AM INTERTEC PUBLICATION

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MIX®

PROFESSIONAL RECORDING · SOUND AND MUSIC PRODUCTION

Multichannel I/O Cards: Workstation Alternatives

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THE MIX INTERVIEW

BJÖRK

World Radio History

It's Not Science Fiction. It's Reality.

Every bit you add doubles the resolution of a digital recorder. Compared to 16-bit formats, ADAT Type II's non-compressed, linear 20-bit recording offers a wider dynamic range, less quantization distortion at low levels, more headroom and even lower noise. Result: detailed, full-spectrum audio fidelity that far exceeds the quality of any analog recorder.

Don't get fooled by the science fiction of some "24-bit" recording systems. Just read the fine print: the state-of-the-art ADAT Type II recorders offer audio specs that rival any 24-bit system, without resorting to tricks like data compression or track sharing.

While the rest of the world is trying to figure out the final frontier of recording formats, you need to make a decision. What's the best choice today that will keep you ahead of the game tomorrow?

The answer: **ADAT Type II**. It's the next generation of Alesis' award-winning digital audio technology that combines the proven power of ADAT with the astonishing fidelity of true 20-bit linear recording.

With the new **XT20**™, you get a serious improvement on the world standard for professional recording. The new **LX20**™ is the most affordable ADAT ever made. Both provide all the real-world qualities that made ADAT the most popular professional recording format: modular design, efficient tape-based media and complete compatibility with over 110,000 ADATs around the world. Plus, as the only modular digital multitracks that write 20 bits to each track of tape, the new ADAT Type II recorders offer audio quality that's miles ahead of any 16-bit system, period. And with the introduction of the **ADAT-PCR**™ interface card, you get the advantages of nonlinear editing on your Mac™ or Windows™ computer seamlessly integrated with ADAT format recording.

Most importantly, the intuitive ease-of-use, comprehensive features and incredible affordability of the ADAT Type II systems put no limits on your creativity. Because, after all, the final frontier is really your imagination.

There are over 110,000 ADATs in use today, and the new ADAT Type II recorders are compatible with all of them. The XT20 and LX20 will work with your 16-bit ADAT tapes, and you can combine the Type II recorders in a system with any model of older ADAT.

If you think tape isn't as advanced as other removable recording media, think again. You'd need more than 30 Zip™ disks to equal the 3.4 gigabyte storage capacity of just one inexpensive ADAT tape.

For more information on ADAT Type II, the XT20, the LX20 and the PCR, see your Authorized Alesis Dealer. Or call 800-5-ALESIS to order the ADAT Type II Systems video and brochure ($4.95 for shipping and handling).

Alesis Corporation

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PROFESSIONAL RECORDING · SOUND AND MUSIC PRODUCTION

AUDIO

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SOUND FOR PICTURE

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On the Cover: FM Studios, owned by producers Denzil Foster and Thomas McElroy and featuring a Euphonix CS2000 in a Chips Davis-designed space, opened to outside clients earlier this year in the San Francisco Bay Area. For more, see page 31. Photo: Tom Rider. Inset Photo: Steve Jennings.

World Radio History

Spirit 328 represents a **REVOLUTION IN LOW COST PROFESSIONAL AUDIO**, bringing all the functionality and sonic excellence of digital mixing to a brand new audience. With its unique **CONSOLE BASED INTERFACE**, 328 finally bridges the gap between analog and digital mixers, retaining the **SPONTANEITY AND EASE OF USE** of an analogue console yet providing all the advantages of digital, such as **INSTANT TOTAL RECALL, MOVING FADER AUTOMATION** and **ONBOARD LEXICON EFFECTS**.

Quite simply, Digital 328 is the most advanced analog 8 bus you'll ever drive combined with the easiest digital console you've ever used - check it out for yourself.

42 Input/8 Bus Configuration

For a mixer with such a small footprint, Digital 328 packs an extraordinary number of inputs. 16 full spec. analog mono mic/line channels – each with its own balanced XLR connector, dedicated insert point and access to phantom power – come as standard, along with 5 stereo inputs. With the addition of 16 digital tape returns on 328's TDIF* and ADAT* optical interfaces, a maximum of 42 inputs are possible. Every input is fully routable to any of the 8 groups and has access to the full complement of 328's parametric EQ, signal processing, onboard effects and auxiliaries.

As Easy to Use as your current analog console

Although other digital mixers offer an amazing array of functions, it can often be a nightmare to access them.

In contrast we've designed Spirit 328 to operate like your old analog 8-bus console and not like a computer with faders, so that you can take it out of its box and get started without even opening the manual. Unlike other digital mixers, there's instant access to any channel, group or master feature with one button press, and you can see that feature's status from the front panel without having to rely on an LCD display.

The key to it all is Spirit 328's unique "E-strip", the lighter-colored bank of encoders and switches that runs across the center of the console. Simply select a channel and the E-strip immediately becomes a "horizontal input channel" with instant access to all that channel's EQ, aux sends, channel pan and routing. Alternatively, press any button in the rotaries section above the E-strip and the encoders change to become a channel pan, auxiliary send, or Lexicon effects send for each channel.

Select a fader bank to display mic/line input faders, tape returns faders, or group and master faders and that's it; no delving through level after level of LCD menus to find the function you want, no delays in making alterations and no need to study complicated EQ curves. With 328, everything you need is immediately accessible from the front panel of the console - giving you the freedom to let your ears decide.

If you want the functionality of a digital console but the usability of your old analog 8 bus, then Spirit 328 is for you.

All the Digital I/Os you need as standard

Most digital mixers don't include digital multitrack I/Os, which means that to get digital recording and mixdown you have to buy extra, expensive I/O options. In contrast, Digital 328 includes two Tascam TDIF* and two ADAT* optical interfaces as standard, allowing you to record 16 tracks entirely in the digital domain, straight out of the box. As you would expect, we've also included a pair of AES/EBU and SP/DIF interfaces assignable to a wide range of inputs and outputs, including group and auxiliary outs, as well as for use as mix insert points with digital signal processors. In addition, a dedicated auxiliary optical output allows you to send a signal digitally to an effects unit.

2 Onboard Lexicon Effects Units

Only 328 can offer the world's premier name in studio effects on board - Lexicon. Two separate effects units are included, offering a full range of reverbs, choruses, delays, and flanges as well as dual effects such as chorus plus delay - all with fully editable program and parameter settings.

Onboard Dynamics

Digital 328 includes two mono or stereo signal processors which can be assigned to any input, output or groups of ins or outs. Each processor provides a choice of compression, limiting, gating or ducking.

Comprehensive EQ

All of 328's mic/line, tape return and stereo inputs have access to 3 bands of fully parametric EQ, designed by British EQ guru and co-founder of Soundcraft, Graham Blyth. A man with over 5 million channels of his EQ designs in the field, Graham has brought 25 years of Soundcraft analog EQ circuit experience to bear on Digital 328. If you want the warm, musical sound of real British analog EQ, look no further.

Unparalleled Sonic Spec

Rubbish in, Rubbish out! It doesn't matter whether the console is digital or analog – if you have poor mic preamps, your sound will be compromised. That's why 328 includes Spirit's acclaimed UltraMic+™ padless preamps, giving your input signals the cleanest, quietest start of any digital mixer on the market. With 66dB of gain range and a massive +28dBU of headroom, they offer an extremely low noise floor and are virtually transparent. Spirit 328 is 24-bit or better throughout; your signal hits the digital domain through state-of-the-art 24-bit ADCs with 128 times oversampling, guaranteeing that it maintains its clarity, while 24-bit DACs on all main outputs equal this sonic integrity should you wish to return your signal to the analog world.

Moving Fader Automation

All of Digital 328's 100mm faders (including the master) are motorized to allow current channel, tape return, group and aux master levels to be viewed at a glance.

DIGITAL 328

By pressing AUX1 in the rotaries section, the E-strip indicates Auxiliary Send 1 levels for each channel. The Fader Bank section indicates whether Mic/Line or Tape Return levels are being shown.

By pressing any select switch, the "E Strip" becomes a horizontal channel strip, indicating EQ, auxiliary, FX and Pan settings. Mono Mic/Line, Tape Returns & Stereo Inputs all have access to the same channel strip functions

FROM THE EDITOR

TRAVELIN' MAN

I just returned from Frankfurt Musikmesse, a convention that combines a bit of NAMM, AES, LDI and DJ Expo into one massive show with more than 100,000 attendees filling nine trade show halls. Aside from the 14-hour airline rides, the real thrill of overseas shows is seeing products before they debut in the States. The down side is that some of these will never arrive on U.S. shores. With that in mind, here are some gems that caught my eye.

Eko Guitars' (www.eko.it) pro sound division showed its NoteMix mixer, built into a laptop PC-sized chassis. Inside the hinged top is a 6-channel mixer surface, with digital FX and fader outs for in-ear monitors and LR mains. The bottom section houses a 200-watt/channel switching power amp. A brilliant concept for a presentation mixer. Sherman's Filterbank (www.xenoweb.com/xta.html) provides about as much fun as you can have in a studio without being arrested. Whether you're doing rap, rock, jazz or sound design, this analog-synth-in-a-box really delivers, with 23 pots controlling ADSR, dual VCFs, LFO for ring modulator effects, harmonics generation and more—from any audio line input. Friend-Chip's (e-mail: friend-chip-berlin@t-online.de) series of pocket-sized, low-cost digital converters include S/PDIF optical-to-RCA, AES-to-S/PDIF, SCMS removal, SRCs, word clock generators, super clock drivers and a 4x2 router. In the same booth was Rosendahl Studioteknik's line of mini timecode converter/generators (VITC/LTC-to-MTC+word, biphase-to-LTC/MTC, etc.). I could use a bunch of these! Klein + Hummel's (Ostfildern, Germany) O-198 is a compact, tri-amped near-field with a shaped front baffle designed to reduce console reflections. The sound? Marvelous. The price? $3,200/pair.

Despite walking past familiar products and logos, seeing a display of 3-inch CD-R blanks reminded me I wasn't in Kansas anymore. However, there were plenty of treasures that are coming here, such as Yamaha's 01V 24-channel digital mixer ($1,995), with moving faders and two effects processors. Better yet, link two for 48-channel/16-track work. Coming soon to a studio near you, Focusrite's new Platinum Series analog processers offer awesome performance at an unbelievable price. Successful in the live sound market, Audix takes on the recording world with its CX-101, a large-diaphragm studio condenser mic priced at $499. TC Electronic unveiled effects on plug-in cards for Yamaha's 02R and Mackie's D8B mixers. And destined to become a "must-have" accessory in any rack, SPL Electronics' Transient Designer does what no compressor has ever achieved, using an envelope follower technology to shorten or extend the sustain time of any input signal. This must be heard to be believed.

Of course, 24-bit was hot: Steinberg's Cubase VST/24 has 24-bit/96kHz resolution; Studer's V-Eight ADAT now ships with 24-bit ADCs and DACs; Mackie added 24-bit ADCs to its D8B mixer; and SEK'D broke the price barrier with its $995 half-rack 24-bit/96kHz ADC/DAC.

Musikmesse had plenty of great technology fishing. Speaking of shows, we stepped up our timetable to provide complete coverage of last month's NAB on page 42. Next, I'll tackle AES Amsterdam from May 16-19.

See you there!

George Pe

George Petersen

World Radio History

THE TAPE FORMERLY KNOWN AS AMPEX.

QUANTEGY
Professional Audio Media

FEEDBACK

GRADING OUR FIELD TEST

The "Field Test" on ASC's Attack Wall by Bob Hodas (Feb. '98 *Mix*) was a pretty good workout for our Studio Traps. However, contrary to the title of the review, Bob did not set up or evaluate our Attack Wall monitoring system. Instead, he reinvented, in nearly perfect detail, our "acoustic shadow" technique used for developing hi-fi room acoustics. We are pleased that his work demonstrates how creative and useful Studio Traps can be, even when used outside of the Attack Wall configuration.

The Attack Wall is a very different system. Studio Traps must be wrapped tightly to the monitors and the sides of the console. This creates an acoustic wall to load the near- or mid-field speakers. In the review, the Studio Traps were not closely coupled to the monitors. Bob could not hear, measure or comment on the effects of first loading the bass wave and then venting it, just before it hits the floor and ceiling. He did not have a chance to experience the decoupling of the monitor from the room.

The Monitor Stand is our only "wave guide" class of bass trap. It's made to do one thing and do it well. It kills the floor bounce and keeps it from phase add coupling to the ceiling bounce, back at the monitor location. It eliminates acoustic feedback conditions that are imposed on nearly every elevated monitor due to the simultaneous return of both floor and ceiling bounces. These bounces combine to produce the comb filter effect of a 65Hz cut, 130Hz boost, 195Hz cut and so on.

Bob correctly voiced the Traps behind him by facing the absorptive side inward. All imaging would have been lost by adding a group of very early reflections from behind his head. However, no one crosses the LEDE line, not even the crew at ASC. The Attack Wall and the setup Bob used (except for his image markers) both provide good protection from early reflections, except from ceiling and console bounce, while allowing for a flush, diffusive, time-delayed backfill. The Traps to his back were spaced apart, and the reflectors were set toward the back of the room. If he had walked around to the back of

the Traps, he would have noticed a very bright and diffusive hallway effect. Likewise for the side wall traps. This pocket of energy bleeds back through the openings between the Traps and over their tops to create the time-delayed backfill of diffusive ambience required in all studio designs. No mid/high-frequency impulse response curve was shown. It would be interesting to see those results.

Arthur Noxon, president
Acoustic Sciences Corp.
Eugene, Ore.

APPLE TALKBACK

I have just finished Philip De Lancie's article "Apple Talk: Desktop Vendors on the Future of the Mac" (March '98 *Mix*). I think this was a well-written article that supported the Apple perspective effectively. However, I believe it would have been infinitely more useful to have spoken with both developers who have a vested interest in the success of Apple as a company, as was done, and software companies who have no vested interest in Apple. The article clearly overlooks the fact that it is Apple who created the loss in the marketplace as a function of their own marketing shortfalls. Elitist marketing is, and has been, their problem. The entry of Mac product into the lower-priced markets was met all over the world with open arms. The stock went up, the market rushed to it and they started to gain in the market. Then they made the worst mistake a marketer could: They couldn't deliver product. Demand went down as a function of the buyers going elsewhere, and the downward spiral began.

I believe that the Power PC is, or was, the platform best suited to the future of computers for our market. It had so much potential that even arch rival IBM had signed on to support it. Motorola became part of the deal, and the future looked sunny. But Apple could not leave well enough alone and began playing games with its partners, the result of which was that this uneasy partnership dissolved.

I think it might be wise to support a more open discussion of where the market is going in the future. The PC occu-

pies 93% of the small-computer market, and it's foolish to treat it as if it doesn't exist in an article like this. Most software is written for this format, and music software is going that way quickly, as well. People should know about these things, and it is the job of your forum to tell them.

Kurt Bevers
Portland, Ore.

MORE TECHNOLOGY, LESS COMMON SENSE

The article written by David Carroll ("Wiring, Patching and Interconnecting: A Guide for the Project Studio," Feb. '98 *Mix*) was another common-sense piece written totally bass ackwards.

David Carroll writes that he assumes the reader already has a grasp of AC power, grounding, shielding and balanced vs. unbalanced. Any reader who has that background doesn't need lecturing in neatness, cable labeling and cable management. What the reader does need is information that no one ever writes about (except in your title), i.e., interconnecting.

The real, as opposed to ideal, project studio contains a mix of audio gear with a mix of standards. Some of it is balanced, low-impedance, operating at +4 dBm while the rest of the gear is semi-pro. The interconnection via patchbays can be a nightmare. This is what needs to be addressed. Does one use one kind of patchbay throughout with various kinds of terminating procedures or use a mix of patchbays? And that's before we get to the problem of some manufacturers saying Pin 2 is high and some not. You get my drift. Go to some real project studios and ask the owner-operators what their problems are and what they would like to read about. I am sure it is not whether they are neat enough.

Noel Masson
nmasson@pipeline.com

Send Feedback to Mix, 6400 Hollis St. #12, Emeryville, CA 94608; fax 510/653-5142; or mixeditorial @cardinal.com.

Capricorn.

"The most fun I've had with my clothes on!"

Roger Nichols, *producer/engineer*

"My first sessions on Capricorn at Chung King Studios, New York City, were the most fun I've had with my clothes on.

"Do you like the EQ before the dynamics, after the insert, before the fader, or EQ on the dynamics sidechain? No sweat.

"I could easily toggle between mixes to compare them. At one point I also kept everything from my current mix but recalled the drums from the final mix of another tune. The recalls were exact, sample by sample.

"The Capricorn mixes sounded so much better than what we'd mixed already, I wanted to remix the tracks done on other consoles."

- Full surround-sound
- format flexibility
- 24-bit audio

Digital First

AMS NEVE

CURRENT

Pictured (L to R) at the AES Golden Anniversary Celebration are founding member Les Paul, AES president Subir Pramanik, executive director/past president Donald Plunkett and founding member Norman Pickering.

AES 50TH ANNIVERSARY

On March 11, Bell Atlantic hosted the AES Goes Gold meeting commemorating the Society's first get-together, which was held 50 years earlier, to the day.

A video montage highlighting "The Early Years" of the audio industry preceded the showing of another tape entitled 50 Years of AES in Audio, which was first shown at the September 1997 AES conference. These pieces were played in the Bell Atlantic Corporate Auditorium to a house filled with AES members and members of the press. Master of ceremonies Michael Tapes introduced a number of key AES figures, including executive director Roger Furness, president Subir Pramanik, and Jerry Bruck, chairman of the AES New York section.

Honored guests from the first meeting included renowned guitarist and inventor of the multitrack, Les Paul. Norman C. Pickering, best known as the designer of the Pickering playback cartridges and arms, was also in attendance. Other original members on hand for the festivities were Emory Cook, Lewis S. Goodfriend, Jack Hartley, E.L. Grayson, Clair D. Krepps, Donald J. Plunkett, Jerry B. Minter and Gerald Shirley.

A number of AES past presidents also were there, including Leo Beranek, Marshall Buck, Elizabeth Cohen, Daniel Gravereaux, Albert B. Grundy, Daniel

von Recklinghausen and Guy Woodward.

MOOG LAWSUIT

Robert Moog filed a formal federal complaint against Moog Music Inc. and Don Martin. Moog's action is a claim of unfair competition, false advertising and violation of his right of publicity. The complaint, filed in U.S. District Court in northern Florida, demands a trial by jury.

