ISRC code recording can be activated, as well as catalog number recording (EAN/UPC). The remote also supports copy prohibit on/off and emphasis on/off
- Ignores SCMS (Serial Copy Management System), permitting unlimited archiving
- Has a comprehensive array of analog and digital inputs/outputs including multiple digital audio interfaces (AES/EBU and IEC-958-II) and balanced +4/-10dBu selectable analog input and +4dBu balanced analog output
- Cascade feature provides simultaneous parallel operation of multiple machines and a 9-pin parallel (GPI) interface facilitates external automation

PMD-101/201/221/222/430
Portable Professional Cassette Recorders

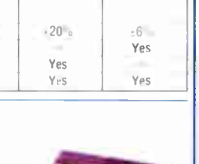
The world standard for field recording, the PMD line is also the value leader. They all feature RCA line input/outputs, 1/4-inch headphone jack, built-in speaker, pause control, audible cue and review, tape counter, full auto shut-off and low battery indicator.

- All models except the PMD-430 have 1/2 speed playback/record capability. With 1/2 speed playback, musicians can slow down complicated passages for analysis. And when played back at 1/2 speed, the pitch is lowered by exactly one octave, so the notes are still musically correct – ideal for figuring out complicated solos or picking patterns.
- By recording at 1/2 speed, a three hour meeting can be recorded on a single tape. A built-in mic and automatic level control make operation simple and built-in speaker makes transcription convenient.
- 1/2 speed recording is equally ideal for churches, because 90 minutes can be recorded on a single side of tape – no interrupting to flip the tape over.
- Three standard "D" cell batteries provide up to 7 1/2 hours of operation and the optional RB-430 rechargeable battery delivers up to 5-1/2 hours.

General	PMD-101	PMD-201	PMD-221	PMD-222	PMD-430
Stereo/Mono	Mono	Mono	Mono	Mono	Stereo
Heads	2	2	3	3	3
Inputs/Outputs					
Mic Input	1/4-inch	Miniplug	Miniplug	Mini/XLR	1/4-inch
Condenser Mic	Built-In	Built-In	Built-In	Built-In	—
Remote Jack	—	Yes	Yes	Yes	—
Modular Tel. Jack	—	Yes	Yes	Yes	—
External Speaker Jack	—	Yes	Yes	Yes	—
Record Controls					
VU Meters	—	1	1	1	2 (Illuminated)
2-Speed Recording	Yes	Yes	Yes	Yes	—
Dolby B NR/dbx NR	—	—	—	—	Yes
Mic Attenuation	—	0,-10dB, -20dB	0,-10dB, -20dB	0,-10dB, -20dB	0,-15dB, -30dB
Ambient Noise Cont.	—	Yes	Yes	Yes	—
MPX Filter	—	—	—	—	Yes
Manual Level Control	—	Yes	Yes	Yes	—
Limiter	—	Yes	Yes	Yes	Yes
ALC	Yes	Yes	Yes	Yes	—
Peak Indicator	—	—	Yes	Yes	—
Playback Controls					
Pitch Control	±20%	±20%	±20%	±20%	±6%
Bias Fine Adj.	—	—	—	—	Yes
Tone Control	Yes	Yes	Yes	Yes	—
Memory Rewind	—	—	Yes	Yes	Yes

Telex

ACC2000/4000 Cassette Duplicators



Designed for high performance and high production, Telex duplicators also offer easy maintenance and ease of use. The ACC2000 is a two-channel monaural duplicator; the ACC4000 is a four-channel stereo duplicator. Each produces 3 copies from a cassette master at 16X normal speed and with additional copy modules you can duplicate up to 27 copies of a C-60 original in ***under two minutes.*** And they copy both sides at once.

The XL Series feature Extended Life cassette heads for increased performance and wear characteristics. They also offer improvements in wow and flutter, frequency response, S/N ratio and bias.

Easy Maintenance:
- Slanted work surface and "heads-up" cassette platform prevent oxide build up on the heads and makes cassette loading and unloading easier.
- Three point tape guidance system eliminates skew problems and prevent unnecessary wear and tear on the tape head mechanism.
- Audio and bias, along with head adjustments, are made easily from the top of the unit and a switch on the back engages the head and pinch roller for convenient cleaning.

Fingertip Operation
- Individual rotary audio level controls
- Peak reading LED indicators
- Side A or A/B select button
- Stop all tapes instantly, at any point during the copy or rewind cycle.
- Short tape indicators alert you if a take stops before the original does, identifying incomplete copies caused by jam or short.
- Automatic or manual selection of rewind and copy operation. Rewinds tapes to the beginning or end automatically (AUTO mode) or manually.
- In AUTO mode the copy button activates the entire rewind/copy/rewind sequence. In manual it starts copying immediately.

ACC2000 Mono Master/Module:
- 1/2 track two-channel monaural duplicator produces 3 copies from a cassette master at 30 ips (16X normal speed)
- Expands up to 27 positions by adding ACC2000 copy modules

ACC2000 XL Mono Master Module:
- Same features as ACC2000 *plus*– Extended Life cassette heads

ACC4000 Stereo Master Module:
- 1/4 track four-channel stereo duplicator. Same features as ACC2000 Mono Master Module

ACC4000 XL Stereo Master Module:
- All features as ACC4000 *plus*– Extended Life cassette heads. Can be configured for chrome or ferric cassette duplication

ACC2000 Mono Copy Module:
- Each module has four copy positions with erase heads and controls for side select
- LED displays indicate end-of-tape status for each pocket

ACC2000 XL Mono Copy Module:
- Same features as ACC2000 Copy Module *plus*–Extended Life cassette heads. Connects to ACC2000 XL Master Module

ACC4000 Stereo Copy Module:
- Same as ACC2000 Copy Module except 1/4 track four-channel

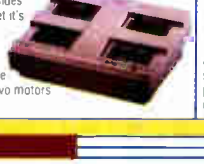
ACC4000 XL Stereo Copy Module:
- Same as the ACC4000Copy Module *plus*–Extended Life heads. Configurable for chrome or ferric cassette duplication

Copyette EH Series Duplicators

The Copyette series produce high quality, low cost cassettes in large quantities at nearly 16 times normal speed. Available in two versions, the Copyettes are capable of duplicating either one cassette or three at a time. Also available in both mono and stereo models.

Stereo Copyette 1•2•1
Weighing only 8 lbs. (3.6 kg), this unit has a durable, impact resistant housing and includes a removable power cord, carrying handle and protective cover. An optical, non-reflective end-of-tape sensing system that provides gentle tape handling.

Stereo Copyette 1•2•3
This duplicator copies both sides of three cassettes at once, yet it's as small as the 1•2•1. It weighs only 12 pounds (5.4 kg) and includes a hard cover to protect the unit while not in use. It uses all DC Servo motors for the ultimate in reliability.



CAD
Equitek Series
Studio Condenser Mics

The "bench mark" for cost and performance, the Equitek series of microphones incorporate a unique servo design and exceptional flexibility to provide extraordinary ballistic capability and exceptional transient response.

E-300

A multi-patterned side address mic that combines vintage capsule design with advanced headamp electronics, the E-300 has an unusually wide frequency response of 10 Hz to 20 kHz and an exceptional dynamic range of 137 dB. Also extremely low self noise of 11dB. Ideal for the most critical applications.