Robert Moog was president of the original Moog Music Inc. until 1977; the company remained in operation until the mid-'80s. Don Martin later founded a new company called Moog Music. Moog's complaint is based on the fact that his name is closely associated with the Moog trademark and that his usage of the Moog name as a trademark predates Martin's. Moog also argues that Martin's company has made false or misleading statements regarding its connection with the original Moog Music.

Moog also filed a consolidated notice of opposition with the United States Patent and Trademark Office in which he formally opposes Martin's application for the Moog Music and MiniMoog trademarks and requests that the registration of the trademarks in the name of Don Martin and/or Moog Music Inc. be refused.

MIX L.A. OPEN IN FULL SWING

The Third Annual Mix L.A. Open is on its way to a third consecutive sell-out tournament. Slated for Monday, June 15, at the popular Brookside Golf Course in Pasadena, Calif., the event once again is being chaired by producer/engineer Ed Cherney. Proceeds from the tournament will be distributed to Hearing Is Priceless (HIP), founded by the House Ear Institute and co-sponsored by Mix magazine and other programs benefited by the Mix Foundation for Excellence in Audio.

Confirmed sponsors as of April 1 in-

clude Audio-Technica, Group One, TSI, Alesis Corporation, Fairlight, BASF, Record Plant, Keith Hatschek & Associates, Euphonix, Quantegy and Sony Pro Audio. A limited number of sponsorships and individual tickets are still available. For more information, call Terry Lowe, tournament director, at 310/207-8222.

TELEX-EVI RESTRUCTURE

Telex Communications Inc. announced its new corporate management structure following its recent merger with EVI Audio. The new structure was established with the goal of managing the more than 20 professional brand names under the Telex Communications umbrella.

The combined companies will have an extensive worldwide distribution network, multinational manufacturing and combined research and development resources.

Dan Dantzler, president of the pro audio group, and Paul McGuire, vice president of marketing and sales, will have worldwide brand management and product development responsibility for Electro-Voice, Altec Lansing and Telex professional sound products. Dantzler also will have responsibility for TRS and Vega products; McGuire will have U.S. responsibility for sales of Elec-

digital

World Radio History

Patented ADC technology | 24-bit digital I/O | 32-bit minimum internal precision | Vari-speed operation with no sample-rate conversion

closer to the sound than ever before. And it's only part of

Sony's complete 24-bit digital

Retain the Oxford's 24-bit resolution by mixing to the PCM-9000 digital master disc recorder

recording system that includes the new PCM-3348HR

The Oxford's unique assignable control surface puts unlimited creative possibilities within reach

DASH PLUS digital multitrack and PCM-9000 digital

master disc recorder. So let the sound

Sony's new PCM-3348HR digital multitrack records 48 tracks of 24-bit (DASH PLUS) or 16-bit (DASH) digital audio

move you to the Sony OXF-R3. For more information,

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website at www.sony.com/professional

SONY

NOW I KNOW MY LCDS

WELL, SORTA

THE HISTORY OF (NON-ASTRAL) PROJECTION

In the beginning there were video projectors—sorta. Little TVs with their brightness and contrast turned all the way up and a Fresnel lens stuck out in front on coat hangers. I never had one of these leading-edge systems, but I used to see them in the catalogs that would stick to my boots whenever I would try to get the Harley started in front of Frederick's of Hollywood. Not that I ever actually *went* to Freddie's—my brother used to live across the street.

Ah, the good old days. Back then I used to carry three guns (remember—my brother lived across the street from Frederick's). I'm pretty sure that this practice of re-lying on three guns was common enough to have inspired the next development in video projection—three gun projectors. Bikers *love* big TVs.

GUNS 'N HOSES

These three-gun phosphor systems have been around for quite some time now and, though they are very bright, they are soft, can't be zoomed, and are plagued with a plethora of uniformity and convergence problems. Not to mention that they need to be hooked up to your garden hose for cooling if you want the image to remain truly stable. And they burn and ghost.

BY STEPHEN ST.CROIX

They are big, heavy and hot. Oh yeah—and unstable and expensive. Every time you move them you have to spend the rest of the day setting them up. They generate magnetic fields that will make any studio host to a hum-fest, yet they cannot tolerate even the wimpiest magnetic field from your favorite speaker. I have never liked them.

They are dinosaurs, yet they still dominate. Why? Brute force. They can be bright enough to project images for an entire stadium audience.

THROUGH THE LOOKING GLASS

Many of us do enough film or TV

ILLUSTRATION: ANDREW SHACHAT

(I SING)

DO ONE THING.

DO IT BETTER.

Claire sings for one reason, to bare her soul. Electro-Voice has designed the N/D367 Female Vocal Mic to capture the emotion of the female voice. For a microphone that listens first, then speaks just the way you want to be heard, contact your nearest Electro-Voice dealer and check out our complete line of application specific, N/DYM® Series mics.

EV

BACK TO THE WEB

CAN WE TALK...AGAIN?

ILLUSTRATION ADAM MCCAULEY

Not too long ago I wrote in these pages about how I hated the World Wide Web, how it was all full of hucksterism and hype, scams and schemes, and what a shame it was that the Information Superhighway was being built more for the sake of the billboards than the travelers.

None of my feelings have changed, except that now I'm an active participant in all this, and you know something? It's fun. It's led to some very valuable connections and some insights about the nature of communications and community.

The column I wrote last year talked about how I was going to set up a non-commercial Web site for the pro audio industry, courtesy of the university where I teach,

called Signal2Noise. Well, I did that, and it has been a success on a lot of levels. Readership is steady, we get lots of contributions from all over the world (especially in the horror-story and joke departments), and we've been able to air some important issues that all of us in the audio industry have to deal with. Plus I've been able to link into CNN's video clip of Bill Gates getting a pie in the face, get two heavy-duty audio theorists arguing enthusiastically about the fine points of perception, and post an exhaustive first-hand account from inside the zoo that was CBS's coverage of the winter Olympics in Nagano, complete with menus of the American-style restaurants that

have popped up there and visits to the bathhouses. I did this with a modicum of help from fellow faculty and a couple of students, on a budget of exactly zero.

And I have learned that there are plenty of people out there craving good information, and entertainment, about what we do. There are people who have stories to tell, some of which will leave you rolling on the floor laughing (or ROFL as we say in Net-speak), while others will have you wincing in pained recognition. They will make you envious of their gigs, or grateful that you've got your own. If the folks who have responded to Signal2Noise are any representative sample, then the people in this industry (whether they're acolytes, hotshot remixers,

BY PAUL D. LEHRMAN

The power of an 02R digital mixer and 16-track hard disk recorder

Imagine having the processing power of the 02R

digital recording console on a computer card. When you install the card in your computer, you've got a **24-channel, 10-bus digital mixer** with all the mixing power of the acclaimed 02R. Pretty great. Imagine this card also gives you **16 tracks of tape-less recording with up to 32-bit resolution**. And works out-of-the-box with the industry's most popular PC and Mac recording software*. Imagine you can have all this for **under $1,000**. Yamaha proudly presents the DS2416 Digital Mixing Card. The star component in the **Yamaha** **DSP Factory**—a complete digital recording and mixing system inside your computer. For details, call 800-937-7171 ext 662.

24 channel, 10 bus digital mixer

16 track recorder with up to 32-bit capability

104 bands of parametric eq

26 dynamics processors

Two 32 bit effect processors

Comprehensive metering

Full mix automation via software

All features available simultaneously

DSP FACTORY
YAMAHA

*DSP Factory is supported by:

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(cleverly disguised as a $1,000 computer card).

ashtray-emptiers, repair-bench jockeys or grizzled, burned-out veterans) are *interesting*, and are worth listening to and talking to.

Somehow, while I was finding all this out, the folks at *Mix* were getting the same idea and began looking at

Not too long ago, I wrote about how the World Wide Web was all full of hucksterism and hype, scams and schemes. None of my feelings have changed.

ways to enhance their own Web presence to create a "virtual community" around it. Mix Online has been up for a while, but the communication it generates has been pretty much one-way: People log on when they want to read an article or review, and then they go somewhere else. But it doesn't have to be that way. *Mix*, with its loyal, active readership and enormous depth of information, could be the center of an interactive community of audio professionals, making its archives available to everyone, and drawing in new ideas and thoughts.

At a certain point, it became obvious that our goals were complementary. In order to make Signal2Noise more effective, I needed a broader base (in other words, more publicity—contrary to popular belief, on the Web you have to work to get people to know about things; word doesn't just "get around") and better economic support. *Mix* needed someone with the skills and desire that could make the same thing happen on their own turf. It was a logical decision for them to ask me to help them. So a couple of months ago I took over as editorial director of Mix Online. You can go there now to see what we've accomplished so far: the address is www.mixmag.com.

Although we've changed the look of the site completely (with the brilliant assistance of Richard Elen, whom I've worked with on a score of projects—

from ad campaigns to software development to record albums—over the past 20 years, and who has designed more Web sites for the pro audio industry than anyone else in the world), lots of what is on the new Mix Online will be familiar to visitors to the old site. We're posting selected articles from the print (we Netizens call it the "dead-tree") version, including Insider Audio, a few features, and most of the Field Test reviews. We're also making available the Studio News and Sessions columns. Because we're not dependent on a printer and the U.S. Postal Service to deliver our issues, however, we can update some sections, like Industry News, weekly, and when it comes to breaking stories (lawsuits, awards, companies changing hands, ongoing events like the Olympics, that sort of thing), we can publish them as fast as they can be written.

The articles we publish online can be enhanced by stuff that doesn't fit or is simply impossible to include in the print edition: the complete transcript of an interview, for example, or a large portfolio of pictures from a new facility, or downloadable or streaming audio files or QuickTime movies demonstrating a new technology or product.

We are also building a complete archive of *Mix* going back to when the magazine started being produced electronically, which is about 15 years ago. The archive will be organized chronologically, so it'll be easy to find an item if you know the issue date, but more importantly, there is a built-in search engine that will let you find any or all of the articles that deal with a particular topic or person instantaneously. The whole magazine goes into the archives: news items, session reports, new product announcements (whether or not the products actually ever shipped) and reviews. Constructing the archive, as you can imagine, is an enormous task, and it's not going to be done all at once. We'll be working backward, starting with the most recent years' issues.

Because we're not restricted the way a paper magazine is in terms of how much content we can print or deliver, we can do things on the Web site no dead-tree publication can do. Every month, there are more Letters to the Editor received at *Mix*'s offices than can possibly be published on paper. On Mix Online, we can publish all of them, and have room for the editors and authors to respond and engage in an extended dialog if that seems to be the thing to do. This is what's going on

The New PCM 81 Digital Effects Processor

"You'll run out
of ideas before you
run out of effects."

Scott Martin Gershin
Sound Designer

NEW FEATURES • Pitch Shift algorithms on-board • 20 seconds of stereo delay • AES Digital I/O

The new PCM 81 Digital Effects Processor has everything that made the PCM 80 the choice of professionals — and more. More effects, more algorithms, longer delay and full AES/EBU I/O. Each effect has an uncompromised stereo reverb with several voices of additional effects. A full complement of *Pitch Shifters* provides everything from pitch correction to unique special effects. 300 meticulously-crafted presets give you instant access to pitch, reverb, ambience, sophisticated modulators and dynamic spatialization effects for 2-channel or surround sound applications.

With its huge assortment of superb effects, the PCM 81 is the perfect tool for a sound designer like **Scott Martin Gershin** of *Soundelux Media Labs.* Scott, who used the PCM 81 to process his voice as the voice of *Flubber*, says, "*This is the best pitch shifter I've used. Our job is to create emotional illusions in audio and the PCM 81 is a powerful tool to get us there. I feel I have only scratched the surface of what can be created on the PCM 81 and encourage everyone to explore the depths of this processor.*"

Explore the depths with Scott's customized presets - **Send us proof of purchase and your PCM 81 serial number by July 30, 1998, and we'll send you the Scott Martin Gershin Preset Card — FREE.**

Heard In All The Right Places

lexicon

H A Harman International Company

Scott Martin Gershin's film credits include:
*JFK, True Lies, Braveheart, Flubber
and Mouse Hunt*

INSIDER AUDIO

in our Talkback section. We also have discussion groups that are not related to published articles, but just deal with subjects our readers want to talk about.

All of these discussions are moderated and contributed to by yours truly, both to keep them interesting, and so that participants don't have to worry about the things that make life unpleasant in many unmoderated Internet Usenet groups: the personal attacks, irrelevant asides, anonymous "hit-and-

If you have a favorite story about the worst gig you've ever done, we want to know about it.

run" postings, blatant sales pitches or e-mail address "harvesting" by spammers. None of that will occur here. And if you don't want other readers to know who you are, that's cool (but you do have to tell *us*...that's for your own protection as well as ours).

If a discussion leads off into a different direction, we simply start a new group, and anyone who wants to follow it, can. We are using some very hip discussion-management software, which makes it easy for people to follow what's being said by whom about what.

Another feature we're in the process of constructing is Ask the Experts. Here you can ask questions about particular products and get real answers from people who know (or at least should). We can get inside the companies who make those products (or repair them) and find exactly the right person to ask, then publish their response so that you and everyone else can benefit from that contact. This feature will be updated constantly, and the questions and answers will be archived just like everything else, so if five years from now you need to find out how to change the idler wheel on a long-discontinued tape transport, that information will be right here.

Two of the most popular features of the Signal2Noise site have been the

Meet the family.

The award winning professional technology that set the benchmark in studios around the world is now available at every price point, meeting every users needs. Each version offers Digital Audio and real-time DSP and the same professional character – not just another pretty face.

World Radio History

ON THE COVER

FM STUDIOS

Denzil Foster and Thomas McElroy didn't set out to be studio owners. They are primarily known as writers, musicians and the powerhouse producers behind such multi-Platinum acts as En Vogue, Tony, Toni, Toné and Club Nouveau. From the late '80s to early '90s, the pair found themselves constantly working days and nights for weeks on end in such San Francisco Bay Area studios as Infinity, Starlight and Fantasy. However, they eventually decided to create a recording environment better suited to their wide-ranging production styles, which typically depend on a distinctive rhythmic combination of sampled material and live instruments.

In 1993, Foster and McElroy located a warehouse space in Emeryville, Calif., just across the Bay Bridge from San Francisco, and gutted it. Chips Davis was brought in to design a versatile live space and a large control room that would be big enough to house racks of keyboards, guitarists going direct or even a vocalist set up in the control room for on-the-fly inspirations. The producers also set up a pre-production studio, with an Amek Einstein board, as a place to work while the 18-month build-out was going on. In June 1995, the main room opened for Foster&McElroy productions, with tracking handled by engineer Steve Counter and mixing by Ken Kessie. Last November, the pair opened the two-studio space for commercial booking.

"We wanted to keep the essence of the energy and the vibe that's here in the Bay Area," says McElroy. "This is where we're most comfortable working—we know how to get around, we know where to eat, all our families are here, friends and musicians. There's so much good music in the Bay Area to be recorded. We want to try to make this into an 'artist central' meeting point, where all types of artists can get together, record on each other's albums and network with each other.

"Part of that is trying to make the studio accessible to all different styles of recording and all styles of music. So we set up a recording environment that was very versatile and a control room that was large enough to record in."

The control room, centered around a Euphonix CS 2000M console (192 line inputs), 16-channel Pro Tools and JBL DMS1 monitoring (powered by Crown Macro Reference amps, with companion double-18 JBL sub), measures 30 feet deep, by 25 feet along the back wall, and 20 feet across the front. Keyboards move between the two studios; McElroy's current favorites include a Korg Trinity and a Roland JV2080 module with Orchestra and Vintage cards. The outboard selection is vast, though engineer Counter regularly uses the TubeTech mic pre on guitar/bass and the Night EQ2 for overall smoothing. Focusrite Red 2, GML EQs and mic pre's, API graphic EQs and countless effects units round out the package.

The studio space, which can hold up to about 20 pieces, is completely variable, with one wall containing RPG Trifusors ("great for piano and drums," Counter says) and roll-around baffles that can be used to create a roomwide diffuse sound. The room has been used for horns, strings and a lot of vocals, not to mention rock band productions. Counter is particularly impressed by the drum sound, which he tends to capture with Crown PZM ambient miking or Neumann U67s.

Perhaps the most unique part of the facility remains hidden in the rather wide space between studio and control room. Davis, known for the LEDE® concepts, designed a unique isolation structure to handle the low-frequency energy that pumps through the studio. "We came up with a way of constructing a steel cage so that it cantilevers out into the studio," Davis says. The structure that supports the control room front walls is built out of 4x4 tubular steel and is anchored into the ground, holding up the front wall of the control room and studio. The speakers slide into the soffits on spring-isolated rails. It completely isolates the speakers from the structure.

"It's all about controlling energy," Davis continues. "These guys push the low end and push the air on the bass drum. And there's no transmission between control room and studio."

Controlling energy would seem to be an apt description for Foster & McElroy, as well. After a brief production lull during the studio construction, they seem to be back in full swing. Artists on their new label (they are shopping for non-major distribution and have talked with DreamWorks) include R&B acts Premiere, Extreme and ID, and rock acts Big Lunch and Deep Julia. A 1996 Terry Ellis project brought ten strings into the main room.

"Right now, we're trying to re-establish our R&B roots and establish ourselves as studio owners," McElroy concludes. "We look forward to seeing what people can do with it. We know what we can do with it, but it's always great to see how different creative people can come up with things you'd never expect." ■

INTRODUCING CROSS PLATFORM, MULTI-FORMAT DIGITAL DUBBING FROM TASCAM

The TASCAM MMR-8 Digital Dubber Will Open Your Mind. Now, there's no reason to get locked into a closed, proprietary digital dubbing system. With TASCAM's Open Systems approach to post-production audio, you make the choice. That's because the TASCAM MMR-8 is the only tapeless digital multitrack recorder that directly mounts and reads nearly any audio file format — MAC or PC. This means Pro Tools 4.X session files, OMF (*Open Media Framework*),

Sound Designer II, WaveFrame and others coming soon.

No Matter Which DAW You Use, Incompatibility Won't Be Part of the Picture. With the MMR-8 digital dubber and the MMP-16 digital player you can chain up to six additional SCSI drives online. This means you can dramatically increase your accessible track pool. Perhaps more important is the MMR-8's rock-solid integrated synchronization

solution. It supports virtually every kind of sync including Biphase in and out, LTC, VITC, MMC, word clock and digital audio sync.

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accurate sync across all machines. As for sound quality, let's face it, even with the best 16-bit machines, as you open more tracks on the console you add more noise. The MMR-8 and MMP-16 give you true 24-bit resolution. This keeps the noise floor at an absolute minimum — no matter how many tracks you're running.