Shown with optional ZM-1 Shockmount

Unique powering of all mics is accomplished with a pair of rechargeable nicad 9-volt batteries in combination with 48-volt phantom power. This overcomes inherent current limiting associated with most phantom power supplies and can supply ten times the current.

E-200/E-100

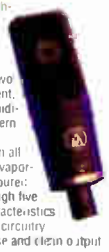
The first member of the current Equitek family, the E-200 is also a dual capsule side address multi-pattern condenser mic, but with lower specifications than the E-300. The E-100 uses the same electronics as the E-200, but with only one of the same capsules in a supercardioid pattern.
- Frequency response of 10 Hz to 18 kHz
- Dynamic range of 137 dB • Low self noise of 16 dB

audio-technica.

AT4033
Cardioid Capacitor Microphone

The AT4033 is a transformerless studio microphone designed for use in the most demanding applications.
- Utilizes a gold-plated, aged-diaphragm condenser element with an internal baffle plate to increase signal-to-noise ratio which coupled with low-noise transformerless electronics makes the AT4033 ideal for critical digital recordings
- Dynamic range is 123 dB without the built-in attenuator
- Accepts up to 140 dB SPL without capsule or electronic system distortion above 1% T.H.D. and a built-in switchable 10 dB (nominal) pad increases it to 150 dB
- 2-micron-thick vapor-deposited gold diaphragm provides accurate reproduction of even the most subtle sounds
- Permanently installed internal open-cell foam windscreen
- Integral 80 Hz hi-pass filter for easy switching from a flat frequency response to a low-end roll-off

AT4050/CM5
Multi-pattern Studio Capacitor Microphone



Supremely transparent and accurate without sacrificing warmth and ambiance, the AT4050 expands upon the AT4033, to set the standard for studio performance mics.
- New large-diaphragm design utilizes two capacitor elements to provide consistent, superior performance in cardioid, omnidirectional and figure-of-eight polar pattern settings
- To achieve a warm, true-to-life sound in all polar pattern settings, Audio-Technica vapor-deposits pure gold onto specially-contoured, large diaphragms which are aged through five different steps to ensure optimum characteristics over years of use. The transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

SENNHEISER

HD 265

The HD-265 is a closed dynamic stereo HiFi professional headphone offering a high level of background noise attenuation for domestic listening and professional monitoring applications. It is a suitable choice for monitoring applications in professional studios and to match the top of the range HiFi systems, delivering a clear and tonally balanced sound with a minimum of distortion.

HD 580

The HD 580 is a top class open dynamic stereo HiFi professional headphone. The advanced design of the diaphragm avoids resonant frequencies. The HD 580 can be connected directly to HiFi systems of the highest quality, in particular DAT, DCC and CD players. This headphone is an ideal choice for the professional recording engineer recording classical music.

—FROM PAGE 18, ORIGINAL AUDIO ARCHIVES

kee Doodle Dandy and many others, including some pretty strange stuff, like *Freaks* and *Street Bird of Youth*. While this was going on, *lots* of old albums and singles came in from major labels, and we were off and running.

I did very well with this process, which I named Revectoring (for reasons that I will spare you). This system actually worked quite well and could do some amazing things. It was capable of dramatic reduction in both noise and distortion and could add at least one octave of bandwidth to both the top and bottom end. It did this bandwidth expansion not with synthetic generation but by analyzing the existing audio for doppler and phase modulation signatures within the recorded audio band, and then generating the missing components using maps learned from the existing data. (This description is close enough to get the idea across, but some of the names have been changed to protect the innocent profit-earning future).

HOW COOL I AM

I'm not really that cool. I am telling you this to show you how cool I *was*. And that's the point. Anyone doing audio restoration of any kind on any material has an obligation to recognize a cosmic truth: No matter how good you are, technology will advance. And when it does, somebody else will eventually be able to do a better job. This is certainly no new concept. Technology advances, and we are capable of producing ever-improving end product. Each year, we kick out cleaner, tighter, more accurate audio, and that is basically all we owe the world (unless of course taste, warmth, musicality and artistic content count).

But when messing around with historically significant audio (I define this as anything old, irreplaceable or worth cleaning up for any reason), we have an additional obligation to face the fact that no matter how good our work is, no matter how slick and shocking our technology might be, that raw, unaltered dirty, popping, distorted original is worth infinitely more than our new-hyper-tech resurrected version.

The reason is simple: The original has to be there, intact and in all its dirty glory, for the next person to tackle it with the next-generation monster Clean-Up 2000 machine. Every time we fix up and re-release any audio, we should also make a direct transfer of the raw tracks using the finest technology available. Yes, this seems obvious, but it is still worth a reminder.

One of my own companies already has a new system out that makes the Revectored work done years ago seem as dated as...well, as dated as it *is*.

HOW NOT COOL IT CAN BE

Unfortunately, I can name at least one horrible disaster in my own history that came about because of a somewhat unorganized and uncommitted program for preserving original unmodified audio. As far as I know, there is no longer any intact, complete, original raw version of *Gone With the Wind* in existence. I know that I had to get certain musical segments from sources other than the MGM archives when I originally did the film, and I know that those sources no longer exist. I have those segments, but several sections within them had to be reconstructed from virtually nothing. Those sections are now integrated into the segments and are now considered "original" data. This original stuff then went back to MGM and was "returned" to their archives. Hmmm...

Then all this stuff went to Turner as part of a huge buy-out, so you *know* that Turner thinks of it as the raw original (well, until they read this, anyway).

So nobody is cool enough, important enough, or has hardware or software great enough to permanently alter the recorded past. In fact, we each owe our clients, our world, and ourselves the courtesy of doing everything within our power to preserve the raw original material using the most accurate technology available to us at the time. Only in this way do we even have a remote chance of having it around when the next Twice-as-Good-as-the-Last-One forensic system is developed (next week).

Yes, yes. This is pretty soap-boxy. Maybe my medication is a bit off, or perhaps I am overreacting to a recent conversation with the owner of an audio clean-up house who told me that he only returns the processed material to the client, and makes no effort whatsoever to create (or check to see if the client has created) a raw archive on the most modern media. Or just maybe I am reacting *properly* to it. You decide. ■

SSC's antirevisionist beliefs apparently extend into the field of audio, as you can see.

—FROM PAGE 23, SHORT CYCLES

as being available imminently, when they know perfectly well that won't be in the pipeline until at least next summer. It isn't just our little segment of the market that is practicing "preventive" product introductions anymore. If we do it, it's annoying but sort of fun. When the big guys do it, there are some heavy stakes involved.

The last revolutionary audio technology we foisted on people, CDs, took a while to get off the ground. It was about seven years between the time that the medium began to be seriously discussed and the time real product appeared; then it was another seven years before it became firmly established enough to supersede its vinyl predecessor. Consumers had to be educated, cajoled, sympathized with, and in time won over with the promise of better quality, ease of use and, finally, a bigger catalog. The parallel to DVD is almost painfully obvious, and yet the DVD folks are not allowing time to work for them at all. They're trying to get their baby to market in about two years from inception and are expecting that it will be no more than three years before it becomes the medium of choice for video, audio and data.

Can we absorb all this new technology so fast? Are people so ready to throw out their VHS VCRs (even if they bought them ten years ago), their CD players (five years ago), and their CD-ROM drives (last Christmas)? Or are the little jolts of electricity, like in poor Harry Benson's brain, coming too close together? Are we in danger of a tipover—where the technological eras, the cycles of stimulus and response, are so short that they collapse into each other? If that happens, the host—that is, the buying public—will be paralyzed out of confusion and fright. Hopefully, unlike Crichton's character, they won't turn into homicidal psychopaths. But for them to turn off to what we have to offer—the music, the movies and the multimedia of the future—because they can't deal with overwhelming and expensive new technology, whether it's being implanted under their skin or forced down their throats, would be just as deadly. ■

Paul D. Lehrman, who loves teaching, writing and, yes, technology, thanks Michael Crichton for years of good reading, even if he didn't get him The Cat in the Hat *from the top shelf.*

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—FROM PAGE 81, DAVID BLACKMER

at 20-to-20k Hz window. Why?

The relative timing of low frequencies is surprisingly important. I should mention that the ear does something very interesting in low frequencies. Nerve path transmissions for low frequencies are pulses modulated in terms of rate appearing only in the positive pressure half of the waveform. And so correlations between low- and high-frequency nerve impulses are done in relation to the way that the signal is transmitted; it's very time-dependent.

This effect shows up, for example, in something like bowed double bass. Surprisingly large changes in the sound in that instrument happen as you vary the phase of the low frequencies—it's not the same instrument if you change them too much. You have to be very careful with what you do with, say, ported speaker cabinets.

Are you suggesting that the theories we have about low-frequency signals being non-directional is false?

I think they're quite directional. My feeling is that the ear is hearing the differences in these waveforms in a way that lets you have a real sense of direction even down at 20 Hz—there's something about low frequencies that deals with room tone, and with giving a kind of foundation to the sound.

Let's talk about the Earthworks series of microphones. How many are there now in the range?

There are three models at the present time, and a new one that will offer response to 60 kHz. The [Sony] Bitstream System is down 3 dB at 100 kHz, and yet a large number of people who have listened to it say that [it] doesn't sound quite the same as an analog channel—I can't tell you what's going on! It's a wonderful system; the best there is in terms of digital.

What experience do you have of digital systems?

We have a Pioneer [D-9601] DAT recorder with 96kHz sampling [available in the US through HHB Communications]. We use the machine's A-to-D converters.

All your current microphones are omnidirectional. Is there a plan to offer cardioid models?

We certainly intend to do so. All cardioids sample from two points in space; hence they do not look [at the signal] from a common point of view. I think it's possible to make cardioid that does—we certainly are interested in doing directional microphones—but my feeling is that the first thing we need to do is completely master the omni. We are not to the point where I am fully happy with what we're doing—there are improvements that can be made, but it just takes time to learn to do those. I want to take the greater simplicity of the omni as an opportunity to learn what must be learned before I go in and repeat everyone else's mistakes.

You are also considering the development of a lab-grade microphone and lab-grade preamp?

We have made our own preamps using Analog Devices chips, which are fine for what we are doing at the moment. I won't say that they are perfect in terms of sound, but we're concerned about things that we can measure. I've done a lot of work on amplifiers that have essentially no distortion; amplifiers that before you put the feedback loop in offer distortion of less than one part per million.

One of the key things about amplifiers is that this delay is signal-dependent. The ear is incredibly sensitive to signal-dependent time changes. A lot of the things that "high-end" people hear—but which other people say nobody can possibly hear—fall into that realm. I'm very interested in [designing] both preamplifiers and power amplifiers in which there is no time transformation, and distortion is way under one part per million.

I'm surprised that nobody's come up with this before.

I think people have bordered on it, but I don't know if they have my obsession with where the distortion comes from and what to do about it. I've worked on zero-distortion amplifiers over the years but haven't put any of them into production. But I very much intend to do so in the future.

What motivates you to become involved with something new?

Just plain inquisitiveness. I look at things again and again from all sides, and wonder what's really going on.

What kind of music do you like?

A very wide range. I especially like Baroque music: Bach and many of his contemporaries. Also a lot of the pop music from the '60s and '70s, which were very creative times. Not much of what is out there now appeals to me.

Do you go to a lot of live concerts? To experience live instruments rather than through recordings?

I go to some. Although a concert is not necessarily a good place to [listen to music]. The frequencies I consider to be important don't travel very far [before they become attenuated by the air]. So when you get way back from an instrument, you don't get the experience you do up closer. I would contend that a well-miked performance with good speakers is very different—and in some ways superior—to a live concert-hall experience. Each person has their own preferences, but there is a lot to be said about the recorded sound experience. Especially when you're careful about these [technical] details that have such an incredible effect on the sound.

Do you play yourself?

No, but all my kids do. I probably would have liked to play piano.

What do you consider to be your greatest challenge to date?

I guess the greatest challenge is to find a way to take an idea and put it into a form that the world wants to buy, and to form an organization that's capable of generating the equipment required.

And that will pretty much shape your future? Coming up with ideas, bringing them to market and hopefully making money.

I'll try to do all those things. ■

Mel Lambert heads up Media&Marketing, a consulting service for pro audio firms and facilities.

—FROM PAGE 98, MERCEDES SOSA

in our computer so I have a log of each place and why changes were made. But, yes, I generally sing more folklore, as well as Charly García's songs such as "De Mí" and some of Fito Páez's music like, for example, "Un Vestido y un Amor." When I sing too much folklore, some people don't like it; in Europe, if I sing more modern songs, people get upset; they prefer folklore. So I have to find a balance.

In the studio, do you do more than one take for each song?

No. I usually do only one. Sometimes, I'll do one take and then correct it, but I don't like to "cut and paste" the songs. The voice changes color, and I feel that editing is, in part, cheating, because whatever you record, you have to repeat afterward onstage. I have been recording for a long time. I have recorded on only two channels in the past, and as you can imagine, I have been through a myriad of recording styles in these thirty years. At one point, I recorded in the studio that Philips had [now PolyGram], finishing ten songs in one day! Now, I try to focus each day in the studio on completing one song from start to finish.

How do you like the younger composers, the ones in the rock movement in Argentina?

I do not generally listen to rock music—not one of my favorite hobbies. I do enjoy the music of Víctor Heredia, Leon Gieco, Lito Vitale or Fito Páez. But, without a doubt, my greatest admiration lies with Charly García, who possesses some tango-sadness, it is sad rock. I must quote [journalist] Alejandro Dolina from his book *El Angel Gris* [*The Gray Angel*]. He says, "We will never hold a carnival as the Brazilians do. We are too sad, because we do not have within us that easygoing and forget-everything condition. We, Argentines, never forget ourselves, except when we are about to vote." ■

Iris Etcheverry is a musician and journalist based in Argentina and correspondent for Mix Edicion en Español. *Mix thanks Alex Artaud, the editor of our Spanish edition, for translating this article.*

—FROM PAGE 96, SR FOR MERCEDES SOSA

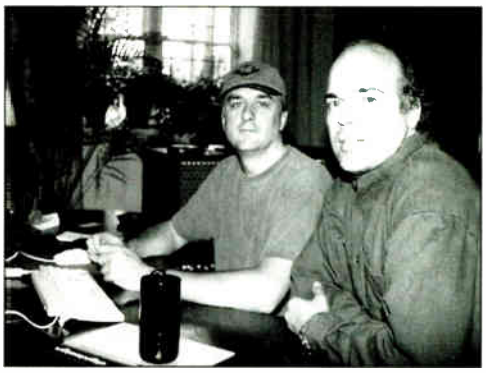
Monitor System:
8 Meyer UM or EAW
Meyer MSL4 or EAW for side fill
1 Meyer UPA or EAW for drum fill

Microphones:
1 AKG D112
1 Shure SM57
5 Shure SM58
3 AKG 451
7 Sennheiser 421
1 Sennheiser 441
2 clip-on condenser mics (bandoneón)
9 Countryman direct boxes

Intercom Set: 1 Clearcom for house and monitor ■

—FROM PAGE 95, INTI-ILLIMANI

Campagne. Campagne was originally enlisted for this project by his agent, who is also the booking agent for Inti-Illimani. At first, the band were considering recording in North America, but they decided they'd be more comfortable at home, so Gendron and Campagne traveled south.