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Open Systems Mean Easy Integration. Installing TASCAM's digital dubbing system is literally a plug-and-play process. The MMR-8 and MMP-16 come with analog and AES/EBU Digital I/Os that use the same standard cables as your TASCAM DA-88s. So you see, there's no reason to be closed-minded. Visit the website at **www.tascam.com**. Or call TASCAM FaxBack at 800-827-2268 for document #5080. You'll get the story on how the MMR-8 Digital Dubber and MMP-16 Digital Player will keep your platform and format options open — wide open.

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CIRCLE #016 ON PRODUCT INFO CARD

Creative Chaos in the RADICAL Control Room RECORDING

In the studio, it can be so easy to get in a rut and end up falling back too often on gear or methods that you know will yield predictable results. Habits and too little time (compounded by the ease of all manner of samplers, MIDI devices, digital workstations and so on) can make it possible to work without ever really feeling the need to journey into the land of fearless, whacked-out experimentalism.

But where would we be without the creative recording leaps made by The Beatles, Beach Boys, Pink Floyd, U2, the Latin Playboys and many others who figured the music wasn't creatively "fixed" unless they took a chance breaking convention? To get a perspective on the possibilities, *Mix* spoke to some contemporary practitioners of control room iconoclasm. What you'll find here are not only some great ideas, but also some outrageous stories that will, we hope, inspire you never to forget what it's like to be truly playful while recording. After all, humor and playfulness are at the root of creative magic.

by Rick Clark

Illustration: David Miller

ROY THOMAS BAKER

Roy Thomas Baker is one of rock 'n' roll's most audacious producers. Since the '70s, Baker has worked on now-classic projects with artists such as Queen (including "Bohemian Rhapsody"), The Cars (their first four albums), Journey, Dusty Springfield, Nazareth, Foreigner, Alice Cooper, Reggie Knighton, Ian Hunter, Be Bop Deluxe, Ron Wood and, most recently, Other Star People, whom he is recording at his studio spread in Western Arizona.

"My experimental years begin with Queen. There is a song on *Sheer Heart Attack* called 'Now I'm Here.' We wanted a long delay, and an Echoplex wasn't long enough, and there weren't any digital delays in those days. So we got two Studer A80s, and we ran a tape loop to the second Studer 2-track machine, which was about ten feet away from the first Studer 2-track machine. The distance was just far enough away for the delay to be in time with the music. To watch the tape go from one machine across a light fixture and down to a chair and over a table and then to the other machine was really funny. Because the Studers had double guides, and they would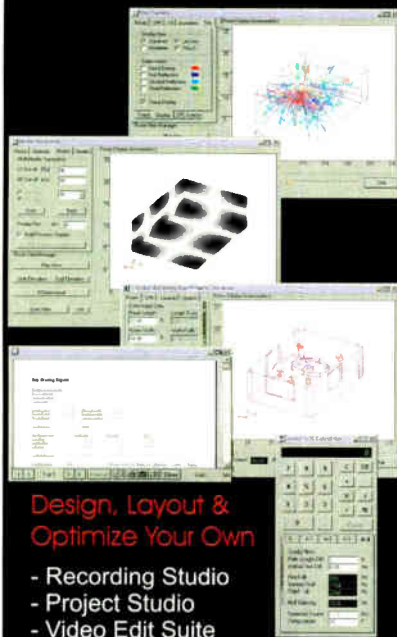n't work unless they were both physically in action (otherwise the machines would just stop), we had to gaffer-tape the rotary guides down.

"So we had Freddie's voice going into one of the tracks on the Studer multitrack and we went out of that into the left-hand channel of the first 2-track machine and playing back off the left-hand channel of the second 2-track, and that would go back to another channel of the multitrack as a delay. We would feed the left-hand output of the second machine into the right-hand input of the first one at the same time we were recording that on a separate track on the multitrack. Then we were playing back off the second Studer machine, on the right-hand side, and that would go into the third track on a multitrack.

"So whatever Freddie sang, there would be a delay coming from his vocal. He would sing something, like 'Now I'm there,' and then it would come out 'Now I'm there,' again, and it was all in time with the music. It was a really long delay, and Freddie was actually singing harmonies with himself.

When he heard the repeat coming out of his headphones, he automatically sang the third above, and when he heard the third above coming back, he was then singing the fifth above, so it was a three part harmony.

"I'm located on the Mohave Mountain Range, overlooking the Colorado River. Since we are on mountains that are half volcanic and half granite, there are loads and loads of volcanic rocks around. They're the rocks with the holes in them. We've got these solar tubes called Burke Tubes. I've got one that is like six feet long, and I stick it in front of the bass drum and seal the bass drum and the Burke Tube, which is the same width as the bass drum, and fill it with all of these volcanic rocks. Then we put a couple of Shure flat mics inside. I think they're called FM91s. That sounds really good. It livens up the sound, but deadens some frequencies more than others. We end up with this huge low-end thud that comes from the bass drum. It's such a big, big sound, yet it's relatively short, because the weight of the rocks alone causes a lot of dampening. The sound doesn't go long like a normal bass drum. It actually makes a high-impact dead sound, really loud.

"Years ago, I did an album with Chris DeBurgh over in Europe and he was always on tour and had his own fleet of airplanes. So while I was mixing in Metropolis Studio in London, we hooked up the stereo mix going from ground to airplane control via satellite, on two separate radios in his private airplane. What he did was he had one set of headphones on one radio and one set of headphones on the other radio, and he put one headphone from each set on each ear, so he could hear the mix in stereo, as we were doing it, while he was flying from Ireland to Germany!

"When The Cars first bought their studio in Boston and changed the name to Synchrosound, we were doing the mixes of their fourth record. We weren't sure if the mixes were going to sound good over the radio, so we set up a link to the main rock radio station and played the mix over the air at 2 o'clock in the morning, while we were still mixing. We had it on automation, so the faders were going up and down. The radio station was playing the mix live on the air, and we were driving around and waving at each other, listening to the mixes as they were going down on the radio. That way we could hear exactly what it would sound like as it came over the radio, through their compression and through all of their EQs and stuff."

EDDIE DELENA

Since 1979, Eddie Delena has earned a reputation as one of the industry's finest engineers. Delena (who works extensively out of legendary L.A. studio The Record Plant) has worked with many top artists, including Stevie Wonder, Tom Petty, John Cougar Mellencamp, Mick Jagger, Black Sabbath, Kiss and Devo. For his work with Michael Jackson, Delena and a couple of other engineers pushed the limits in the realm of radical mixing. He also discusses capturing Jackson's organic percussion methodology.

"We've made entire drum and percussion kits out of Michael sort of beat-boxing. He would sing on a wooden platform, because during his singing and sometimes without singing, he would stomp on the platform, which would basically be the kick drum, and he would do all of the percussion with his hands and mouth. He'd clap and finger-snap and slap his thighs and do all of this beat-boxing with his mouth. All of these sounds would be incorporated. At one point, we sampled every one of them and made a whole percussion kit out of that, and he even wrote songs with that as the foundation. One song was called 'Stranger In Moscow,'

The stuff I did with ZZ Top is the nuttiest, because they had money and time.
—Joe Hardy

which was on *HIStory*. He does that on a lot of his records anyway. Sometimes you're not sure if it was a percussion instrument or him. He's really tremendous to work with, and that is a lot of fun to do.

"During the mixing of Michael Jackson's record *HIStory*, we did something that was the height of overkill. I don't know if it's been done before, but for mixing the song 'History,' we hooked up two control rooms with four 3348 digital multitracks DASH-locked and both SSL computers running in sync from different rooms at Larrabee North Studios. That was 96 tracks in each room. This was for one song!

"Basically, in Room A we had an 80-channel SSL, so we were using both large and small faders. That essentially had the basic tracks, like all the music tracks and lead vocals, etc., and Room B had an orchestra spread out, a choir, background vocals, Boyz II Men and a bunch of other stuff.

"The tracks in the B Room, like the orchestra, were sent to the front bus, and the vocals, like the choir, were sent to the rear bus, which came up on four faders in the A Room. Then the entire stereo mix bus from A was sent to an external monitor in B, so you could actually adjust the levels in the B Room and listen to how everything sat in the entire mix. By changing which 3348 was master, you could run the mix in either room. Between Steve Hodge, myself and a guy named Andrew Scheps, who put it all together technically, we all worked on the ongoing song."

JOE HARDY

Joe Hardy is another producer/engineer renegade who relishes pushing the envelope whenever there's a chance. His credits include the Georgia Satellites, Steve Earle, Colin James, Jeff Healey, Carl Perkins, Tom Cochrane ("Life Is a Highway"), Jimmy Barnes, Merchants Of Venus, The Replace-ments, The Hooters and many others. Hardy is probably best known for his work with ZZ Top. His organic "Leslie" effect for acoustic guitar has inspired every person with whom he's shared this trick.

"I just produced this artist from Australia named Marie Wilson. For this one song, I wanted this acoustic guitar to sound sort of like a Leslie, but the problem is that when you run an acoustic guitar through a Leslie cabinet, it sort of destroys the acoustic-ness of it—once you amplify the guitar, then it's no longer an acoustic instrument. It may be a cool sound, but it's a different thing.

"So to get a Leslie effect, I miked the acoustic guitar by putting two wireless SM58 microphones on a ceiling fan. So instead of making the speakers spin, as in a Leslie, I was making the microphones spin. It really does the same thing, but this way it sounds like an acoustic guitar. There is a lot of Doppler and phase shifting going on, except it's all acoustic and not electronic.

"The stuff I did with ZZ Top is the nuttiest, on the verge of being almost unbelievable, because they had money and time and Billy Gibbons, who is just insane. For example, on the song 'Rough Boy,' Gibbons had five different guitars tuned to the chords of the song, and he played them with an airbrush, so there was no impact. On the song 'Sleeping Bag,' I bolted an EMT driver onto one of those gray metal utility shelves that you see in people's garages. We put that in the echo chamber at Ardent, and that's on every snare sound on that song.

"On the last ZZ Top record, which is the best album they've done in many years, there's a song called 'Loaded.' Billy wanted a guitar effect on the end that sounds like a shortwave radio. Since he was a kid, he would listen to these broadcasts from Mexico, and he has always loved the way shortwave radios sound. (Shortwave radios sound so oddball because part of the signal gets there direct, but part of it bounces off of the ionosphere, so it takes longer, because it has to go further. It phases with the original signal that was direct. Because the ionosphere changes so much, the frequency that it phases at changes really rapidly and in a weird, random fashion.)

"We made a cassette of only the guitar part, and sent it to a friend of Billy's in Mexico, who broadcast it over his shortwave radio to Houston. We recorded it off of Billy's radio in Houston, and then flew it back into the track. It is a nutty guitar sound. Instead of running it through a Harmonizer that happens to say 'Shortwave Radio Effect' or something, we just did the real thing. If you were across town and tried it, it wouldn't work. You need to be far away, because if you're close, there's not enough phasing. Plus, Billy insisted that it come from Mexico." ∎

Contributing editor Rick Clark is a producer, songwriter and writer based in Nashville. He thanks Greg Archilla, Brad Jones and Eli Shaw for their valuable input.

NAB98

CONNECTIVITY IN THE DIGITAL AGE

By George Petersen and Sarah Jones

I/O. Up to 128 snapshots (EQ/aux/pan/mute/effects) can be stored or recalled via MIDI. Deliveries begin this summer.

Larger consoles were well-represented, especially for on-air duties. **Wheatstone** (www.wheatstone.com) announced a digital radio production board, while **Calrec** (www.avb-forum.com) has added a fully digital model to its proven T Series of digitally controlled analog broadcast desks. The Digital T uses 24-bit ADCs and floating-point 40-bit processing for superb clarity, while its hot-pluggable DSP cards, 14-second boot-from-cold and redundant power supplies are ideal for critical applications.

Perhaps the biggest surprise came from **Graham-Patten** (www.gpsys.com), which is best known for its Emmy Award-winning D/ESAM line of edit suite mixers. The company unveiled a prototype of a large-scale (up to 512-channel) mixer designed for DTV and post applications and based around a scalable DSP engine with up to 144 SHARC processors. Shipments are slated to begin early 1999.

In the DAW realm, Sonic Solutions debuted its networking technology years ago, and now other manufacturers are getting on board. **AMS Neve** (www.ams-neve.com) unveiled StarNet, a high-speed fiber-optic network allowing multiple

ast month, more than 100,000 convention-goers descended on Las Vegas for NAB98, the 75th-anniversary exhibition and conference of the National Association of Broadcasters. The town's exponential growth (including expansion of both The Sands and the Las Vegas Convention Center) forced attendees through a network of detours. However, after making it through the maze, those who survived the shuttle buses, taxi lines and gastronomic delights of $3.99 casino buffets found a wealth of new technologies in the other "city that never sleeps."

"Convergence" was the theme of this year's NAB, yet the term "connectivity" seems more appropriate. With DTV and digital radio coming to U.S. broadcasters, many attendees were planning full-scale system upgrades, with integrated all-digital production, networking, servers, file format exchange and scalable open-architecture systems, as well as a budget line or two for rewiring entire facilities to handle the requirements of this "intratech." Expect a major broadcasting buying binge over the next five years: It's a sure bet—even by Vegas odds.

Lately, the buzz at every convention seems to be digital consoles. In terms of affordability, Tascam's (www.tascam.com) TM-D1000, introduced at NAB98, is a winning choice for the edit suite or project room. Retailing at a mere $1,199—and about the size of a Mackie 1604—the D1000 is an automated 16-channel/4-bus mixer with four XLR mic inputs, eight channels of TDIF I/O, two AES/EBU outs and two S/PDIF outputs. Two slots accept optional cards for DSP effects (four dynamics processors and a stereo reverb/chorus/delay, etc.) or eight more channels of TDIF

AudioFile (updated to Version 3.0, now dubbed AudioFile 98) units to access and share 24-bit files over multiple disk drives. Using an independent NT server, MediaLink is a real-time, multichannel network supporting multiple **Fairlight** (www.fairlightesp.com) MFX3plus DAWs and FAME systems via standard Ethernet cabling. Demonstrated with Media 100xs workstations, an impressive third-party solution was **Rorke Data's** (www.rorke.com) StudioNet-FC, an eight-seat Fibre Channel system including network and volume management software and expandable storage ranging from 16GB desktop arrays to 2-plus-terabyte towers. **Doremi Labs** (www.doremi-labs.com) showed the V1 Video Server, a slick and very affordable approach to accessing large libraries of audio and video for multiple users via SCSI-3 or Fast Ethernet. It features full 4:2:2 ITU601 picture resolution and variable 2:1 to 34:1 compression; systems are expandable and vary from simple setups to total redundancy.

There was plenty of talk at the show about Advanced Authoring Format (AAF), a cross-platform digital media interchange spec under development by a group of content providers including **Microsoft** (www.microsoft.com), **Digidesign** (www.digidesign.com) and Digi parent **Avid Technology** (www.avid.com). Avid has licensed selected portions of its Open Media Framework Interchange (OMFI) to the working group. Expect more on this over the coming months. In other Digidesign news, the company announced support for Avid's MediaShare F/C Fibre Channel workgroup storage solution, which allows shared real-time access of audio, video and

Augan OMX 24 MkII

THE MIRAGE

liance with developers providing HDSP high-density audio and surround sound technology plug-ins. Initial partners include George Massenburg Labs, Metric Halo, Pacific Microsonics, POW-r Consortium and Spatializer; more to come at AES Amsterdam.

Sonic Solutions was giving **Opcode**'s (www.opcode.com) Studio Vision Pro software free to people who knew what MIDI stood for—but never ran out of copies. (You shoulda been there!) So clearly, there's room for better audio awareness in many areas of the broadcast industry. Yet we're starting to see increased audio support from developers of video-oriented workstations: **Silicon Graphics** (www.sgi.com) says its Nuendo system is almost out of beta; and **Media 100**'s (www.media100.com) Version 4.5 for Mac now has real-time, 3-band EQ, multiple filters and updated audio metering.

Graham-Patten's big digital prototype

Popular with classical engineers, the OMX 24 MkII optical disk recorder from Holland's **Augan** (www.sascom.com) has been used in high-end applications in Europe since 1992, most notably at Deutsche Gramophon. This self-contained, stand-alone system offers 24 tracks of 24-bit recording/editing and is linkable (up to 24 systems controlled from the RC-48 remote) and networkable. Now, with Sascom's distribution, it's likely to gain popularity in the States. Hans Zimmer reportedly used a 24-track system to record a London orchestra direct for an upcoming DreamWorks project.

New at **WaveFrame** (www.waveframe.com) was the Version 6.2 upgrade for its 401, 408, DCS and the recently introduced 408 Plus systems. The new software features enhanced support for file exchange, plus faster waveform display, improved network support and support for multichannel digital I/O via AES/EBU pairs. WaveFrame also introduced the DIO-8 I/O board, which offers eight channels of I/O on AES/EBU; up to three boards can be accommodated in one system to provide up to 24 channels of I/O. Last but not least, the new R8-Plus board allows playback of eight channels over a SCSI bus and allows integration with a Tascam MMR-8 using a single cable.

Australian manufacturer **DSP** (Digital Studio Processing; www.dsppl.com.au), which had a low-key presence at last year's AES, offers the Postation P family of modular, upgradable media production workstations with up to 32 tracks of recording, nondestructive editing, 80-channel digital mixing and fully integrated nonlinear video with a unique, ergonomic control

session files over a multi-user network. And although testing focus will be on MediaShare F/C, Pro Tools is designed to integrate many storage subsystem platforms, and Digi is providing manufacturers with compatibility evaluation tools.

Sonic Solutions (www.sonicsolutions.com) introduced its HDSP Plug-In Processor, designed to deliver multichannel 24-bit, 88.2/96kHz and 192kHz high-density audio, plus a family of products supporting high-density technology. Debuts included a High Density Mastering Workstation with eight tracks of 96kHz/24-bit audio and NoNoise tools, a CD Mastering Workstation offering 16 24-bit/48kHz I/O channels (expandable to support high-density and surround sound audio) and a high-density multichannel I/O supporting resolutions up to 24 bit/192 kHz. Just announced, Sonic's HDSP Partners is an al-

Calrec Digital T Series

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Mix Online has launched a new format!
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major enhancements to the site, while maintaining our
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Going Wireless

What You Should Know Before Choosing a System
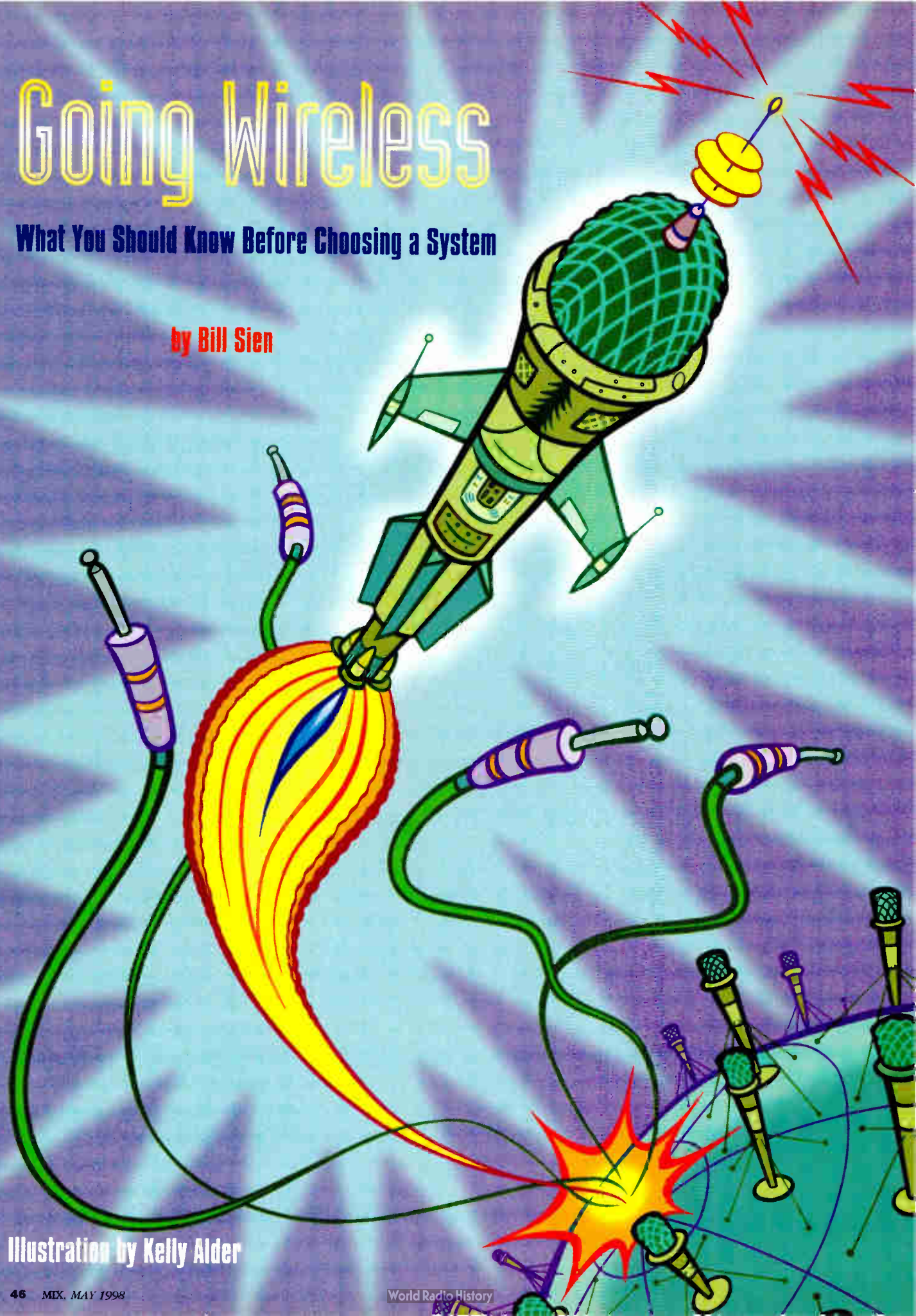
by Bill Sien

Illustration by Kelly Alder

There was a time when wireless microphones were luxury items reserved for the rich and famous, and even then they were only used as a last resort. In the beginning, cordless microphones had more snap, crackle and pop than breakfast cereal. They did, however, eliminate cumbersome cables, freeing performers to "do their thing" untethered. A generation later, RF technology has evolved and wireless microphones are now a serious option in pro sound applications; they are no longer difficult to use, unreliable or suffering from poor sound quality. Wireless mics are in daily use for television and motion pictures, onstage, in sports programming, concert sound and conference rooms, auditoriums and churches. And, yes, they are even becoming as common in the recording studio as they are on the nightly news. Wireless technology continues to expand beyond microphones and guitars to intercoms, MIDI systems and, more recently, in-ear monitors and even video. And you don't have to be rich or famous; there are now wireless systems in all price ranges.

IN THE BEGINNING

The road to successful wireless use has been bumpy. Early wireless microphones operated in the FM low band (26 to 50 MHz), and there were plenty of frequencies available at the time. At these lower frequencies, however, a quarter-wave antenna had to be quite large, because antenna length is inversely proportional to the frequency. Dropouts and fades occurred over several feet due to the long wavelength, and RF output power was limited to about .001 watts, resulting in minimal range.

Wireless microphones underwent a radical change by moving to the VHF high band (150 to 200MHz range). VHF allowed the quarter-wave antenna length to be reduced considerably.

DTV TABLE OF ALLOTMENTS FOR TEN MAJOR U.S. CITIES

CITY	NTSC	DTV	MHz	CITY	NTSC	DTV	MHz
Atlanta	2	39	620-626	Los Angeles	2	60	746-752
	5	27	548-554		4	36	602-608
	11	10	192-198		5	68	794-800
	17	20	506-512		7	8	180-186
	30	21	512-518		9	43	644-650
	36	25	536-542		11	65	776-782
	46	19	500-506		13	66	782-788
	57	38	614-620		22	42	638-644
	69	43	644-650		28	59	740-746
					34	35	596-602
Boston	2	19	500-506		58	41	632-638
	4	30	566-572				
	5	20	506-512	New York City	2	56	722-728
	7	42	638-644		4	28	554-560
	25	31	572-578		5	44	650-656
	38	39	620-626		7	45	656-662
	44	43	644-650		11	33	584-590
	68	32	578-584		25	24	530-536
					31	30	566-572
Chicago	2	3	60-66	Philadelphia	3	26	542-548
	5	29	560-566		6	64	770-776
	7	52	698-704		10	67	788-794
	9	19	500-506		17	54	710-716
	11	47	668-674		26	42	638-644
	20	21	512-518		35	34	590-596
	26	27	548-554		57	32	578-584
	32	31	572-578				
	38	43	644-650	San Francisco	4	57	728-734
	44	45	656-662		5	28	554-560
					7	24	530-536
Dallas	4	35	596-602		9	34	590-596
	8	9	186-192		14	29	560-566
	13	14	470-476		20	19	500-506
	27	36	602-608		26	27	548-554
	33	32	578-584		32	33	584-590
	39	40	626-632		38	39	620-626
	58	45	656-662		44	45	656-662
				Washington	4	48	674-682
Detroit	2	58	734-740		5	6	82-88
	4	45	656-662		7	39	620-626
	7	41	632-638		9	34	590-596
	20	21	512-518		20	35	596-602
	50	14	470-476		26	27	548-554
	56	43	644-650		32	33	584-590
	62	44	650-656		50	51	692-698

A complete listing of NTSC and DTV frequency allotments for every U.S. city may be found in the FCC document 6th Report and Order on MM Docket No. 87-268; FCC 97-115, which is downloadable from the FCC Web page at www.fcc.gov/dtv. Note: all information is subject to change.

WIRELESS ON TOUR
WHAT TO EXPECT IN THE NEXT FEW YEARS

BY MARK FRINK

Despite licensing and regulation, nobody actually owns the air. At the Super Bowl last January, everything was planned and working just fine for a week. Then, during the dress rehearsal, someone turned on a broad-band wireless video transmitter—illegal and not FCC-type accepted—and "stepped on" all the wireless in the stadium. Every handheld mic, RF intercom, in-ear monitor, NBC's communication and NFL Films' wireless mics became unusable.

Uncoordinated transmissions can affect an entire production. Quick action by the AudioTek (Burbank, Calif.) crew identified the source and cleared the air at San Diego's Qualcom Stadium, but not without a few harried moments. Preparation, it seems, paid off.

The RF engineer on AudioTek's 40-person audio crew was ex-Navy submariner James Stoffo, trained in a world where wireless is suspect and vulnerable. (Besides RF field services, Stoffo's company, Professional Wireless Systems of Orlando, does rentals, repairs and tech support, including frequency changes.) It seemed the perfect opportunity to interview a man whose daily chores revolve around getting wireless to work in the most trying circumstances. *Mix* asked Stoffo to look into his crystal ball and pull out a few pearls for the casual user of wireless audio. "We are going to see a difference in the way wireless systems are manufactured and sold over the next year or two," he predicts. "People who don't respond to the coming changes will have unusable wireless."

NEW UHF TRANSMISSIONS

"There are 1,600 TV stations scheduled to light off a parallel transmission of their programming in the new DTV format at a second, new frequency sometime before 2006, but primary markets are mandated to transmit by November of '98, or they may forfeit and another broadcaster pick it up," Stoffo points out. "New

RF engineer James Stoffo at the Superbowl

York, L.A., Chicago, Dallas, Atlanta—name all the big cities in America and there will be digital TV transmission on new frequencies before the end of the year."

These are stops on every major tour. Even if the shed you're playing is an hour from downtown, you'll still be out of action at these new frequencies. "A 50-milliwatt RF microphone can't compete with one 100-kilowatt television station," Stoffo warns. "Some people just can't believe that the FCC would let broadcasters come in and step on thousands of wireless mics. But you have to realize that wireless mics are secondary users of the airwaves and must steer around the broadcast of television and other licensed primary users."

The 470 to 512MHz band is up in the air and may be reallocated to high-power business-band carriers that are 25 to 100 watts—enough to flatten a wireless mic. Above 750 MHz, high-power repeaters for state and federal governments are scheduled. It's going to be important for touring applications to carry frequency-agile equipment of between 512 and 750 MHz, or at least make sure crystal-controlled, fixed-fre-

quency wireless is not operating in frequencies scheduled for local DTV transmissions or other new broadcast services.

These changes will hit touring wireless the hardest because the acts are in different cities every week. Many manufacturers make frequency-agile equipment that can operate on 16 or more frequencies within a band of up to 40 MHz. A television band is only 6 MHz wide, whether digital or analog, so if your window is 24 to 40 MHz wide, there's probably a clear spot. "TV stations are rarely going to stack next to each other on adjacent channels because of the guardband that must be maintained between each," Stoffo points out. "You'll still have to punch in an intermod study to determine interaction at that frequency of the various broadcasters in the area, but at least you have a place to go." If you have fixed-frequency units on tour, you'd better carry at least one spare for every system.

More UHF than VHF DTV stations will be "lighting off" in the next few years. "For a long time everyone was getting away from VHF and the buzzword was UHF," Stoffo comments. "I think you might see people wanting to hop back down to VHF in a few years because that's where clear channels are going to be." Most VHF equipment is lower-end, generally for churches or schools, and it's not likely to interfere with professional systems at any great distance.

DIRECTIONAL ANTENNA
The other side of the equation is focusing in on your RF action to get the right signals into your reciever. One tip is to employ directional antennae, which have 10 dB of forward gain and 30 dB of backward rejection, to focus reception on the stage area where the transmitters are operated. Like a shotgun microphone, even if you don't need the forward gain, the rejection properties can be used to avoid interference. Though no one makes them specifically for wireless mics, antennae from ham radio and television suppliers can be modified. A directional antenna looks like a smaller version of the old TV aerials you'd see on rooftops back before cable and dishes, with a main axis and graduated-length cross-members.

"I never use an omnidirectional antenna, except for scanning—I have

RF antennae at Superbowl

an inventory of gain-antennae that's tuned to cover every possible frequency," Stoffo says. "If you're touring, get directional antennae tuned to cover your frequencies. If you have 16 wireless mics in the same group, you might only need a pair to cover those frequencies. If you have a directional antenna and you aim it at the transmitter, you're going to have a better-sounding signal and less of a chance of drop-out or interference than if you had an omnidirectional antenna. For a few hundred bucks, your performance may increase 50 percent by changing the antenna and no other component."

OTHER WIRELESS ACCESSORIES
Active antenna splitters can also contribute to the noise floor. "Instead of putting an RF amplifier in my splitter, I use a directional antenna, which has passive gain, along with a passive splitter, so there's no increase in the noise floor," Stoffo explains. "This gives the best signal-to-noise." Just by going to a passive-gain antenna and no RF amplification on the same system, the performance is going to improve. "I have dozens of directional antennas but only a couple of omnis, which I only use with my handheld scanner to sweep a site and check for interference."

Touring personnel may want to carry a scanner. A scanner is the

user's window into the RF world. "You can see signal strength at each frequency," Stoffo comments. "A really killer handheld scanner that can see from 100 kHz to 1 gig might cost you $750." Scanners have FM demodulators, so you can listen to the offending signal. If you also carry a wide-band log-periodic directional antenna, you can then DF (direction-find) any problems. "When you know where interference is coming from, you can orient the directional antenna on your wireless so that its back, where its rejection is highest, is toward the interference," Stoffo explains. "Even with a crystal-controlled system, where you can't change frequencies, you can use a directional antenna to steer away from problems."

In addition, you'll want to carry low-loss cable for the antennae. "UHF is really lossy, so you have to have good cable, not RG-58," Stoffo says. He recommends RG-8 or RG-213—thick, low-loss poly-foam cable that is rated for 750 meg. "RG-58 loses about 14 dB per hundred feet, and some transmitters only put out 15 dB, so if you ran a hundred feet, there'd be nothing left." You can buy RG-8 from ham radio outlets. At Radio Shack, it comes with PL-259 connectors which are "lossy" at UHF, so you'll want to cut those off and crimp on BNCs.

Wireless operators will have higher RF hurdles in the future. With the advent of new UHF transmissions in the air, it's becoming a different world out there. Stoffo's company, Professional Wireless Systems of Orlando, publishes technical papers and puts on seminars, like the recent "Wireless applications and how DTV will affect wireless systems." Users with specific questions for Stoffo can get in touch with him at jsrfguy@aol.com.

"A lot of people in the audio industry don't know what's going on right now," Stoffo concludes. "If you own three wireless systems, chances are that one of them is going to stop working." You can make the equipment that you have work, but you need to do a little more planning. RF sweeps and frequency coordination will become more of a necessity because there will be more RF traffic. No longer can you simply put in fresh batteries and hope for the best. ∎

Legal frequencies within the VHF band were 150 to 160 MHz and were shared with higher-powered (1 to 30-watt) two-way radios. Maximum output was limited to .05 watts for wireless microphones, with the result that many systems were operated in unauthorized portions of the VHF high band. In the late '70s, the Federal Communications Commission allowed those engaged in the production of television or motion pictures to operate between 174 and 216 MHz (television channels 7 through 13) as secondary users, meaning they could not cause an interference for a primary user (broadcast station). In general, secondary users could operate on any unused TV channel since in a given city, no two adjacent channels are used for TV broadcasting. In addition, the location of any potentially interfering source (TV stations) was clearly defined.

Later, the FCC set aside eight frequencies between 169 and 172 MHz for wireless microphone use. However, potential users were "unprotected from interference from other licensed operations in the band," and the primary licensed users included many business and government operations with relatively high-power transmitters. Further, only two or three of these eight frequencies will work together in close proximity.

As airwaves became increasingly crowded, manufacturers began to design systems in the UHF band (450 to 900 MHz). On December 29, 1986, the FCC opened up more frequencies by authorizing wireless microphones to operate on VHF low-band TV channels 2 through 6 and UHF channels 14 through 69. The FCC also removed the previous limitations on the use of VHF frequencies. The output power of transmitters operating in the UHF band was increased to .25 watts, much higher than the power allowed in the VHF band.

MORE CHANGES IN THE LAW

Today, most professional systems operate in the UHF band. UHF offers much more available bandwidth, and the potential for RF interference is less. But change is again in the air. Congress is in the process of reclaiming portions of the UHF-TV spectrum in preparation for the introduction of digital television (DTV), and also as a method for balancing the Federal budget. The Balanced Budget Agreement of 1997, signed by President Clinton this past summer, calls for the reallocation of the spectrum currently occupied by UHF channels 60 to 69 (746 to 806 MHz).

The FCC's January 6, 1998, ruling (ET Docket No. 97-157) allocates frequencies 764 to 776 MHz and 794 to 806 MHz to the fixed and mobile services, and designates this spectrum for public safety use on a primary basis. The remaining frequencies, 746 to 764 MHz and 776 to 794 MHz are allocated to the fixed mobile and new broadcasting services for commercial use on a primary basis. The FCC also assures the continued protection of all of these frequencies (TV channels 60 through 69) on a secondary basis for low-power TV and translator stations through the year 2006, the end of the projected DTV transition period. The FCC has made these changes in order to alleviate what it sees as a critical shortage of public safety spectrum, to make new technologies and services available to the American public and to promote more efficient use of this spectrum.

The ruling will have a negative impact on wireless users in this band even though the FCC will continue to allow

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wireless microphone users to operate on these frequencies indefinitely. Until now, we knew the location of all the users of these frequencies, namely the TV stations. Under the new rules, there will be new additional users, many that will not be in fixed or well-defined locations. On the contrary, their location will be unknown until interference causes a problem. Furthermore, if past experience in the other bands is any indication, we can expect some users of two-way radios to operate without a license.

To further complicate the matter for wireless microphone users, each TV station will be given a second, new channel assignment during the DTV build-out phase for use along with the NTSC (analog) assignment. These frequencies are not well-known to most wireless users, so during the transition period, the potential for RF interference is quite high. The permanent Table of Allotments for digital television is still being worked on by the FCC's Office of Engineering & Technology and will in all likelihood be challenged, at least in part, by the Maximum Service Television group, which represents the network-owned and -operated stations, as well as affiliates.

One other recent development is a lesser-known change of the FCC rules that affects wireless microphone users in both VHF and UHF bands. On December 1, 1997, the FCC amended Part 15 of its rules to permit biomedical transmitters in health-care facilities to operate at increased power—and without a license—on the frequencies for DTV channels 7 through 13 (174 to 216 MHz) and 14 through 46 (470 to 668 MHz) on a secondary basis. For some time now, the FCC has permitted the operation of biomedical telemetry devices in the 174 to 216MHz band, 450 to 470MHz band and in the 512 to 566MHz band, though the FCC generally has not permitted unlicensed Part 15 devices within any television bands before. Biomedical telemetry devices permit patients to move around in health care facilities while their vital signs are monitored remotely.