Engineer Toby Gendron (left) and producer Paul Campagne

They recorded using one of the studio's Otari MTR90II tape machines, with Dolby SR to 15 ips. Studio Master is also equipped with an Amek Hendrix 48x48 console and Quested H108 monitors. "At first," Campagne says, "being in a different country for me, I was unsure what we would run into, but the minute I saw that the studio itself was well-equipped, Toby and I knew everything was cool. The toughest part was the fact that the recording room wasn't that big, and Inti is a fairly elaborate band, and we wanted to do it fairly live—or, rather, do most of the tracking of the instruments live and record the vocals afterward."

Campagne says he made do by arranging the musicians in sections—not partitioned off, but in groupings that would work with the acoustics of the room. "The back of the room had a higher ceiling than the front part, so we tested out certain percussion instruments and after a few hours, we realized the best placement for every instrument. The classical guitars and bass we brought to the front, and percussion and any hammer instruments were farther into the bigger section of the room."

To capture the heart of musical tracks, the classical guitar, Gendron used four microphones: two AKG C-414s about four feet from the instrument, one to the left and one to the right. Two feet above the player's right shoulder, pointing toward the soundhole, he used a Neumann U67 to capture the ambient sounds, and the main guitar mic was an AKG 460, situated about three inches away from the 12th fret and pointed right at the hole. "The classical guitar was the staple," says Campagne. "Whenever we looked at a song and discovered what was going to be coming around the classical guitars, we'd create a sound that would accommodate it. For example, if we knew there was going to be bass, we didn't concentrate as much on the low end of the classical as we would if it were just solo.

"One of the other important things about this project," Campagne continues, "was that there's maybe only one punch in each vocal. It was all done from A to Zed with the essence, as opposed to the perfection, of vocals. And I don't understand Spanish, which is a bit of a test, but I think that when you're doing vocals, there's a sense of whether someone's got it or not, and in that sense, you don't want to stop halfway through. In general, I think it put them at ease. Afterward, there were points where they were not really happy with some of the vocals, and I said, 'Look, you've got to let that go. It sounds fabulous because of the essence and feel that is there,' and they ended up listening to the mixes and saying, 'You're right. There's something in that one that's just *there*.'" —*Barbara Schultz*

—FROM PAGE 156, BIAS PEAK

pick up your work from there. Once you change an edit in this window, of course, all of the edits that you did subsequently are voided.

Another welcome feature is the blending function: When you edit two pieces of a file together, you don't have to go in with a microscope to make sure they fit together without glitching, you can merely invoke this feature, which performs a crossfade between the two regions. You can specify the length of this crossfade, and even the in and out envelopes. However, you have to specify the parameters for an edit before you actually make it, which is a bit unwieldy. The envelopes you create can be saved as disk files and recalled at will, and the program comes with a small library of envelopes to get you started.

In general, Peak is very fast, using RAM when it can and disk swaps when it must. During most time-consuming functions in Peak, a Time Remaining window appears when doing the conversion to let you know how much time you have for coffee. In many cases, you'll be pleasantly surprised how little time that is.

GETTING AROUND

The program makes excellent use of markers—they are easy to drop in and edit, and can be anchored to a particular sample, so that when a section of a file is moved around, the marker goes with it. It's also easy to select a region between two markers: Command-click in the region and you've got it—no guessing about whether you're right on it or not. When you move a marker, pressing the Shift key restricts your movements so that the marker can only land on a zero-crossing, which helps to make glitch-free edits.

Markers can double as loop-in or -out points. A crossfade looping function with user-definable length and envelope is included. Peak only supports one loop per file, so if your sampler uses multiple or decay loops, you can't create them here. Loop points can be locked to each other, so you can move a loop around without changing its length. A feature called Loop Surfer lets you specify a tempo and number of beats, and it automatically creates a correctly timed loop from the current cursor position. You'll probably still have to trim and crossfade it to make it just right, but it's nonetheless a big time-saver.

There's a very cool scrubbing feature that hasn't been seen in audio editing programs before. Conventional scrubbing emulates the rocking of tape-recorder reels, so that as you move the mouse back and forth on the screen the sound comes out at variable, but usually very low pitch, either forward or backward. In Peak's Dynamic Scrubbing, as you move the mouse, little chunks of the file are played, in the correct direction and at the correct pitch. Although it sounds a little strange when you're doing it, the feature lets you find the precise beginnings or ends of sounds, or changes within them, really quickly. To my mind, it is infinitely preferable to the old-fashioned tape-emulation method. Like I said, a modern program. And although I don't miss it, BIAS says traditional "tape-style" scrubbing will be included in an upcoming version.

Editing functions are what you would expect: Cut, Copy, Paste, Insert (paste and move everything else over), Silence, Insert silence and Crop (remove everything except what's selected). You can zoom in through many levels using command keys, and there are some helpful "instant" display functions.

INS AND OUTS

File formats supported are legion: Sound Designer II, AIFF, QuickTime, .au, .snd, System 7 sound, .WAV for DOS machines and Red Book audio for CD mastering. In addition, four compression options are available: IMA 4:1, MACE 3:1, MACE 6:1 and μlaw compression for AIFF and QuickTime files. You can also save files in 8-bit format for multimedia use, but the program simply truncates the file, without any dithering or level-changing, and so the results will often be less than optimal. Fortunately, you can use the plug-in version of Waves' L1, which I'll talk about momentarily.

Speaking of CDs, the program lets you import tracks on an audio CD directly from a CD-ROM player (assuming the player supports what's called "SCSI-to-audio-transfer" or "audio extraction"—unfortunately, a lot of popular third-party drives don't). The feature lets you select a CD track, listen to it, and designate in and out points for the conversion. Peak conveniently imports it directly as AIFF, so you can start working on it right away.

Like many office software products (and like System 7.5's Recent Documents feature), Peak remembers the last few files that you've opened, in the current session or previous ones, and lets you access them instantaneously from the File menu. You can have multiple files open and play them one at a time using the Mac number keys, the numbers corresponding to the order in which you opened the files.

PROCESSING

DSP functions are accessed through submenus under the Action menu. Some are resident in the program, while others are "plug-ins" from third-party manufacturers, and these live in a special folder on the Mac desktop. The plug-ins that Peak can access are those designed to be used by Adobe's Premiere: This is a whole new family of tools whose format is being adopted by a number of companies' products (such as Macromedia's Deck), and is becoming a viable, and much less expensive, alternative to Digidesign's TDM plug-ins.

The DSP functions in the Accessory Paks include Sample Rate Conversion, Phase Inversion, Normalization, Click Repair, Gain Change, Reverse, Reverse Boomerang, Fade In and Out, and "Rappify," which the documentation says "rhythmically applies an extreme dynamic filter" to the file, but doesn't do a lot for me. There's also a Duration Change function, which lets you change the tempo of a file without changing pitch, but despite its comprehensive selection of sub-parameters (Grain Duration, Grain Overlap, Crossfade Envelope, etc.), it doesn't do as good a job as one might like—complex sounds take on an unpleasant low-frequency modulation. There's also a Phase Vocoder feature, which can change pitch independent of duration, and does a cleaner job.