FREQUENCY COORDINATION

So what's the solution for the wireless microphone user who needs multiple systems that only have an output power of .25 watts in the UHF band or .05 watts in the VHF band? First, it would be advisable to stay away from any of the frequencies within UHF-TV channels 60 through 69 (764 to 806 MHz). Second, if operating near a health-care facility, check which frequencies, if any, are being used. Finally, and most important, do a thorough frequency coordination to ensure successful operation without RF interference.

Frequency coordination is the most important consideration aside from selecting the best wireless for the application. Depending on the RF environment and the number of systems, frequency coordination can be very complex and involves considerably more than just avoiding putting two systems on the same frequency (known as a direct hit). This task becomes especially complex when traveling to multiple cities. If you are renting and touring from city to city, the rental house that supplies the wireless should do the frequency coordination for you. If you are purchasing systems, your provider should supply you with compatible systems that will not cause problems. This may seem obvious, but it's surprising how many rental houses and suppliers don't have a grasp of what's involved in frequency coordination of multiple systems.

WIRELESS IN TELEPRODUCTION
BY DAN DALEY

Producers may run the show, but the fundamental decision as to whether to go wireless or wired often rests with the talent and/or engineer. "You really want to ask the talent how comfortable they are with a wired or a wireless microphone," observes Todd Hemleb, owner of Pyramid Recording Studios and a 25-year veteran of live and studio A-V productions. "Even though most of them are used to wireless and prefer them, you'd be surprised how many still like to have cabled microphones in a fixed location, or at least a handheld wireless mic. For some people, a wired microphone provides a sense of security. I've noticed that doctors don't seem to mind the wire; on the other hand, business executives will almost always want a wireless. So the type of talent you're working with provides the first clue as to which type of system to go with."

The next issue to consider would have to be audio quality, though the differences in wireless vs. wired systems have become almost undetectable in recent years, for certain applications. Handheld wireless microphones can have as large a diaphragm as their wired counterparts, and while lavaliers are small and their frequency response on average is not quite comparable to a wired version, most provide more than sufficient frequency coverage for voice work.

Most wireless lavaliers are condenser-type microphones, highly sensitive to lower sound pressure levels but more vulnerable to pressure spikes. The sound pressure levels of lavalier-wearing talent can vary widely (a particularly enthusiastic show moderator, for instance, vs. a quiet, bookish author), so comp/limiters inserted at the mixer are advisable. On some larger-budget productions, the audio tech might want to use both lavaliers and an overhead wired boom microphone to increase both the reliability of the audio signal to tape and intelligibility of the voices. (Phase is a concern in this situation: The lavalier and booms should have at least a 90° angle between them.) But in regards to the fundamental arbiters of signal quality—frequency response and the ability to handle dynamic range—wireless microphones have come of age.

Because wireless systems are RF-dependent, their transmitters and receivers are vulnerable to the effects of other low-powered radio devices, metal—which can absorb or deflect radio waves—and moisture, which is often detectable by tell-tale crackling. Hemleb cautions that, when placing small wireless microphones, make sure there is no conductive material in contact with them. "I had a dancer/singer once who was wearing an angel costume," he recalls. "The signal was weak, and I couldn't figure out why until I realized that the transmitter was touching the metal brace that was holding up her halo, siphoning off signal strength." Other metallic items to watch out for, especially when placing transmitters into pockets, are heavy pens, cigarette cases and pocket change.

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Frequency coordination can be broken down into two parts. The first includes all the frequencies on which each of the systems will operate. The second is the local RF environment. This includes TV stations, two-way radios, personal communication devices and all radio frequencies operating in the area where the wireless will be used.

Looking at the operating frequencies, most people understand that a single system can operate without any trouble and that if a second system is introduced, it's important to put it on a different frequency. How far apart should the second frequency be from the first? It depends on the receivers. Better receivers have better selectivity. This means they can discern the frequency to which they are tuned better than lower-quality systems. The IF filtering is superior in better receivers because they use multiple filters and have a very high "Q," resulting in a narrow range of RF reception. Better receivers can operate as close as ½-MHz.

When a third system is introduced, a more complex interaction occurs. Called a third-order intermod, it's the result of the way RF transmissions interact. When systems operate in prox-

—CONTINUED ON PAGE 236

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—FROM PAGE 56, TELEPRODUCTION

The frequency-dependence of wireless microphones is their greatest vulnerability. In an increasingly wireless world, there are lots of other systems and devices operating in the ether. The frequencies of a transmitter/receiver set from the same wireless microphone manufacturer are matched, and multiple microphone systems require multiple frequencies. But what if those frequencies happen to be the same—or nearly the same—as those in use by any number of other nearby operations, ranging from hotel security to government operations? (Keep in mind that cell phones and some local television broadcasts operate in the UHF band, between 800 and 900 MHz; broadcast radio is in the VHF spectrum.) Many manufacturers, in response, provide frequency-selectable systems—up to 16 channels.

RF interference is characterized by symptoms like drop-outs, other transmissions picked up by the wireless receiver, thuds or thumps, and other sonic anomalies. There are also so-called dead spots in many venues, areas in which physical objects interfere with the transmitted signal. Sometimes low-hanging metal grids for lights or other objects can form a partial, unintentional version of a Faraday cage, which is a metal grid intended to keep RF out of an environment. Engineers suggest walking the areas to be shot with the microphone on, having a colleague monitor the receiver and checking for dead spots and for crossing frequencies from other systems.

Neighboring frequencies can be checked beforehand, in many instances using production guides published locally, an approach highly recommended by many engineers who have worked in the Washington, D.C., area, which they will tell you is an RF nightmare thanks to the plethora of unregistered frequencies in use by government security agencies. Another potential problem to watch for is another production using another room in the same venue, such as a hotel. Coordinating with colleagues is a lot easier than asking a CIA spook to switch channels. Mario

World Radio History

BJÖRK

STRINGS AND BEATS

The Icelandic singer/songwriter Björk can be quite enigmatic. Her lyrics combine the worldly maturity of an adult with the wide-eyed wonder and blunt honesty of a child. The *Trouser Press* guide to alternative music calls her "an elfin character whose range of pitch is only surpassed by her range of emotions: One moment she's a little girl soprano; the very next, she's growling like a crazed animal about to go for the kill." Her music reflects her sense of extremes, too. Her third and latest solo disc, *Homogenic* (Elektra), offers a sympathetic merging of strings and beats, a symbiotic blend of classical and electronica. Purists from those camps might not approve of such a union—despite the fact that Björk tries to maintain the purity of each of her sources—but since the late '80s, when she first gained popularity as frontperson for The Sugarcubes, her music has always been groundbreaking and somewhat controversial. She is that rare artist who has devised a musical language that is hers alone.

On *Homogenic*, Björk acted as co-producer with collaborator Mark Bell from LFO. Self-production is not new to Björk—she co-produced many of the songs on her *Post* album, as well as one tune on *Debut*. The benefit of her producing is that she is able to maintain her own vision with minimal interference. Interestingly enough, Björk has professed respect for artists who make music for a mass market; she feels that she's a bit selfish in wanting to make music mostly for herself. But it is her ability to communicate her thoughts and feelings that allows this sometimes eccentric artist to connect with so many listeners. She may or may not ever have a mass following of her own—stranger things have happened, to be sure—but hearing her musical evolution has so far been both fascinating and rewarding.

PHOTO: STEVE JENNINGS

How did you work with Mark Bell?

I did the first pieces as very scruffy versions—sort of demos with my equipment—and then he would come and make them flourish, make them a lot more detailed.

Did you have a lot planned beforehand, or did you experiment a lot in the studio together?

I had a skeleton of the album ready, but it was a very rough sketch—the songs, the beats. I had done string arrangements just on the computer. It was perhaps five or six songs. The original idea was to have the strings on the left and the beats on the right and the voice in the middle, like when they first invented stereo. So with just the balance button in their own house, people could decide if they wanted more of the strings or the beats or both. That was one of these things which was a good theory and probably a

BY BRYAN REESMAN

good way to get us going to the direction...It was like a good hint to where we were heading. We decided not to do that. Now it's very middle-based.

"The Hunter" has a very orchestrated feel, and I like the fact that you have these very frenetic snare drums dancing along with slower strings. It's organized but feels very chaotic at the same time. Many of the songs have such contrasts, particularly with many of the textures.

I knew beforehand what kind of beats were going to be the core of the album. They were going to be like explosions, like distorted explosions. I guess the song that shows it most is a song like "Joga." So what we did is we got really organized. I was touring then—this might have been early '96—and I would come back and we would create several more beats and go. And Markus [Dravs, programmer
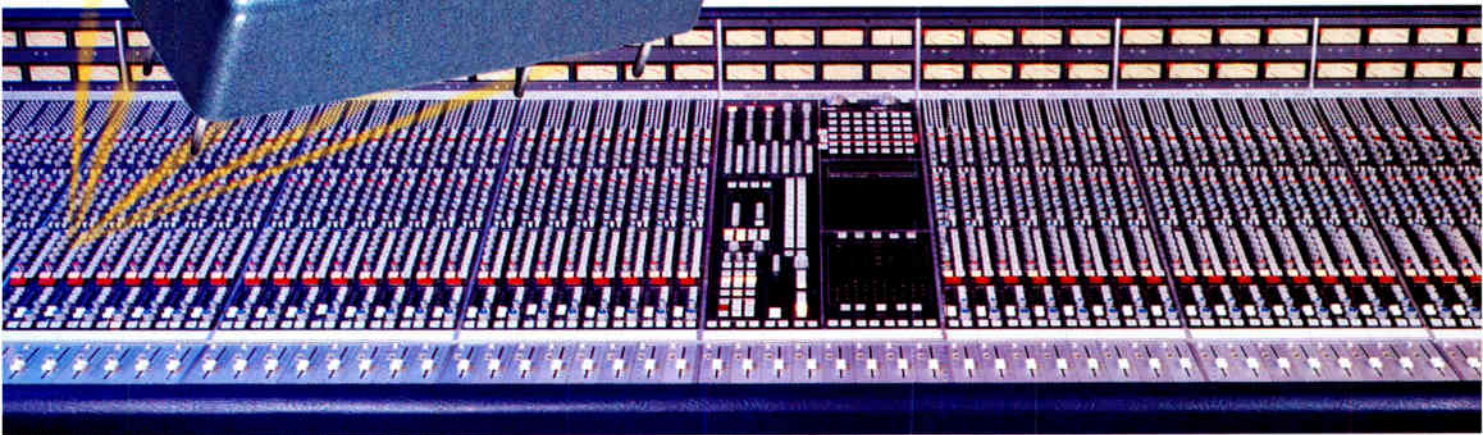
and engineerl would do research, and we slowly collected a library of a hundred beats that were like that. Then we would basically pick the ones we liked.

So you had a lot of different elements to work with.

It was like these flavors—strings, beats and voices. Each thing had to have so many colors. It was almost important to be organized and scientific about it.

I've noticed, too, that the sound design seems very simple, but there are a lot of interesting little things going on. The basic elements add up to a lot more.

I did want it to be very stark. The album is very confrontational emotionally. It's the same thing when a mother tells her kid off. It's done with love, but it's: "Listen, there's a line there and don't cross it." That's the tone of the whole album. The noises had to be not nice. They had to say "wake up!" It's a warning, so people have to listen. It's like when you've said something ten times and people don't listen, and you say it one more time and you raise your voice just a bit. That's the idea of the album.

It's definitely very dramatic. In this country, people write more standard

pop ballads, and you're taking that idea and making it very dramatic, especially with the strings.

You have become a very conservative country, and it's not too bad. Somebody has to be conservative.

Do you find that Europeans understand your music more?

The album is very confrontational emotionally. The noises had to be not nice. They had to say "wake up!" It's a warning, so people have to listen.

Yeah, definitely. But when I say that, I'm not saying I prefer Europeans; not at all. It's just two different points of view, and that's fair enough. There are a lot of things in America I don't understand, and that's probably why it excites

me. Like I go to New York, it's like the most alien place I've ever been. But I do love it; it turns me on so much. It pushes me to places I never...like I'm saying things and doing things and I don't even recognize myself. It's very exciting. I celebrate differences like this.

I've noticed that people here are more easily satisfied. If an artist here does something that's just a little bit different than what they normally do, people get very excited. Whereas what you're doing is radically different—you keep changing and redefining yourself on each record.

I think countries are like human beings. They get very brave, and they make big jumps. And they tear themselves from all their past references, and sometimes it hurts maybe a little, but it's good. And then they rest, and they cuddle, and they heal. I'm not going to pretend I know about the States, because I don't, and it would be very hypocritical of me to pretend I do know, but it seems like you guys took a lot of jumps in the '40s and '50s and '60s—you invented rock 'n' roll, you invented space shuttles. Basically NASA and Elvis, isn't it? But I think you climaxed in the '50s and have become very stationary now and very

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Why did you decide to use a string octet so much on this record? What appealed to you about that?

I think with everyone—it doesn't matter what they do—if they have a period when they learn, then they have a period where they say, "Okay, I've learned, now it's my turn to make a statement about who I am." And this album was a little bit like that for me. I started off lyrically, say, with The Sugarcubes, and then on *Debut* and *Post*, my first two albums, with arrangements a little bit, finding my own voice. Now this time around, it was my turn to go all the way, go to the whole structure, to the beats and everything. I think this is an attempt to find the core of me. I had to start from the beginning.

What I like most in music is beats, especially when they are done by the instruments that have got the most rhythm and most imagination—basically computers. And then I like strings. I've been trying to figure out why I like strings. They're cool. And with violins, I think our nerves move like the strings of a violin. That's my theory. And I think when scientists have invented a good enough camera to put inside us and to photograph when we feel, they will see our nerves shiver a little bit. And when we really explode with emotion or heartbreak or we love so much, we will really go like this [imitates wildly throbbing strings].

But the human voice is still my favorite instrument, because you can't lie with it. It's so honest. You hear immediately what character a person is, what age a person is, and so on. What they've experienced, what they're feeling. I think we're all experts in the human voice without knowing it.

How did the song "Joga" evolve?

Well, I wrote the song about my best friend. Everybody should have one of those friends who you can call 24 hours and be abstract and they get it. We are basically emotionally married. I was in the middle of Iceland on Christmas, because I had overdosed on people, and I just had to be on my own. I was on my own for about a week, and we only had two hours of daylight. So I was doing very long walks, maybe ten hours a day over there in the ice and the mountains in the dark. I had been away from Iceland [for a long time], and I was missing it very much. And the person who was keeping me going was my friend. So it's sort of a love song to my friend but also to Iceland. I had a very magical moment where I walked for a very long time, and I came on top of a mountain and looked over a quarter of the island from that point. It was very strange weather—the heat had just increased about ten degrees over very few hours from minus to plus Celsius, so all the ice over an incredibly big area was melting. It was crackling like popcorn but echoing, a very strange noise. The clouds were very, very thick and very moist, like a blanket, but very low. And the cities—all my favorite little towns that I had been to as a girl—were mirrored in the clouds because they were so full of water. And the light from the light posts in all the cities was orange. Then above the clouds were the Northern Lights. It was just a very magical moment, both visually and emotionally, because this was the quarter of the country I loved so much. And to hear this sort of popcorn sound echoing over all this—it was really gorgeous. The beat [in the song "Joga"] is trying to be that, while the strings represent emotion.

Do you like the remixes and reinterpretations of your work that have been done?

Most of them. I've been really lucky,

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Frequency Response (Master Output)	0 +1, –3 dB 20 Hz<20 kHz @+4 dB output into 600Ω
Hum & Noise (20 Hz–20 kHz) Rs=150Ω Input Gain= Max. Input Pad= OFF Input Sensitivity= –60 dB	–128 dB equivalent input noise. –99 dB residual output noise. –64 dB (68 dB S/N) MIX OUT, Master level control and one Ch fader at nominal level. –81 dB (85 dB S/N) STEREO OUT, Master fader at nominal level and all Ch assign SW's off and all MIX to ST SW's off. –77 dB (81 dB S/N) MIX OUT, Master level control at nominal level and all Ch assign SW's off. –83 dB (87 dB S/N) MIX 1–8 OUT (FIX), Master level control at nominal level and all Ch assign SW's off. –90 dB (94 dB S/N) MATRIX OUT, Master level control at nominal level and all Matrix Mix controls at minimum level.
Crosstalk	–80 dB @1 kHz adjacent inputs, –70 dB @1 kHz input to output (Ch Input), –50 dB @1 kHz input to output (ST Input)
Ch Input PAD SW	26 dB
Ch Input Gain Control	44 dB variable
ST Input Gain Control	40 dB variable (ST IN A), 30 dB variable (ST IN B)
Ch Input High Pass Filter	12 dB/octave, roll off bellow 20–400 Hz at –3 dB point.
Ch Input Equalization +15, –15 dB maximum	HIGH: 1k–20 kHz (peaking, Q= 0.5), HIGH-MID: 400–8 kHz (peaking, Q= 0.5/3) LOW-MID: 80–1.6 kHz (peaking, Q= 0.5/3), LOW: 30–600 Hz (peaking, Q= 0.5)
ST Input Equalization +15, –15 dB maximum	HIGH: 20 kHz (peaking, Q= 0.5), HIGH-MID: 3 kHz (peaking, Q= 0.5/3) LOW-MID: 800 Hz (peaking, Q= 0.5/3), LOW: 30 Hz (peaking, Q= 0.5)
Oscillator/Noise	Switchable sine wave @100 Hz, 1 kHz or 10 kHz (1% T.H.D. @+4 dB output), or pink noise.
Scene Memory	Direct Scene Memory recall switches (1–8), Switchable Scene Memory recall (1–128)
VU Meters	12 illuminated meters
Power Consumption	USA and Canada: 120 V AC 60 Hz, AT: 240 V AC 50 Hz, Other: 230 V AC 50 Hz
Dimensions (WxHxD)	2042×265×877 mm
Weight	115 kg