A great feature is the Threshold function, which is a tool for automatically breaking up a file into regions, similar to the Strip Silence function in Opcode's Studio Vision. When you invoke this, it analyzes the amplitude of the file over time, and inserts a marker whenever the level crosses a certain user-definable threshold and stays there for a certain (also user-definable) period of time. A very slick graphic window is used to set the threshold level, letting you see exactly where and how many markers will be created as you change the level up and down. Each marker can then define a region, and you can use these regions to, for example, break up a drum loop into individual hits or separate a voice track into syllables. Once the markers are set up, the individual regions can be automatically exported into windows of their

own, and even saved to disk. Very cool.

Another interesting feature, similar to one of my favorite Alchemy tricks, is an Amplitude Fit function, which lets you design an envelope graphically and then impose it on top of an audio file. Like the program's other envelope-based functions, "fit" envelopes can be stored and recalled from disk.

There are three DSP functions that work through the clipboard—that is, they involve two sounds simultaneously: one the current selection, and the other a selection cut or copied from somewhere else. Mix simply merges the contents of the clipboard into the current selection. Modulate creates a ring-modulation effect, in which the two sounds are multiplied. The amount of the effect is adjustable. Convolve is a weird function that, according to the manual, imposes the spectral character of one sound onto the other. It certainly can create unusual sounds, but exactly what's going on is not clear, and there are no user parameters.

PLUG-INS

There are currently two sets of plug-ins available: the Cybersound FX set from InVision Interactive, maker of the VS virtual synthesizer sound set for playing MIDI files with the Mac's internal sound chip; and a set from the remarkable Israeli company Waves, which has become famous for its superb plug-ins for Digidesign Sound Designer and TDM systems, which have been ported over to the Premiere format.

The Cybersound set includes echoes, delays, reverbs, flangers, EQs and a fairly simple dynamics processor. They are useful, but their programmability and flexibility are limited, and the sound quality ranges from pretty good to pretty awful.

The Waves plug-ins, on the other hand, which consist currently of the L1 Ultramaximizer, the Q10 parametric EQ and a "Swiss Army knife" combination of dynamic processing and filtering called AudioTrack, are exactly the same as—and therefore quite equal in usability and quality to—their Pro Tools counterparts. The controls themselves are sluggish, but parameter changes are heard in real time. Waves has recently started using a "dongle" on the ADB (i.e., mouse and keyboard) cable as an authorization key for its plug-ins. It's probably much easier to administrate, and undoubtedly causes fewer system conflicts than disk-based copy protection, but personally I'm uneasy about loading down my ADB line (which in my case has two keyboards, a mouse, a trackball, a fax modem and a Steinberg dongle) with more junk.

Other programs using the Adobe Premiere plug-in architecture have a serious drawback, which Peak's creators seem to have been able to escape from. To listen to a plug-in's action you select a region, open the plug-in's window, and press the Preview button. The selected region plays, over and over, while you adjust the plug-in's parameters. In most Premiere-compatible programs, the amount of sound you can audition is limited to three seconds, which makes it quite difficult to set parameters intelligently, especially if the sound varies a lot over time. Earlier versions of Peak suffered from this problem, but in the newest version, the designers have found a workaround, and now the audition time is limited only by the amount of RAM the program has available. I was able to get it to play 15 seconds of a stereo file, using a RAM partition of 12 megabytes.

A more serious drawback of relying on third-party plug-ins is that it's probably unlikely that third parties will feel compelled to create some of the more esoteric DSP functions found in a program like Alchemy—I'm thinking specifically of the volume-, time- and frequency-envelope analyzers and modifiers. BIAS did come up with its own Amplitude Fit feature—perhaps they'll take on development of more of these types of tools in-house as well.

BUT THERE'S MORE...

Also included in the program is Apple Events support, which means that you can have Peak play audio files from within any other application that works with Apple Events. This includes many word processing and database programs, so that you can use these programs to organize and audition large collections of audio files.

Finally, the Accessory Paks include support for MIDI samplers. The normal method Peak uses for transferring samples is SMDI, the SCSI Musical Digital Interface protocol developed by Peavey and now also used by Kurzweil and E-Mu in their most recent models. In addition, support is provided for some Ensoniq samplers using a proprietary, also SCSI-based, protocol. The company says support for some Roland and Akai samplers is on the way, and so is support for MIDI Sample Dump Standard, that well-designed but painfully slow transfer protocol. This will at least make the program backward-compatible with a host of older devices, even if it means a lot more users getting up and going out for coffee—and a donut or two. I tried the SMDI transfer with a Kurzweil K2000, and it worked nearly flawlessly in both directions.

DOCUMENTATION AND HELP

Learning Peak is easy: The program itself is relatively intuitive, and the manual is trim and well-organized. Two things I would like to see are more tutorials using the waveforms included with the program (they're pretty strange but could be used effectively), and a keyboard command chart. The latter is available on the company's Web site (www.bias-inc.com), but having it on paper would help.

There's also plenty of online help, in three forms: The program has its own Help menus, which though brief, are useful and well-organized; the current version ships with Peak Guide, a self-reading eDOC document; and the Web site is excellent (it also contains the latest versions for downloading). There is actually a lot more that could be said about this powerful, fast and very thorough program. Although it's a small company, Berkley Integrated Audio Software has come out with a big, big product. More than just clearing away the cobwebs that have accumulated in the Macintosh sound editing world from several years of neglect, Peak is an exciting, innovative, thoroughly up-to-date program that will (assuming Apple doesn't blow it completely) greatly help the Mac in its struggle to maintain its long-standing, but endangered, superiority as a creative tool. Like any infant, it has teething pains—it needs better DSP and memory management, and needs to work with a wider range of file formats—but I have the utmost faith it will grow out of them. If you're serious about sound editing, whether for composition, effects design, multimedia or MIDI samplers, you will want Peak. It fills a niche—which in recent years has come to resemble a chasm—and it fills it very well.

Berkley Integrated Audio Software, PO Box 2481, Sausalito, CA 94966. Phone 800/775-BIAS; phone/fax 415/331-2446. ■

Paul D. Lehrman, Mix's "Insider Audio" columnist, wrote his first sample editing program (featured in Mix*) in 1984. He admits this new stuff beats the pants off it.*

—FROM PAGE 160, DISTRESSOR

cations, I found myself wanting to use it on almost everything, from vocals to cello to talking drums.

The compression ratio modes are all quite useful, and each has its own distinct personality. Because of the soft knee curves, the onset of compression was often difficult to detect, even using the higher ratios and extreme attack/release times. The unit is virtually unchokable, and breathing and pumping were almost nonexistent except at the most radical settings. Distressor produces very little audible noise, even when the distortion modes are engaged.

The manual states that you "won't go wrong" by choosing the 6:1 ratio mode and setting attack and release at around 5 or 6. Although this is more or less true (and provides a good starting point for experimentation), there are many variations possible, and the interaction between the various knobs and switches ranges from subtle to dramatic. For example, the release range is normally adjustable from 0.05 sec to 3.5 sec, but in the 10:1 Opto mode, it can be up to 20 seconds.