INPUT SPECIFICATIONS

Connection	PAD	Gain Trim	Actual Load Impedance	For Use With Nominal	Input Level			Connectors In Mixer
					Sensitivity	Nominal	Max. before Clip	
CH IN (1–40)	0	–60	3 KΩ	50–600Ω Mics & 600Ω Lines	–80 dB (0.078 mV)	–60 dB (0.775 mV)	–40 dB (0.775 mV)	XLR-3-31 type
	26				–54 dB (1.55 mV)	–34 dB (15.5 mV)	–14 dB (155 mV)	
	0	–16			–36 dB (12.3 mV)	–16 dB (123 mV)	+4 dB (1.23 V)	
	26				–10 dB (245 mV)	+10 dB (2.45 V)	+30 dB (24.5 V)	
ST IN (1–40) [L, R]	A	–30	5 KΩ	600Ω Lines	–50 dB (2.45 mV)	–30 dB (24.5 mV)	–10 dB (245 mV)	XLR-3-31 type
		+10			–10 dB (245 mV)	+10 dB (2.45 V)	+30 dB (24.5 V)	
	B	–20	10 KΩ	600Ω Lines	–40 dB (7.75 mV)	–20 dB (77.5 mV)	0 dB (0.775 V)	Phono Jack
		+10			–10 dB (245 mV)	+10 dB (2.45 V)	+30 dB (24.5 V)	
TALKBACK IN			10 KΩ	50–600Ω Mics	–66 dB (0.338 mV)	–50 dB (2.45 mV)	–20 dB (77.5 mV)	XLR-3-31 type
2TR IN 1 [L, R]			10 KΩ	600Ω Lines	–2 dB (0.616 V)	+4 dB (1.23 V)	+24 dB (12.3 V)	XLR-3-31 type
2TR IN 2 [L, R]			10 KΩ	600Ω Lines	–13.8 dB (158 mV)	–7.8 dB (316 mV)	+12.2 dB (3.15 V)	Phono Jack
CUE SUB IN [L, R] MATRIX SUB IN [L, R]			10 KΩ	600Ω Lines	–2 dB (0.616 V)	+4 dB (1.23 V)	+24 dB (12.3 V)	Phone Jack (TRS)
STEREO SUB IN [L, R] MIX (1–16) SUB IN					–6 dB (388 mV)			
CH IN (1–40) INSERT IN			10 KΩ	600Ω Lines	–20 dB (77.5 mV)	0 dB (0.775 V)	+20 dB (7.75 V)	Phone Jack (TRS)
STEREO INSERT IN [L, R] MIX (1–16) INSERT IN					–10 dB (245 mV)			

OUTPUT SPECIFICATIONS

Connection	Actual Source Impedance	For Use With Nominal	Output Level		Connectors In Mixer
			Nominal	Max. before Cliping	
STEREO A OUT [L, R]	150Ω	600Ω Lines	+4 dB (1.23 V)	+24 dB (12.3 V)	XLR-3-31 type
STEREO B OUT [L, R]					
MIX (1–16) OUT					
MONITOR OUT [L, R]					
MATRIX (1–8) OUT					
CH (1–40) DIRECT OUT	600Ω	10 KΩ Lines	0 dB (0.775 V)	+20 dB (7.75 V)	Phone Jack (TRS)
CH IN (1–40) INSERT OUT	600Ω	10 KΩ Lines	0 dB (0.775 V)	+20 dB (7.75 V)	Phone Jack (TRS)
STEREO INSERT OUT [L, R]					
MIX (1–16) INSERT OUT					
PHONES OUT [L, R]	100Ω	8Ω Phones	1 mW	20 mW	Stereo Phone Jacks
		40Ω Phones	3 mW	75 mW	

* 0 dB is referenced to 0.775 Vrms.
Specifications subject to change without notice.

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because I basically pick who does the remix, and usually it's people who I've listened to quite a lot and who I admire very much, and I may have gotten to know a little bit of their character. I know some personally, but not all of them. We will talk and together we will pick a song. A lot of the times, the people pick the song, what they find is the biggest turn-on. And if I pick the song, I will tell them why I thought of them. So it's done to experiment in areas of the song that I couldn't do myself because it's not me.

You have been remixed and covered by some intriguing artists. You have a metal band Carcass, you have Towa Tei, you have the Brodsky Quartet. They're very different, they're radical.
Yeah, I think on songs with a good structure the arrangements become invisible.

That means your material can translate to different formats. You also worked with Evelyn Glennie, and I'm curious about that. She's a classical percussionist, and she's deaf, isn't she? She does everything based on vibration.
She has about ten percent of her hearing. When I worked with her, I would stand close to her, and we would just completely improvise. Usually I don't like improvising because I was brought up by hippies, and I've had it with them going in circles for nine days and never getting anywhere and doing solos and that. But I think someone who's that disciplined, like Evelyn Glennie, can improvise. It has to be a very delicate mixture of discipline and freedom.

She was gorgeous. I went to visit her at a farm she has in England. She has a room full of instruments, many of which she made herself. In that song, there are parts she played on exhaust pipes that she found in the area. I just walked around the room and she let me pick the instruments I liked and then we just recorded. It was great.

I've heard you refer to what you do as a form of world music, in the sense that you recorded this in a Spanish studio, and you have an Icelandic string octet, a British producer, and a Brazilian string arranger. Do you feel you're making world music for the electronic community in a way?
I don't see myself anywhere, really. I find categories are just so hilarious. And for me to walk into one [record store] department that says classical music, basically German music for 300 years, I find that very funny. And then you go to another category, and there's Indian music that's been around for 2,000

years next to African music next to music from Hawaii, Japan, Lapland and Uruguay, and that's called world music, like some sort of second-class hippie stuff. And I just don't get it. I don't get as well the whole arrogance of...you get England and the States, and how many people is that? 300 million or something? And the rest of the world is like five-and-a-half billion? And that's world music? And you find categories like rock, and then another one called jazz and another one called blues.

The human voice is still my favorite instrument, because you can't lie with it.

I think people feel comfortable with categories. Then there are artists like you to come along to break those boundaries, to confuse them more, and hopefully to make them think.
We'll see. I just find it very funny. I think some journalist was trying to make me into a world music eskimo, and I was just flattered, and I just decided to become one then. I find that very exciting.

How do you plan to translate this material to the stage?
The string octet that plays on the album is touring with me. And Mark Bell as well. We've done quite a lot of concerts, and it's worked really well. We did Europe for three weeks, but I then got sick, so I couldn't play in America.

Another thing I noticed about Homogenic is that songs like "Unravel" and "Immature" are very ambient in feeling, although you have beats there

to ground the songs so they don't float away. You like having contrasts on your record.
A lot of people say that. I think I'm just like that kind of person—I really like extremes. I like things to be pure, and I don't like the in-betweens. I am terrified of mediocrity. And I will listen to very experimental, eccentric, electronic stuff, and then I'll listen to Michael Jackson. I like very pure pop—so emotional it's mushy. And then I like very scientific, experimental music.

Did you sample a lot of instruments on this album?
No, not really. I prefer to let synthesizers be synthesizers. There's one song where this guy plays glasses instead of violins. I wanted one song ["All Neon Like"] to be like strings but even more fragile.

You do have backwards accordion on "The Hunter." What was the inspiration for that?
This guy [Yasuhiro "Coba" Kobayashi] just came and played accordion on the song. We played quite a lot with effects, especially on the beats, but we wanted to try a little bit on the accordion as well. Coba's an incredible accordion player. He learned from Astor Piazzola. I think he was voted the world's best accordion player for two years or something. He plays Mozart. It's outrageous.

As far as your lyrics, you're very inspired by love and relationships.
I think I'm a bit narrow-minded, because I tend to look at everything through the eyes of love—if it's driving a car or eating a mushroom or walking down the street, loving a person, loving the weather, loving a city. And somehow all my songs in one way or another become love songs. ∎

Bryan Reesman is a freelance writer living in Boston.

PHOTO PHIL POYNTER

GINO VANNELLI

JUST CAN'T STOP

A few years back, Gino Vannelli—best known for the singles "I Just Wanna Stop" (1979) and "Living Inside Myself" (1981)—left Los Angeles for Portland, Ore., to be closer to his wife's family. He opened a project studio, Inka Productions, in downtown's Northwest section, and when *Mix* visited, he was finishing the final mix of his second release on Verve/PolyGram, tentatively titled *Slow Love* and due to be released next month.

were. Building a song like this is how a contractor plans a house—the tempos, rhythms and samples all needed to come from the blueprint, which is the chart itself. It's not just the walls and trim, it's the foundation and framing. The worst thing is programming and realizing that you don't have all the materials." (He recommends over-sampling so that you have a long enough menu to choose from.)

"I make most of my own samples, building a library and picking

Doug Durbrow (L) and Gino Vannelli

Although the studio is in a converted office space, attention to detail is obvious: A sub-floor was installed, wall and ceiling treatments abound, and ASC Tube Traps are carefully arranged. "It's an imperfect room, but when you know it, it fits comfortably, and that's the whole idea behind a project studio," Vannelli says.

After listening to a couple of mixes (engineered by Doug Durbrow, who did Vannelli's most recent album, *Yonder Tree*, as well), I was surprised to learn that bass, drums and percussion were all done on a computer. "We use an architectural process," says Vannelli. "Before we even came into the studio, we knew how long each song would be and what all the changes

the best of what's available," adds Vannelli, a drummer by trade. "I'll start by making a list of every possible drum and percussion sample I might use, so that when I finally start programming, everything is ready. We start with the grooves, building on a beat, writing each section and then adding fills and embellishments. It's difficult to be precisely human, but the ability to get a clarity, presence and perfection can make up for that." Graham Lear, who played drums on *Yonder Tree*, came in to help find the groove for one of the new cuts, "Cry Baby," picking a slow 12/8. From there, it was built on the computer.

Vannelli works with both Logic and Vision, but the house sequencer is Performer. All mixes are virtual, within Pro Tools, and monitored on a 36-channel Amek Angela. The stereo mix runs through an Apogee AD-1000, into a TC Electronic Finalizer then into the Rane Paqrat. "We're mixing down to the Paqrat for 24-bit digital recording onto ADAT, which keeps the music more true to what you're putting into it," Vannelli says. Hafler-powered KRK 7000 monitors are supplemented by a Tannoy subwoofer, and a pair of Tannoy System 12 monitors sit mutely behind them.

"My preferred preamps and equalizers for voice are Summit," he continues, "but I still like my old dbx 160 limiter because it has a time release that's good for my voice." He also uses an LA-22 on his vocal to compress certain frequencies. "On piano, we really enjoy our old Neve V72 preamps—they're clear, yet they're warm—and the ART MPA mic pre's are good for backing vocals." Effects are all Lexicon, with a PCM 80 and 90 plus a pair each of PCM 42 delays and LXP-15s.

Vannelli is divided on a favorite vocal mic. "On some songs I use the Manley Gold and on others the AKG C-12," he explains. "The Manley is more clinical—you almost have to watch how your lips smack—and it took me awhile to get used to it. The C-12 has a hump around 90 Hz, which is nice for my voice. The Manley is brighter and quieter, but the C-12 is warmer and friendlier.

"I like to take my time," Vannelli sums up. "This album is six months in the writing and a year recording. Instead of having a chart and running it in a few takes, you build the chart to put in the exact expression you originally envisioned. It's tedious building a song this way, but once you get it, it's right there." ∎

BY MARK FRINK

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"We want people to be in a dark room with big speakers so that if people come up and tap them on the shoulder, they've forgotten they're in the real world."

—Rand Miller

RIVEN

by Robert
Thomure

THEME FROM AN IMAGINARY LANDSCAPE

You are trapped on a series
of beautiful, volcanic is-
lands. You explore them with
an unhurried, serene curiosity,
despite the gnawing realiza-
tion that there are daunting
riddles and unseen dangers
beyond your mind's reach.
Fascinating flora and fauna
abound, temples are adorned
with glowing, incomprehen-
sible iconography, and be-
guiling scenes entice you to
investigate their secrets at
your leisure. Paradoxically,
you are a willing prisoner.

*Lead sound designer
on the project was
Broderbund 's
Tim Larkin.*

RIVEN
THE SEQUEL TO MYST

Machines with bloated metal hulls hiss and rumble, turning with whining servos and groaning levers. They are connected by a labyrinth of pipes in every direction—down fissures in the rock, through the dividing seas, and over strange, jagged landscapes. Valves direct the mysterious power of machines that take you from one place to another, both over and under water, like a Jules Verne fantasy. Your ears, sometimes disturbed by an almost subsonic rumble, are more often caressed by soft tufts of wind, the murmur of water, bird song, animal calls and the buzzing of beetle-wings and other insects.

You are sitting alone at your desk, playing Riven: The Sequel to Myst.

THE SCOPE OF A FEATURE FILM

Like its predecessor, Myst, Riven is the brainchild of Robyn and Rand Miller and Cyan Productions in Spokane, Wash. Distributed by Red Orb Entertainment, a division of Broderbund Software Inc., this game contains more than 4,000 still images, 45 minutes of music and three hours of animation. Riven took more than 3½ years to produce and was released on five CD-ROMs in October 1997. (A DVD version is slated for spring '98.)

Lead sound designer on the project was Broderbund's Tim Larkin; Brian Walker assisted with file management, and Greg Rahn provided additional sound design. Cyan co-founder Robyn Miller composed all the music (as he did with Myst), and additional sound design and music sampling engineering were performed by Chris Brandkamp of Cyan. O'Donnell/Salvatori Music in Chicago also provided sound design assets, as well as live-action Foley and mixes.

Particularly challenging for the multimedia sound designer was the fact that Riven rivals a full-length feature film in its scope. But ask Tim Larkin about the project and he speaks glow-

ingly (and with more than a hint of nostalgia) of 16-hour workdays, long weekends, and lying awake at night racking his brain, thinking of ways to create a sound effect never heard before. Larkin, whose credits include work with Ella Fitzgerald, James Brown, the San Francisco Symphony and PBS, somehow managed to do trumpet sessions for three National Geographic specials and a full-length feature film while working on Riven. And this is a man who drinks no coffee.

THE STRANGE AND THE FAMILIAR

As Larkin explains, one of the basic goals of Riven's sound design was to create a constant and totally immersing experience for the player, on the scale of a movie soundtrack. "Robyn Miller's passion is to create worlds," says Larkin. "So we got down to details of the last nut and bolt that was in a room, what are the walls like exactly, how big, what's outside, what's inside, getting down to minute details."

Richard Vander Wende, co-director of Riven, describes the philosophy behind the sound design: "One of the aspects about the sound that really excited us was that, beyond satisfying

the beginning. But when they saw that the relationship was working and they trusted my aesthetic judgment, they loosened the reins quite a bit."

PROCESS AND TOOLS

Three separate 16-bit, 22kHz stereo tracks were created for the final soundtrack and are combined in real time on the player's PC. The three stereo pairs

include music, foreground (sound effects and dialog synched to animations) and background ambience. The relative levels of these QuickTime audio tracks were programmed by Larkin in Apple's Hypercard, the chosen authoring environment for Riven. Separate mono mixes were also created for slower PCs, which would likely choke on three stereo audio sound files while

the obvious needs of the graphics. [sound design] allowed us to significantly broaden the world by defining all the things that you couldn't see. The other important goal for us with the sound effects was to achieve what we had tried to do with the graphics. Ideally, they needed to be a believable synthesis of the strange and the familiar. It's not an easy thing to accomplish, but when you get it right, it's great. The familiar makes it accessible, and the strange compels you to investigate."

"I was scared at first, to be honest, when I heard some of the descriptions of what they wanted," notes Larkin. "And having someone come in that they're not familiar with was tough in

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running all the graphics.

The team opted for IMA (Interactive Multimedia Association) compression, a cross-platform standard for 16-bit audio files that can reduce storage requirements by up to 75%. As Larkin notes, because IMA is a lossy compression scheme (4:1 ratio) there are a few compromises in the sound quality, mainly noticeable through headphones. However, the quality is excellent, near-CD even, through speakers. Minor artifacts are more than compensated for by the reduced sound file size, which in turn results in a smoother-running program.

For the sound effects, Larkin worked with compressed QuickTime movies as his visual reference, though some ambiences were created using only a simple screenshot in PICT format as a visual cue. Most of the work was done in Macromedia's Deck II on a PowerComputing 210 Macintosh clone, which could support QuickTime video and 24 audio track capabilities. Digidesign's Pro Tools 4.0 and Mark of the Unicorn's Digital Performer were also used on specific sounds. Work was divided between Broderbund and Larkin's home studio; in fact, many of the more interesting and original sound effects were created by mixing and processing recorded elements created with objects found in Larkin's home. Larkin also used a Kurzweil K2000 to create custom ambient sounds, and a variety of software (including Alchemy, Sound Designer II, Digital Performer and BIAS Peak) to process, pitch-shift, time-compress and otherwise morph, stretch and create new sounds out of individual sound file elements.

Larkin paid especial attention to ambient sounds and transitions. "You couldn't just create an ambience for one section and a totally different ambience for another," explains Larkin. "They had to link together." For that reason, two-second crossfades link the end of one ambient sound and the start of another as the player navigates through Riven's various environments.

SOUND EFFECTS AND AMBIENCES

Larkin focused on making the ambient sounds dynamic and believable, so that the player wouldn't notice loop points or repetition. "You never know how long a user would be in a given area," he explains. "So you've got to make these ambiences sound random, like you're in a real environment, not like you're hearing this loop of birds chirping. So I would load a lot of these samples into the K2000, whether an ambient pad or the sounds of birds, and just play them to set a tone or rhythm or a randomness."

Random sounds occur, even if the player doesn't "move" from a particular spot, though the basic background sound continues to loop. "For example, on Jungle Island there are about 20 animal sounds that come in and play at random," says Larkin. "I'd start with an ethereal pad, really subtle, and then started placing the birds, placing the crickets, so that when it comes around to the loop crossover points, after a minute or so you wouldn't know

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where it looped. It became more of a performance than merely piecing different ambiences together."

In addition to a sense of real-world randomness, Larkin also strove to achieve a certain depth in the sound-scapes he created. "You've got to make them feel that they've got stuff going on behind them, on the side, on top," he notes. To that end, he paid a lot of attention to panning and the dynamics of stereo image placement, even to the point of doing what he calls "unnatural pans," all in the interest of bringing the player more into the experience.

"It was really important to Robyn [Miller] that every place we created ambience for was 'warm'…a peaceful place, a place that you wanted to stay," Larkin recalls. Creating this "warm" feel-ing involved judicious use of wind sounds. "It was a real challenge to get these wind sounds to every once in a while come out of nowhere," says Larkin, who roamed the Internet in search of every conceivable wind source on CD libraries and then painstakingly created 30-second sound files from many wind fragments.

Mechanical sound effects also played an important role in Riven, particularly because of the abundance of machines that have no real-world counterparts. Even the simplest lever throw or button push was mixed in stereo, from at least four to as many as eight tracks. According to Larkin, the challenge for the sound effects creator was to come up with brand-new sounds for machines that don't exist in reality, yet sound believable and true to their intended structure and function.

"There are a lot of Victorianesque-type machines in Riven," Larkin notes. "I always think of *20,000 Leagues Under the Sea*. There's a lot of brass, a lot of metal, a lot of rusted metal. When you make a sound for it, you have to ask, 'How is this thing powered?' Since it's on a volcanic island, most of them are steam-powered."

How did Larkin deal with the fact that many of these made-up machines are somewhat incomprehensible or am-biguous in purpose to the player at first? "You can subliminally suggest sci-fi," he points out. "But you can't put it on the surface, because then it becomes unreal. And everything had to be believable."

As well as using Broderbund's sound facilities, Larkin created custom sound effects in his home studio. The search for just the right sound could take some surprising paths. "There are many things that turn in Riven, such as fire marble domes and jungle eyes," Larkin says. "To get the sound of something turning was really difficult. I ended up recording my son's Big Wheel. Between different pitch-shifting and time compression, I got the sounds for all these different spinning things."

Larkin's Neumann U87 came in handy for recording source material. One particularly challenging example was for the "map room," in which the player can press different buttons to cause large 3-D relief maps of the different islands to suddenly pop up; the maps are made up of a series of large metallic pins. "I'm lying awake at night trying to figure out how to make this sound," Larkin recalls. "At one o'clock in the morning, it hits me, so I come

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down to the garage, and I get nails. I got about 30 or 40 takes of me throwing these nails and catching them in my hand, and grasping them close together. So I took all these takes and formant-based pitch-shifted them, and got this deeper sound. And I probably had about 20 of these tracks mixed together of just these nails falling into my hand. And I ended up using that mixed in with the sound of roller coaster brakes."

Animal sound effects also play an important role in the sound design, and provide clues in the gameplay. Like the machines, they involved a lot more than simply grabbing tracks off CD libraries. In the case of the "sunners," amphibious beasts found on Temple Island, Larkin used the sounds of hippos, hyenas and walruses. "I would take the breath from a seal, and a certain grunt from a camel, and then pitch it or time compress it to make it work, while mixing it with other sounds. They're really complex sounds."

"The wahrks [underwater whale- or shark-like creatures on Garden Island] were taken from elk," Larkin continues. "Several different sounds were mixed and pitched way down, so that you got this kind of eerie, modulating sound." There was even a call for "the sound of a lobster bubbling." Larkin created that effect by mixing the sound of a bubbling desktop fountain—those little devices intended to relax business people—and the sound of a "stuffed up Gecko" (his term: a sort of a reptilian wheeze).

CONCLUSION

Because of the unpredictability of end-user playback system capabilities and the complex nature of the ambiences and sound effects, the final mixes were checked in a number of monitoring environments.

"It's like mixing for TV—you don't know what the end-user will have," Larkin notes. "So I did mixes where you would be able to hear all the elements on a Mac speaker, as well as if

you had a subwoofer system where you're going to get some low end. I had several sets of speakers and went through all them."

After months of looking at isolated animations and still shots, and laboring over each separate ambient and sound effect mix, Larkin finally knew success was at hand when he attended a screening at the Cyan headquarters. Also present in the Spokane conference room were Broderbund's Senior Production Manager Dennis Leahy and CEO Joe Durrett. As Rand Miller navigated the complexities of the game, Larkin was first able to experience Riven on a large screen with big speakers and hear all the elements of the soundtrack working as a whole. "Everything you had done came together," he recalls. "All of a sudden, you were in the jungle—everybody felt it. All eyes were glued to the screen. And you don't usually stare like that at a computer screen.

"On the plane back, [Broderbund CEO] Joe Durrett told me that had he been asked six months ago how important sound was in a computer game, he would have replied 'not much.' After hearing Riven, he said he was in total awe."

With all the pressures of production of a high-visibility product like Riven, *Mix* wondered if Larkin had fun doing the sound design. But as he reports, with its great development team, working on a product that pushes the multimedia envelope and breaks new ground was "a complete gas from start to finish!"

Mix asked Larkin one final question: "Are you a gamer?"

There was a pregnant pause. "I hate to say this," he confessed, "but I never got off the island in Myst. But I'm playing Riven and really enjoying it." ∎

Robert Thomure, recently downsized out of a cushy job with a major Bay Area software company, now struggles like the rest of us as a freelance sound designer, composer and writer.

ANDY WALLACE

with the ¼-inch 4-track TEAC. Previously I had actually rigged up my own 4-track using two 2-track machines—I swapped heads and put them beside each other. It was a homemade job, but it worked and I was my band's hero.

They could overdub, they were in heaven!

Yes. But in 1970 I got a proper 4-track and just started recording. I cut my teeth on that, as a songwriter, putting together demos and getting them to sound as good as possible. I got a record deal as a solo artist and went out to L.A. to do a record for Paramount. The record never really came together, but it got me to L.A. at a very fertile time musically. Rents at the time were dirt cheap, and I found a storefront, realizing I could set up my 4-track there and actually sell studio time. From then on I was in deep, engineering every day.

I learned to engineer by the seat of my pants—experimenting and using my head. That studio became Hit City West, which no longer exists. In late '79 I sold my interest in it—I decided to make a career shift, and I came to New York. I was doing a lot of independent production, and the studio was a great place and a wonderful experience, but I'd gotten so involved in owning the studio and dealing with all of that I felt it was keeping me from pursuing what I wanted. I still miss having a studio; I've always loved having one, but I don't miss the distraction of running it—it's a tough business.

Also, I was out of step musically for the time and place. In the '70s in Los Angeles I was doing more of what sounded like the club records in the '80s in New York. L.A. was very much Eagles and Linda Ronstadt, and it wasn't the right place for the kind of music I was working with.

You were doing dance music?

Kind of rock dance music, and there was really no market for it at the time out there. There were a number of reasons why I came East in 1980, but one of them was hearing the early club records, hip hop things, like Planet Rock. So I came East and got involved in the dance record thing. That's where I really first connected, working with people like Arthur Baker and Shep Pettibone—I did a lot of records with them. These guys were brilliant—great editors,

great ideas. I fit right into the pocket, because I was an engineer and also a competent player. [Ed. note: That's Wallace playing the piano solo on the "Into the Groove" remix from Madonna's *Immaculate Collection*.]

These days you don't do much recording unless you are also producing.

Although I'll often have another engineer accompany me for part of the process, I still do most of my own engineering. But I don't [just] engineer for anyone but myself.

On the booklet of the Ben Folds Five CD, they say you "often took the initiative and muted or 'ducked' missed notes and unsavory textures." Isn't it unusual for a band to be so accepting of having a mixer mute their parts?

It really does vary, but I think that a lot of the people that come to me are interested in my input on arrangements as well as sonics. So it's not that uncommon that I'll say 'Try this,' and if they're open-minded…well, I go for whatever will make the best record. Presumably they're not hiring me and going to the expense of doing this just to have me engineer. They also want my input, so it's not uncommon that people would be open to suggestions like "Let's try leaving this part out in this chorus."

Ben Folds Five is a trio with no electric guitars; you're known for your work with walls of rock guitars—why did they chose you to mix the record?

I don't really know, you'd have to ask Ben. I do know that Ben is very concerned with not being perceived as a typical piano trio—he wants a powerful rock thing going on sonically, and that may have been part of his interest. Prob-

ably also he'd spoken to people about me and hopefully heard good things—like me being a good guy to work with, getting the job done and basically going for the music. I'm not going to make my impression on something; I'm going to make as good a record as I can with whatever that takes musically.

Is there at least electric bass on the record?

Yes, electric bass, and the piano is almost invariably amped, through a Marshall, as well as miked—there are pickup mics on the soundboard. That's generally the sound he wants—that kind of thick, in-your-face, almost wall of sound, as opposed to very clearly well-defined.

Acoustic sound plus amp sound.

Yes, the bass as well. The bowed bass was often also run through an amp—sometimes with a great deal of distortion.

On "Brick," is Ben's voice really just completely dry?

I don't recall. I use a number of different space-sized reverbs, so there are apt to be very small amounts of something on a sound that might appear to be dry on initial listening. Then again, I've been know to mix some-

thing completely dry if it felt right.

What are some of those ambiences?

It varies. I'm not one to go in and spend three days fine-tuning parameters that I never knew existed before on a certain reverb. I generally try to find a setting in the ballpark of where I want to go, then adjust a few parameters—usually reverb and decay times. I'm partial to the Lexicon 480, and to Lexicon PCM 70s. I like some of the longer reverbs on the 480—church and hall setting—and I use the PCM 70 for smaller, shorter sounds.

The mix between bass drum, piano and bass on "Brick" seems like it would have been difficult to achieve—lots of low end flying around.

Yes, particularly with bowed bass, which is apt to expand and get louder and quieter, with certain frequencies that resonate more than others—it's a little more organic and alive. And sometimes when you're dealing with piano, the low ends will fight. That can happen with acoustic guitars also, especially closely miked acoustic guitar—you'll really have to fiddle with the bass on it to find not necessarily what sounds the best when the instrument is solo'd, but something that works with the other in-

struments. Like posing people for a picture: It's not quite the same as taking a solo portrait. You have to get a grouping that works, and decide what aspect of each individual subject works well in the composition.

What format do you mix to?

Half-inch 30 ips, Ampex 499 at plus 6, no noise reduction, and I go to DAT for a safety.

Listening to Rage Against the Machine I was sure you monitored on headphones while mixing.

No, I don't. But I do listen at a lot of different volume levels during the course of a mix. I also position myself in various places in the control room, and one of the things I'll often do is stick my face right up there between the speakers—not at a very loud level, but enough that I can zero in on things and hear in a dramatic way what's going on with the stereo field.

Stereo placement is very important to your mixes.

I'm a stereo freak. I spend a lot of time on it in the mixes, depending on what's appropriate, of course. Once I get the mix to where I feel it's really rocking

ANDY WALLACE SELECTED CREDITS

MIXING

Nirvana
Nevermind, From the Muddy Banks of the Wishkah

Rage Against the Machine
Rage Against the Machine, Evil Empire

Everclear
So Much For the Afterglow

Ben Folds Five
Whatever and Ever Amen

Rancid
And Out Come the Wolves

Sonic Youth
Dirty

Limpbizkit
Three Dollar Bill Y'all

Jane's Addiction
Kettle Whistle

Vast
forthcoming LP

PRODUCING/ MIXING

Jeff Buckley
Grace

White Zombie
La Sexorcisto

Bad Religion
Stranger Than Fiction

Sepultura
Chaos A.D.

Rollins Band
The End of Silence

Cola
What Knot

Blind Melon
Soup

and has all the right things happening in the right places balance-wise, I spend time doing little ear candy things. Sometimes they are very subtle. I try to provide things so that upon repeated listening there will be some new things to find that are cool—not necessarily a

trick or a gimmick, but something that will continue to augment whatever I'm trying to get out of that mix on further and further subterranean levels.

More depth.

I really try to put a lot of that into all the mixes. It's usually appropriate on some

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level, even in a really in-your-face, two guitars, bass and drums situation. There are still things you can do with a subtle reverb. I try to get that blend of things—rough, in-your-face, not slick—but at the same time there can be little things that provide extra aural interest that aren't so up front that they make the mix sound slick.

That concentration on the stereo image must help when you have to balance so many guitars.

It helps with everything. How wide apart I put toms or cymbals in the stereo drums—all of that is really critical, and I try to fine tune that stereo field and to use it as much as possible. Sometimes I'll put a little phase thing on an instrument to get it to sound even further off to the side—as long as it doesn't fall apart in mono. A partially out-of-phase signal may sound even wider.

Using a phase shifter?

Either a phase shifter, or I'll just flip the phase button on the console 180 degrees. Or I'll just delay something, like the difference between the bass amp and the direct signal, a few milliseconds.

So you might use stereo bass.

I'll put anything in stereo. Which is not to say that I'll put everything in stereo. Sometimes I'll get a record where everything is recorded in stereo, and I'll reduce those stereo recordings of individual instruments back to mono in

rage against the machine

order to get a more distinct instrumental stereo spread. All those things in stereo can be effective sometimes, but it gives you sort of an overall mono-ish sounding mix. Sometimes it's better to get more up front with something placed off to the side.

So what's the truth about how much replacing of sounds you do?

There seem to be rumors about that, and a number of artists have been surprised that I wasn't replacing their drums. I rarely, rarely replace drums. I will bend over backwards to use whatever performance is on tape, although I will move things around a bit if something's out of time. I try not to do that carelessly, but if something is bothering me and just doesn't sound right, I'll do what I can to make it right. I'm not inclined to replace drum sounds, but it's funny—the word on the street must have gotten out there that I do.

Was there any replacing of drums on Nirvana's Nevermind?

No, there was not.

Okay, if you don't use samples, how do you get such great bass drum sounds? A lot of rock records don't have that powerful bass drum bottom, but on records like Rage and Nirvana you find a way to make the bass drum large but still not turn muddy when everything is playing.

While I rarely replace sounds, I have no qualms about seriously working on them. I have no formulas; sometimes I'll use a gate fairly hard, or I might use it

softer like an expander, or sometimes I don't use it at all.

A lot has to do with EQ—I'm not shy in that department. I particularly like the SSL EQ on drums, especially the E Series EQ. When I'm setting up on a console that has both E and G, I'll generally have the drums on the E modules. There's no frequency I can say I always use—I'm as apt to take something out as to add it. And a lot of it has to do with how it sounds relative to other things that are in there. I'll start, perhaps, by soloing something and getting it in the direction that I want, based on what's on tape, but it's fine-tuned with other things in.

I am apt to notch things. For instance right now I'm mixing an album for an Irish artist named Sinead Lohan. A lot of her tracks were recorded live with acoustic guitar and vocals. The EQ I add to her acoustic guitar may boost a frequency in the vocal bleed that I may then cut back on the vocal track, even though I wouldn't have made that same decision listening to the lead vocal in solo. That same thing applies to the kick drum. If there's a frequency

getting in the way of certain things I'll trim it out of one area or another. I don't just boost; I'll always look for things I can cut out first.

Do you make major changes in sound for different parts of the song?

I ride things a lot—automation has been a blessing for me. Particularly on *Evil Empire* there was a lot of drum track riding.

So you are most likely to use console EQ and compression on drums?

Yes. I do use some outboard EQ; the ones that we have here that I draw upon are API 550As and the GML 8200 stereo equalizer, which is primarily a parametric program equalizer that I'm apt to use on individual instruments because it's really sweet-sounding. And old Neve equalizers are always lots of fun.

Any processors you like for guitars?

No, I don't use tons of processing other than EQ and compression. Occasionally I'll flange something. As far as EQ, sometimes I'll plug in an individual EQ, but more often than not I'll work with the SSL EQs.

A lot of rock records don't have much bass on them, but your basses are always very audible. How do you deal with the problem of all that low fre-

quency stuff knocking around? Trying to make the bass and bass drum groove in that seems like a real art.

Sometimes with bass, and also with guitars, fine tuning midrange has a lot to do with it. You can't be careless with it—you don't want to start pouring midrange on and having everything sound boxy—but choosing certain midrange frequencies can help give presence and apparent definition without necessarily having to bring something up louder in the mix, which could then cause the whole low end to run away.

Sorting out definitely seems to be one of your talents.

It's a big part of what I do. I can very quickly bang together a basic track mix of a band that rocks, and often that will become the core of a mix, and the final mix will have that basic vibe and sound. But the big time-consuming thing for me initially is learning the tracks. I spend a lot of time listening to all the tracks, because I want to hear if there's some funny little thing that happens in the hi-hat or some special little lick or subtle snare roll—I really try to pick those out. I try to learn the subtleties of what's on every single track

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and where all the little good bits are. The next thing that takes time is coming up with a plan—figuring out what to feature where.

What piece of gear can't you live (or mix) without?

[Laughs] My ears. But that's not the answer you're looking for, right?

I can tell you the things I rely on. Obviously, I mix on SSL; I have mixed on Neve—the whole White Zombie album was mixed on Neve—but SSL is my preference by far.

I like to use near-field monitors, but I also like to have big monitors. Even if they don't sound too good, I refer up on them occasionally just to understand how some of the very low stuff works when it's loud. For near-field I generally use NS-10s, and also lately I've been augmenting them with Genelec 1031As—I use them side by side about equally, although I organize my specific balances on the Yamahas.

For effects I like the 480, and I have to have PCM 42s or the Roland SDE 3000s if I can't get PCM 42s. I like them because, in addition to being high quality, they're straight ahead—I'm not a big user of multiprocessors. I like creating my own thing with my own collection of reverbs and delays rather than a pre-programmed thing.

For utility I like the [Eventide] H3500—if I need to sample something and move it around fast, it's a handy thing to have. I also like having Yamaha SPX 90s. They have an interesting sound—I won't call it trashy, but something about the reverb is kind of cool.

A rumor that a number of people have told me, which I find amusing, is that I'm the guy with mountains of outboard. In fact, I use very little—even the normal amount that's in the room here very often goes unused. You can be almost certain I'll have patched in four or more PCM 42s with maybe a Primetime 2 in there, and I'll usually keep the Eventide handy and an SPX 90 or two.

For the occasional outboard EQ or compressor—that's apt to be anything depending on what's around, although I am partial to some of the older things like the LA2s.

Are you a perfectionist with pitch changing on vocals?

I'm certainly aware of it and won't hesitate to do it if it bugs me, but I do try to let things be what they are. I'm not a fan of picking something apart and making it perfect. That's the big danger of a Pro Tools situation—it's hard to know when to stop. So I don't automatically pitch correct. As long as it doesn't bother me, I leave it.

A lot of what I do—initially in a mix, but also in production and especially in pre-production—is to remove the negative stuff. And then I spend a lot of time trying to make as good a picture as I can with exactly what the artist has given me, because I'm a big bug on maintaining the artist's vision.

I think that's obvious from your work—I don't think you can listen to a record and identify an Andy Wallace mix.

That's good. I don't want to go in there and do all the things that I'd do if I were the artist. My thing is to really try to understand their vision and view and then to make that as full-tilt as possible. After that, to whatever degree other people such as A&R or management want the vision to go in a certain direction—such as, "We want to make sure the song will really work on the radio"—then obviously that comes into play as well. But my first and foremost desire and drive is to capture and maintain the artist's picture of what they want. ∎

Maureen Droney is Mix*'s Los Angeles editor.*

GARTH RICHARDSON

MR. CRUNCH

PHOTO: DOUG OLSON

Garth Richardson began his career in the time-honored way—cleaning the toilets at a recording studio. By the time he was 16 years old, he had put in countless hours as a "gofer" and, appearances of nepotism notwithstanding, had earned his position as second engineer on a project being produced by his father, Jack Richardson, the Canadian producer responsible for dozens of albums by bands such as Poco, Alice Cooper, Badfinger, the Brecker Brothers and the Guess Who. Garth Richardson's first sessions became Bob Seger's *Night Moves*.