I used the Distressor on vocals and a wide range of instruments, while both tracking and mixing, and found it to be very versatile. I started with the 6:1 5/5 setting, to test the one-size-fits-all theory, and then proceeded to try the other settings. Sometimes I had to make a lot of adjustments to get things right, but I almost always arrived at something useful.

Electric guitars sounded good using several different ratio modes. The standard 6:1 setting yielded an increase in presence and a slight brightening of the sound of chordal guitars, while evening out single note runs. The 4:1 setting offers more transparent and subtle compression, while the 10:1, 20:1 and Nuke settings were useful for funky chordal chops and super-distorted power chords. These last two ratio modes really squashed the guitars into submission no matter how over-the-top they may have been.

Acoustic guitars gained sheen and upper-frequency presence using the standard setting, but the 6:1 ratio mode was a little too much in most cases. If the performance was very uneven then this could be the perfect setting, but with a smooth performance and more delicate dynamic shifts the 4:1 or even the 2:1 sounded best. Of course you might want squashed acoustic guitars in some mixes, but for applications where the guitar is out front, compression should be as transparent as possible.

Electric bass benefited from several different ratio modes, depending on the desired result. A 4:1 ratio mode with 5 to 10 dB of gain reduction added punch and definition with little noticeable compression, while the standard ratio tended to be more obvious, particularly with slower release times. Even when super-squashed and hard-limited, there was little or no pumping except with really fast release times. The highpass filters helped eliminate mud and rumble, while the two distortion modes added grunge where desirable. A veteran Nashville session player who tried it said Opto mode faithfully emulated the LA2A. He summed up Distressor's performance on bass by saying, "It ruled!"

On drums and percussion, Distressor is useful for altering attack, articulation and tonal characteristics. Talking drums could be made to "speak" more clearly by emphasizing the pitch bends that occur after the initial attack. Shakers could be altered drastically by adjusting attack and release times. Big, low-frequency sounds could be tightened-up and made more percussive without any trace of pumping, even with fast release times. Using Nuke mode with a room mic resulted in a very big, "Bonham-type" sound.

On vocals, the manual recommends the "can't go wrong" setting, with the attack at 5 and the release at 4, and 3 to 17 dB of compression. This was quite satisfactory as a general setting. It provided a tighter and slightly more defined sound, without being obvious. I found that the 4:1 ratio mode, combined with a shorter attack time, say 3 or 4, enhanced the sound while retaining most of the original dynamics. Even when extreme settings were engaged, the Distressor did not sputter or spit out audio artifacts. The manual wisely advises against using the distortion modes while going to tape, but some of these settings offer creative usefulness, if not in the best interests of sonic fidelity.

On flutes, saxophones and clarinets, the unit added clarity and definition, but in most modes it also emphasized breath, pad and valve noises. This made the instruments more "real" to my ears, but some people might prefer settings that decrease, rather than increase, those sounds. The distortion modes were particularly noticeable on flutes, and generally made them sound warmer, particularly Dist 2.

The Distressor is a fine piece of gear that meets or exceeds the claims made by the manufacturer. Because I only had one Distressor, I could not test it in stereo mode, so I was unable to determine how useful it might be for mastering applications. However, used for tracking and mixing individual instruments it performed superbly.

Would I recommend buying one? This depends on who you are and what you want. At $1,499 for a mono device ($2,750 for two linked together at the factory) the Distressor is probably not the first choice for a small project studio. But for the professional producer or engineer who wants a unit that can emulate vintage devices costing much more, and do it with modern noise specs and the predictability of digital control, the Distressor is hard to beat.

Add to that its ability to warm up digital signals and the Distressor becomes a very impressive and useful package. As Brian the Bassist said, "It rules!"

Empirical Labs, available through Wave Distribution; 50 Bordeaux Terrace, West Milford, NJ 07480; 201/728-2425; fax 201/728-2931. Web site: www.dataslam.com/~wavemech. ■

Barry Cleveland is a San Francisco-based engineer/producer and composer.

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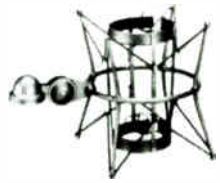

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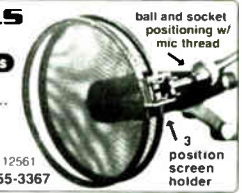

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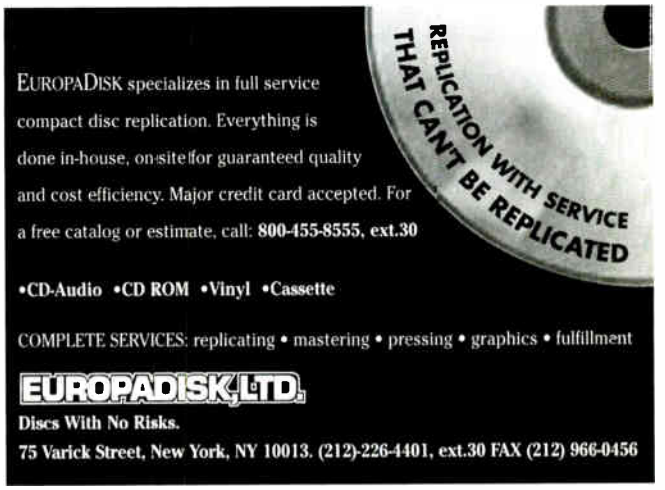

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February 1997 ☛ **December 15**
March 1997 ☛ **January 15**

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Mail Subscription:	42,924	44,788
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Hillel Resner, Publisher

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1996

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FEEDBACK

IN DEFENSE OF STUDIO 'PERFECTION'

I enjoyed Lolly Lewis's sidebar article "Computer Editing for Classical Music," (September '96 *Mix*), but I must take issue with some of the opinions expressed regarding the ethics of editing classical music. I concur with her condemnation of "performance editing" for the purposes of audition (or any fraudulent use, musical or not, for that matter). I question, though, the idea that editing for the purpose of creating a more perfect recording is anything but admirable.

The basis of her argument is that listeners will "learn to expect an unrealistic level of perfection in what they hear." I think what is more likely to happen is that listeners will finally stop viewing classical recording as an approximation of live performances and accept it as a self-sustaining art form in its own right. This has been going on in popular music for 30-plus years now, where it is widely accepted that live performances could never match the sound quality, arrangement or performance details of the recording. Why must the classical realm be different? We know that a classical recording cannot currently capture the full live experience, so why can't we move past the idea of a recording being only an "adequate" replacement for the performance and understand it as a separate art?

If we can accept this fact, one must then ask why a classical recording shouldn't be made the best it can possibly be, regardless of how "perfect" or "imperfect" it is performance-wise? Shouldn't quality outweigh accuracy in creative endeavors? It makes me wonder if two chunks of music are edited together in such a way as to create something that sounds beautiful and musically pleasing but is, in reality, "unplayable," would that be considered "wrong" by Ms. Lewis? (If so, we've got a problem, because I've been asked to do it on many a jazz CD.) I have even had more than one composer show interest in writing music specifically designed for editing into a new "unplayable" piece of music. Sounds like a great idea to me.

Editing numerous classical CDs over the years, I have come to see that when artists choose to edit their masters into one perfect take, the choice is aesthetic and not to impress their peers or give the wrong impression to young performers. When I have been fortunate enough to have composers present, they have always wanted only the most accurate representation of their work, which is what editing offers. As a composer myself, I understand this desire to create the absolutely best product for the listener. Shouldn't that always be the goal of the recording industry?

Mike Lawler
Studio B Productions
mklawler@aol.com

MORE ON BONNER

There are few words I could add to Larry Blake's eloquent tribute to one of my dearest friends, John Bonner. However, an additional memory comes to mind that truly underscores John's love and caring for the people around him. I was honored to be nominated for an award one year, necessitating a bow tie. Since John was the epitome of sartorial excellence (and always wore a bow tie), I turned to him for advice. He carefully explained the proper way to tie a bow tie, even diagramming it for me. It was like riding a bicycle. It took a long time to "get it," but once I did, I knew I'd never forget. I'll never forget John, either.

Elliot Tyson
Re-recording mixer
Warner Hollywood Studios

EAT YOUR SQUASH...LIVE

Regarding "Eat Your Squash" by Stephen St.Croix ("The Fast Lane," September '96 *Mix*), squash problems are not just limited to CDs, radio and computer games. They also exist in the realm of live sound. I think the real problems are more subtle, such as:

1) Individual musicians not having enough chops to get their sound together without having to resort to corrective electronics (like compression), or a musical education that should have taught them about what dynamics can do to help the expression of their music, adding feeling.

2) Groups of musicians who have not really thought about how to play together. I mean, they shouldn't need to compete with one another onstage or in the studio to be the loudest one (lots of musicians want to hear their instrument first). They ought to listen to one another.

3) Managers and bands who want their show to be the loudest (meaning "the best"). I have been at concerts where the manager has stood next to the capable FOH mixer and told him to raise the level until he could read 120 dB SPL on the analyzer in the mix position 25 meters from the stage. I must admit that the mix sounded good with my Westone 15dB hearing protectors, but I wonder how the public stands it (with their own ears compressing at those levels for the two-hour show; I guess beer and some other substances might help).

4) Engineers, live and studio, who know as much (or as little) as their clients.

The end result during a concert with these people (in any combination) is a wall of sound from start to finish. One song runs into the next, all seeming the same, giving the impression that the concert was a homogenous smear from beginning to end.

I have worked for years constantly looking for the best way to get clean, powerful sound to the public, only to have my efforts rewarded on most occasions by having crappy source material for my great-sounding systems. On those occasions where the musicianship has been spectacular, so has the sound system.

If the four groups above work together and use today's available technology in the studio and live, then it follows that the public would demand similar quality from the CDs, radio, TV, computer games and whatever else may be on the way.

James Woods
james.woods@mad.servicom.es

Send Feedback to Mix, *6400 Hollis St. #12, Emeryville, CA 94608; fax (510) 653-5142; or mixeditorial@cardinal.com*

REALITY FOR $1500* A PAIR. INTRODUCING THE HR824 ACTIVE MONITOR.

If you've been trusting the quality of your creative product to passive monitors costing $400-$600 a pair, there's an astonishing revelation waiting for you. In our opinion, the active, biamplified HR824 is the most accurate near-field monitor available — so accurate that it essentially has no "sound" of its own. Rather, Mackie Designs' High Resolution Series™ HR824 is the first small monitor with power response so flat that it can serve as a completely neutral conductor for whatever signal you send it.

Mackie acoustic engineer David Bie uses scanning laser vibrometry to map HR824 tweeter dome vibrations. Film at 11.

SCIENCE, NOT SNAKE OIL.

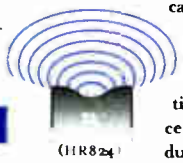
Internally-biamplified, servo-controlled speakers aren't a new concept. But to keep the cost of such monitors reasonable, it's taken advances in measurement instrumentation, transducers, and electronics technology. In developing the HR Series, Mackie Designs sought out the most talented acoustic engineers and then made an enormous commitment to exotic technology. The HR824 is the result of painstaking research and money-is-no-object components, not to mention thousands of hours of listening tests and *tens* of thousands of dollars in tooling.

FLAT RESPONSE... ON OR OFF-AXIS.

One of the first things you notice about the HR824 is the gigantic "sweet spot." The detailed sound field stays with you as you move back and forth across the console — and extends far enough behind you that musicians and producers can hear the same accurate playback.

The reason is our proprietary exponential high frequency wave guide. Without it, a monitor speaker tends to project critical high frequencies in a narrow beam (Fig. A) — while creating undesirable edge diffraction as sound waves interact with the edges of the speaker. Imaging and definition are compromised. The "sweet spot" gets very small.

Like biamped speakers, wave guides aren't a new concept. But it takes optimized internal electronics and a systems approach to make them work in near-field applications.



(HR824)

The HR824's wave guide (Fig. B) maximizes dispersion, time aligns the acoustic center of the HF transducer to the LF transducer's center, and avoids enclosure diffraction (notice that the monitor's face is perfectly smooth.) The exponential guide also increases low treble sensitivity, enabling the HF transducer to handle more power and produce flat response at high SPLs.

CLEAN, ARTICULATED BASS.

Seasoned recording engineers can't believe the HR824's controlled low bass extension. They hear low frequency accuracy that simply can't be achieved with passive speakers using external amplifiers. Why?

First, the HR824's FR Series 150-watt bass amplifier is directly coupled in a servo loop to the 8.75-inch mineral-filled polypropylene low frequency transducer.

It constantly monitors the LF unit's motional parameters and applies appropriate control and damping. An oversized magnet structure and extra-long voice coil lets the woofer achieve over 16 mm of cone excursion. Bass notes start and stop instantly, without "tubbiness."

Second, the HR824's low frequency driver is coupled to a pair of aluminum mass-loaded, acoustic-insulated 6.5-inch passive drivers. These ultra-rigid drivers eliminate problems like vent noise, power compression, and low frequency distortion — and couple much more effectively with the control room's air mass. They achieve the equivalent radiating area of a 12-inch woofer cone, allowing the HR824 to deliver FLAT response to 42Hz with a 38Hz, 3dB-down point.

Third, the woofer enclosure is air-displaced with high-density adiabatic foam. It damps internal midrange reflections so they can't bleed back through the LF transducer cone and reach your ears. The typical problem of small-monitor midrange "boxiness" is eliminated.

A TRUE PISTONIC HIGH-FREQUENCY RADIATOR.

We scoured the earth for the finest high frequency transducers and then subjected them to rigorous evaluation. One test, *scanning laser vibrometry*, gives a true picture of surface vibration patterns. Two test results are shown in the upper right hand corner of this ad. Figure C is a conventional fabric dome tweeter in motion. You needn't be an acoustic engineer to see that the dome is NOT behaving as a true piston.

The Mackie HR824 Active Monitor. ±1.5dB from 42 to 20kHz.

Figure D shows our High Resolution metal alloy dome at the same frequency. It acts as a rigid piston up to 22kHz, delivering pristine, uncolored treble output that reproduces *exactly* what you're recording.

INDIVIDUALLY OPTIMIZED.

We precisely match each transducer's actual output via electronic adjustments. During final assembly, each HR824 is carefully *hand-trimmed* to ±1.5dB, 42Hz-20kHz. As proof, each monitor comes certified with its own serialized, guaranteed frequency response printout.

Fig. C: Uneven fabric dome tweeter motion distorts high frequencies.

Fig. D: HR824 alloy dome's uniform, accurate pistonic motion.

The HR824's front board has "radiused" edges to further eliminate diffraction; an "H" brace bisects the enclosure for extra rigidity.

Mackie is one of the few active monitor manufacturers that also has experience building stand-alone professional power amps. Our HR824 employs two smaller versions of our FR Series M•1200 power amplifier — 100 watts (with 150W bursts) for high frequencies, and 150 watts (200W peak output) for low frequencies. Both amps make use of high-speed, latch-proof Fast Recovery design using extremely low negative feedback.

TAILOR THEM TO YOUR SPACE.

Because control rooms come in all shapes, sizes and cubic volumes, each HR824 has a three-position Low Frequency Acoustic Space control. It maintains flat bass response whether you place your monitors away from walls (*whole space*), against the wall (*half space*) or in corners (*quarter space*). A low frequency Roll-Off switch at 80Hz lets you emulate small home stereo speakers or popular small studio monitors.

CONFRONT REALITY AT YOUR MACKIE DESIGNS DEALER.

We've made some pretty audacious claims in this ad. But hearing is believing. So bring your favorite demo material and put our High Resolution Series monitors through their paces.

If you've never experienced active monitors before, you're going to love the unflinching accuracy of Mackie Designs' HR824s.

If you've priced other 2-way active monitors, you're going to love the HR824's $1498/pair price* AND its accuracy.

*$1498 suggested U.S. retail price per pair.

HR824 Active Monitors accept balanced or unbalanced ¼" and XLR inputs. Jacks & removable IEC power cord face downward so that the speaker can be placed close to rear wall surfaces.

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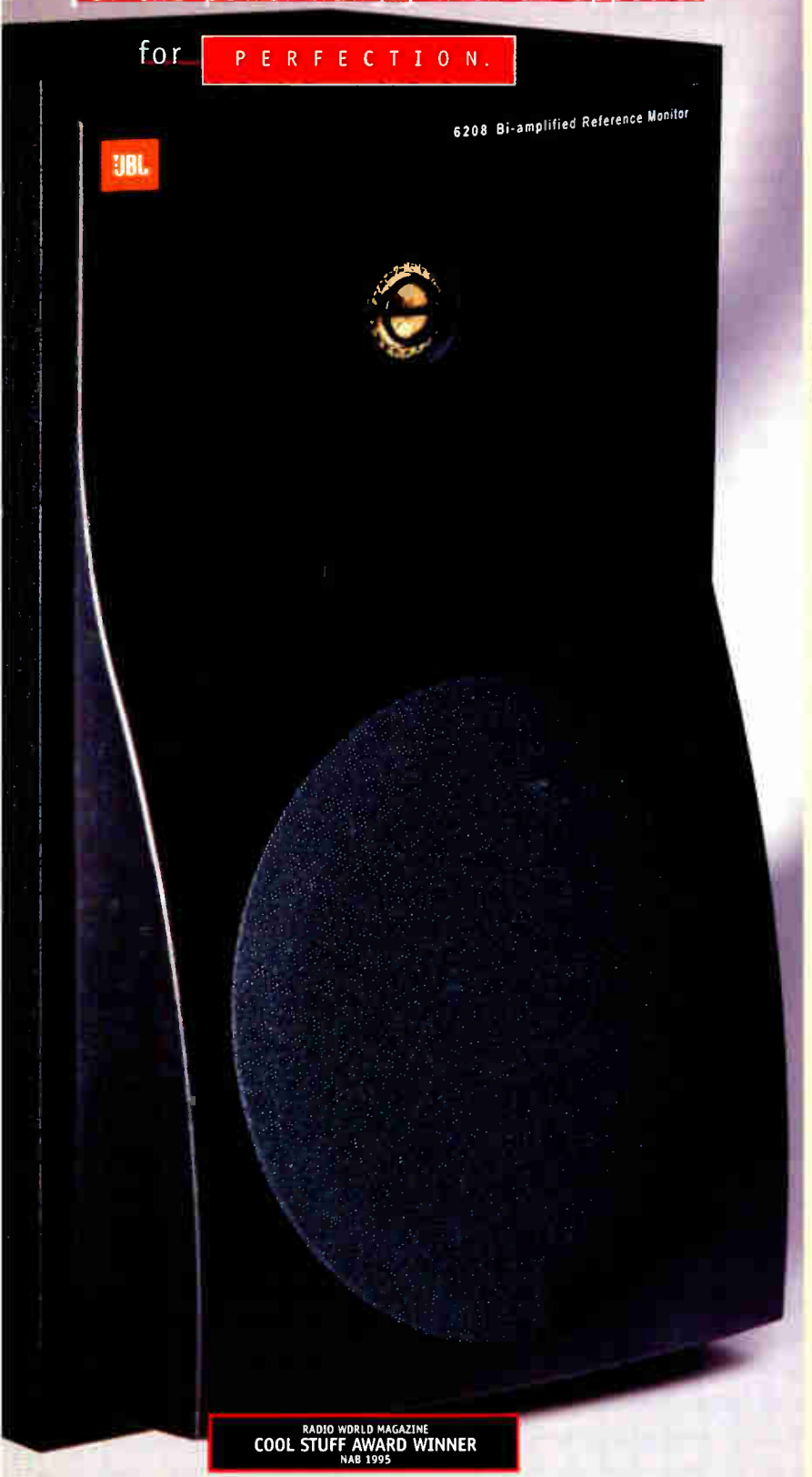
The JBL 6208 Bi-Amplified Reference Monitor

For the power hungry with an appetite for PERFECTION.



The Best System Starts with the Best Parts.

JBL has more experience in designing and building transducers for professional studio monitors than any other company in the industry. We not only use the latest engineering and design equipment, but also the most important test device of all, the human ear. We believe in physics, not fads, so while other companies pick parts off somebody else's shelf, we create our components from scratch. And by utilizing more than 50 years of experience in transducer design, we create the perfect transducer for each system.

Multi-Radial Design - An Ideal Solution to a Complex Problem.

Combining individual transducers into a system is a delicate balance of acoustics, electronics and architecture. Our exclusive Multi-Radial baffle is contoured to bring the drivers into perfect alignment, so the high and low frequencies reach your ears simultaneously. This reduces time smear for a smooth transition between the low and high frequency drivers. In addition, the gently rounded edges of the 6208 provide controlled dispersion and balanced power response. That means even off-axis, you will hear an accurate representation with wide stereo separation and an immense depth of field.

Gold/Titanium Hybrid Dome.

By mating the materials to a large magnetic structure, the 6208 can produce extremely flat frequency response and low distortion for hours of fatigue-free listening. JBL pioneered the use of the light but rigid gold/titanium hybrid construction to provide a transient response that is quick and precise for pinpoint accuracy.

Shielded Drivers for Flexible Placement.

JBL shields all of the drivers so you can place the 6208 right next to your audio workstations without interaction. Gone are the days of compromised monitor placement in your production environment.

Why Bi-Amplification?

It's a simple fact, a separate amp for each speaker produces the most accurate sound. Each of the 6208's two amplifiers is designed to reproduce the assigned frequencies. And by combining the amplifiers inside the cabinet, you improve the amplifier's ability to control the speaker it's driving for controlled low end punch.

> "We played just about every type of instrument through these speakers and they reproduced it with flying colors."
>
> - Bobby Owsinski
> EQ Magazine

Active Crossovers Provide Accurate Response Tailoring.

By carefully tailoring each amplifier's performance to the response characteristics of the drivers, you get the most faithful reproduction possible. By using active crossovers, power is not robbed by passive components like inductors and resistors. The result is clear, accurate sound at the highest levels.

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