Today, Garth has built a solid reputation in his own right. Known as "Mr. Crunch," he has produced and engineered several of today's coolest musical acts, including Rage Against the Machine, Red Hot Chili Peppers and Catherine Wheel. He was recently given a Canadian Juno award for Producer of the Year for his work with The Melvins and Jesus Lizard.

One thing for sure that he picked up from his old man along the way is the "interpersonal" aspect of producing a band. Talking to both father and son reveals a common thread in their approaches. *Mix* caught up with Garth Richardson for lunch at Subeez, a

trendy café in Vancouver's Yaletown district.

What is your biggest strength as a producer?

A lot of producers that come in want to do their ideas, not the band's ideas. I always try to make sure that I'm helping them make their record and not my record. People tend to make the same-sounding record over and over, with different bands. Bands are smarter now than they were in the '60s, because they write the songs and they have a vision, so it's my job to help them get there.

How much did you hang out with your dad, and what did you learn from him?

I would go right from school downtown to the studio and clean toilets and wash floors and clean glasses and go and get the food from the age of about 12. I learned how to deal with the people. I learned to be very honest and caring and to work hard. The place was called Nimbus 9, and the studio was called Soundstage. Part of Pink Floyd's *The Wall* was done there, the first Peter Gabriel solo album was done there, Alice Cooper's *Welcome to My Nightmare* was

BY TIM MOSHANSKY

done there. I knew from the age of about ten that this was what I wanted to do.

Were there any specific things you learned from your dad about recording?

The one thing that he did teach me was that you had to have good songs, you had to have good sounds. If you had a shitty guitar player with a shitty sound, that sound came through the speakers. He taught me to look at songs in many different ways: whether it should be slowed down or sped up, or different key, strings, horns, that type of stuff. He taught me to be very patient and focused. Whatever you had to do to make it right you would do. Whether you had to sing the melody into the singer's ear because he just couldn't sing, or whether you had to teach the drummer to play drums.

You had to be in charge because you were basically the hub of the session. You determined if it went fast or slow, who was playing what when. He taught me just to care, I guess. People today care more about how many planes they have, how many cars they have, how many houses they have, and they totally lose sight of the fact that they're there to do a job. I know so many people that call in on the

phone to see how their band's doing.

Who else inspired you in your earlier years, besides your father?

Band-wise I would have to say that Gentle Giant had a huge influence on me. I loved Alan Parsons. I really loved Ted Templeman and all of those Doobie Brothers albums, and of course George Martin and The Beatles were a huge influence. I grew up with Hendrix and Zeppelin.

How is your family connected to (producer) Bob Ezrin?

Actually, my dad is Bob's mentor. He used to play piano and write charts for him. A funny story was Shep Gordon, who manages Alice Cooper, wanted my dad to produce him. Bob was working for my dad at the time, who sent him to New York to check it out. Bob told Shep and the band that they would do it, without telling my dad about it. So Bob came back and said, "I told them that we'd do it!" and my dad said, "You're fired." Then my dad said, "Okay, you said we'd do it, let's do it together." That was the first thing that Bob had really done, and he went on to do Kiss's *Destroyer* and Pink Floyd's *The Wall.*

When I first moved to L.A., I was 25 years old, and Bob was kind of like a father to me there. He was always there for me. Getting to work with Bob recently on the Catherine Wheel album was a real thrill for me.

What made you move to Vancouver?

I like the West Coast. There really isn't, in my mind, much of a music scene back east. I like to be close to L.A. It's a two hour flight, so I can fly home and see my family. Plus my lovely wife wanted to live here. In L.A. we lived through the fires, the riots, the earthquakes and the floods.

My two homes in L.A. are Sound City and A&M. They have old vintage Neves there. Sound City is where I did the first Rage Against the Machine record.

How long did it take you to record Rage Against the Machine's first record?

Thirty days. We cut it almost all live. Zack lost his voice on the first track, so when his voice came back, we set him up inside with me, close-miked, and I blasted the main monitors so it would feel like he was doing it live. No one wore cans, and we blasted it back through the Meyer P.A. system. The one song that was cut totally live on that record was "Settle for Nothing." After that, he lost his voice.

You're known for your heavy guitar sound and using more than one amp

JACK RICHARDSON
THE VOICE OF EXPERIENCE

Jack Richardson's diverse background includes playing and recording many styles of music, from symphony to country to jazz to polkas to rock 'n' roll. He also has a penchant for arranging and restructuring material.

Richardson was one of the first in Canada to record with multiple 24-track machines when Max Webster teamed up with Rush to record the Canadian rock opus "Battlescar." He says his people skills have enabled him to succeed with a variety of artists and talents over the years.

Richardson also observes that the industry is made up of very different players from when he started out. "I think in a lot of cases, the competency of the actual players involved is very questionable, and I think the record companies have lost all control of the cost thing," says Richardson. "I know I've talked to Garth, and he's talking of $300,000 budgets, and up. I could make about eight albums for that. It seems as if the image has taken over a much greater priority from the actual ability of the players to play. I'm not saying it's all like that, but it's just a general observation. I feel that with all of the new instruments and technology, there's more manufacturing than creative performance. In the past, musicians would spend a lifetime becoming capable and competent, and now someone just switches on a machine and makes flawless music with sequencing, sampling and editing."

As a producer, Richardson puts a lot of work into problem-solving, finding new ways to get sounds onto tape. "One of the things that had always bothered me when doing guitars [is that], in order to get that huge wall of sound-type of texture to it, you invariably had to bring the guitar player back in and do it two or three or four times. You always ran the risk there that you did with a lot of guitar players who couldn't re-create exactly what they had done on the last take. You never got a totally accurate depiction of the original track, in most cases."

Richardson knew there must be another way of doing it, and he eventually relayed his "problem" to a technician who worked at one of the studios he worked in. He developed a guitar splitter box that would take a guitar signal and split it, with no signal loss, to six different amplifiers, so that he could dial in specific textures from any of the amps in combination with each other, thereby avoiding the need to do multiple passes on a track. From there, he says, depending on what result you are trying to achieve, there are many options of recording those six separate signals. You can record each one onto a separate track, or combined onto one, or split into discrete stereo signals, or put onto one track if you wanted a really significant, huge guitar sound.

Today, Jack Richardson teaches at a recording college in Ontario, and he still likes to do one or two albums a year, just to stay close to the music. He admits it's hard for people starting out to all of a sudden become "producers" without a track record and a lucky break. "There are very few staff production positions," he observes. "If you're dealing with an artist that does have a fairly high profile, they're certainly going to be reluctant to go with someone fresh out of the box. To become a producer, you have to be self-made, you have to be self-starting from the standpoint of going out and finding a group that you have faith in and work with them until you can get them down on tape of some kind and hopefully make a deal. There are very few opportunities out there. You have to make your own." ∎

at once. How do you get such good guitar sounds?

I have a box that can split one guitar signal into six different cabinets and heads at the same time. Sometimes I use one cabinet and sometimes I use

six. It's actually so much easier to get a sound because you can have them on all the time or off all of the time. You can pick from several different amps and not always have to unplug, standby, plug in, etc.

About ten or 12 years ago, my dad wanted to use more than one amp for recording rather than overdubbing, so he got one of the techs from Phase One Studios in Toronto to build him this box. It's called the Guitarsplitter, from a company called Systematic Sound. Kirk Elliot, the guy that makes them, now lives in Vancouver. Bob Rock has them, Bruce Fairbairn has them. It really is a godsend.

How many mics do you normally use on each amp?

Usually there are about three to five mics used for each cabinet. I'll use 57s, 421s, 414s and some 452s, and then maybe back a few feet I'll have a couple of 87s, just to get that warmth. You have to put baffles in the room to separate the amps. Sometimes you're running six Marshalls at the same time, and it gets so loud. We did one record with a band named Kerbdog, and we started off with about 25 cabinets and amps. It took about two days just to go through 'em all, but we got the best sound that we have ever gotten. We used old Les Pauls, old Strats and Teles, different strings, different pickups.

What other miking techniques do you use?

So many bands are used to playing live, and they have a full-blown monitor system and a full P.A. system, so I try to make them feel like they're playing live.

Like I'll have the drummer play through a giant P.A. system so when he's playing the drum tracks, he can feel his kick, his tom toms and his snares. Every song may not be like that. Each song has to have its own sound. Some songs we won't use the P.A., we'll use all old tube mics, and some songs we'll use very standard, boring mics. Some songs we'll use 40 mics for a five-piece kit. The sound has to be right for the song.

What's the favorite record that you've worked on?

I have a bunch of favorites. I did three Melvins records, which were an absolute joy, the Rage record, the Jesus Lizard record. I just finished working on the Catherine Wheel album which really doesn't have any "crunch" on it, because I want people to understand that I don't just do "crunch" records. We had a lot of keyboards on the album. I had the pleasure of co-producing the record with Rob Dickenson from the band, Tim Friese-Greene and Bob Ezrin.

What was the reason behind doing a co-production, and how did that work out?

The whole thing went smoothly. The band's manager wanted to draw from each guy's positive strengths. We also had Randy Staub mixing for us. It was

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Gate controls thresh old, ratio, attack, hold, release

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18.

AC Gtr/Vocal
3Gat+G+Cmp+Lm
EQ+G+Cmp+DS

DDP
Digital Dynamics Processor

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Midi bypassable via midi program changes

Gate

18.

Threshold-50
Ratio 38:1

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

Compressor

18.

Threshold-25
Ratio 5.0:1
Gain 8.8

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

Limiter

18.

Threshold-1
Attack 0.1
Release 50

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

De-esser

18.

Common
Frame
Maximum

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

and More

18.

AC Gtr/Vocal
3Gat+Cmp+Lm

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

IT FORGIVES

• New dbx technology, the TYPE IV™ Conversion System with TSE (tm) (Tape Saturation Emulation) gives you the pleas ant overload characteristics of analog tape without the harsh distortion of most digital input systems. No more dancing around with the input levels to protect the integri ty of your audio.

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• The DDP works right out of the box. It comes with 50 factory setups that are guar anteed to knock your socks off. There are presets for every application you can think of, and then some. dbx engineers are musi cians and recording engineers. We know what a compressor is supposed to sound like, and we know it better than anyone else. We invented compression. We eat, sleep and breathe compression.

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• When you save a preset, you also save the information that makes it work behind the scenes, too. Digital output (optional), sam ple rate performance, MIDI setup, as well as any of the other utilities, like sidechain setup and monitor, EQ settings, and SysEx functions.

• When you make changes to any parameter, you can see where your adjustments are effecting the signal, simply by looking at the Hi-Res graphical display, which shows the processing curve in real time as you make your adjustments.

Check out the DDP at your local pro audio outfitter, and experience DIGITAL perfor mance you'll never forget.

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dbx
PROFESSIONAL PRODUCTS

five or six really talented people working together, and it's a great record. It's kind of like Pink Floyd meets Talk Talk meets the Catherine Wheel.

What techniques do you use to get unusual sounds onto tape?

I've now been getting into a lot of pedals, like guitar pedals and using them as effects as opposed to buying the new $10,000 piece of gear. I'll put something through an old Big Muff pedal or a Dynacomp. Too many people are caught up on specs, like you can't do this because yada yada. That is the biggest piece of horseshit. I use all kinds of miking techniques. Like I'll take drum mics and have them pointing down on the floor, I'll put mics behind amps to get a sound. On one of the Melvins records we had Buzz go through seven pedals directly to the console and bypassed all of the amps. There is no such word as can't.

You work on a lot of projects from unknown bands for a lot less than your usual rate.

When I first moved to Vancouver I really tried to help out a lot of young bands because they don't have any money, and they don't know how to make records. It's important to help out people because they're the same people going up when you're going down. Also, it keeps me on the street because then I hear the new sounds and I know what's going on. I mixed the new Damn the Diva record because I knew the guys from playing hockey with them, and they really needed a major favor. So I said, "Look guys, if it sells we all make money, and if it doesn't sell no one makes money." Again, they are a band that could be huge.

Where do you see yourself ten years from now? Would you like to own your own studio?

I would never own my own studio. It's too much headache, it's so hard to keep up with the times. I have become a bit of an avid gear collector, though. I have a bunch of old amps and pedals that I take with me. Ten years? I wouldn't mind actually teaching someday, like my dad. Play golf a lot. I would like the luxury of only having to work three days a week. The bottom line is, once you've been bitten by this bug, you can never do anything else. You can wear what you want to wear, you can say what you want to say, you can smoke and drink on the job and you get to listen to really good music and hang out, and actually pay rent. I'm the luckiest guy in the whole world. I love what I do. ∎

Tapeless Tracking

Engineers
Sing the Praises of
DIRECT-TO-DAW
RECORDING

BY PHILIP DE LANCIE

It's only been a decade or so since the term "digital audio workstation" entered the industry vocabulary, but you need simply stroll the floor of an AES convention to see how much has changed in that time—how much the DAW has become an integral part of the recording business. But while DAWs have been accepted in the mainstream for editing and mastering applications, their use as an alternative recording medium for tracking instruments and voices has been widespread mostly in "project studio" settings. Traditional recording studios and professional audio post and broadcast facilities still rely largely on analog or digital tape formats.

As CPUs become more powerful, hardware interfaces more professional, and software capabilities more impressive, DAWs are making inroads into traditionally tape-based applications. To explore the pros and cons of taking tape out of the loop, we spoke with engineers in several fields about the process of recording directly to DAW, the equipment they use, and how a DAW-based recording environment affects their working methods and end results.

IN THE STUDIO

"The Fairlight MFX3^{plus} is my hands-down favorite recording medium. It's my first choice for any project," says Herb Tassin, a Nashville-based independent engineer whose contemporary country projects include both major-label records and artist/song demos. "I'm in the middle of a record for a great new duo on Warner Bros. called Crawford West. The producer, Bob DiPiero, has extensive experience working on hard disk and has been enthusiastic about doing all the tracking, overdubs and mixing using the MFX. I've also used it on many other projects, including Billy Gibbons of ZZ Top, Vince Gill, Rodney Crowell and Faith Hill. I really can't think of an example where working directly to the MFX wouldn't be my first choice. But I'm a freelance engineer, and if the producer prefers another medium, then that's what we'll use."

Tassin is enthusiastic about both the system's convenience and its capabilities. "I get incredible editing and DSP power," he says, "virtually unlimited tracks, and no rewind/fast forward time. The MFX also has superior real-time waveform graphics. Since I can see the waveform graphic of the original track, I can perform punch-ins quickly and flawlessly without having to review my in and out points. And if I record over something accidentally,

Tapeless Tracking

I just cut back the repaired section to uncover the original track."

Overdubs are the recording stage where Tassin feels the advantages of working directly to the Fairlight are most evident. "You can subtly shift words or phrases backward or forward in time," he says. "A line that was sung with great emotion but that the artist feels is uncomfortably ahead of the beat can be instantly and seamlessly slid back into the pocket."

The bottom line for Tassin is that "working on the MFX helps me do better work faster. I can perform creative tasks on the MFX that would be cum-

setup also includes a separate unit with two Iomega Jaz drives, a Yamaha CD-R drive and an Exabyte drive for backup.

"I'm an old analog freak," Becker says, "so I'm pretty picky about using digital systems of any kind. I've tried a lot of the multichannel digital systems, and after doing a lot of listening I just really like the way the SADiE stuff sounds."

"For live orchestra recording," Becker continues, "I record stereo straight into the SADiE with a nice set of mics and an Apogee A/D 1000 preamp. We'll record three or four performances over that many nights, and then we can go ahead and directly edit the best parts together."

Becker has also used the SADiE extensively on tour with Neil Diamond. "On the road," he says, "we were

recording and a half-hour editing. So it's a dramatic savings."

POST HASTE

If speed is a big factor in music recording, it's even more of an issue in the high-pressure world of audio for broadcast and film, where deadlines are tight. Direct-to-DAW has strong appeal for audio post and voice-over facilities such as One Union in San Francisco. Specializing in sound for television and radio commercials, as well as voice recording and ADR (automated dialog replacement) for feature films and television, the two-room facility has been in business for three years. Film clients include Pixar, the computer animation specialists that created *Toy Story*. Voice recording and ADR for Pixar's upcoming feature *A Bug's Life* is currently

> **You can shift words or phrases backward or forward in time. A line that was sung with great emotion but is ahead of the beat can be instantly and seamlessly slid back into the pocket. —Herb Tassin**

bersome if not impossible to do on more traditional gear." Tassin does not feel that this power to fine-tune comes at the expense of sound quality. "Before I press the Record button," he says, "I want to be absolutely happy with the sound coming from the monitors. The MFX gives me back exactly what I send it, without compromising warmth, imaging or transient response. I love the way it sounds. And I've made believers out of more than a few self-confessed digital skeptics. But some producers still prefer to track on 2-inch, for all the usual benefits attributed to analog, and that can sound great too."

ON THE ROAD

West coast music engineer Bernie Becker agrees with Tassin that recording to a DAW does not necessarily mean compromising the sound. Becker works both as an independent and as owner of Bernie Becker Recording and Mastering in Van Nuys, Calif. Because he spends a lot of time on tour or recording remote, his DAW of choice is a three-year-old SADiE Portable. The small 8-channel unit includes analog and digital ins and outs and weighs only about ten pounds. His

recording a stereo mix of the concerts straight into my SADiE, as well as multitracking to four DA-88s. After the concert, we would take the SADiE back to the hotel room where we had a little monitoring setup. Sometimes we would pick off a song to use for a radio promo for the concerts, or we would just listen to the show for reference. Neil was also working out one new song to be added to a boxed set that was being released. At the hotel, we could take the song from the SADiE mix of the show and try out new things, like editing out a chorus or try new parts by overdubbing onto the SADiE."

Becker likes the immediacy that recording direct adds to the production process. "It gives me the ability to be able to edit right away," he says, "without taking the time to dump a tape onto the system. With a live performance of one or two hours, that can save a lot of time." Another big plus, he says, is the ease of editing. "If I'm recording dialog for movies or radio spots and I go to 2-track, I might normally spend an hour recording and five hours editing. Since I started recording straight into the SADiE, I spend an hour

under way at the facility.

"We are 100% digital, all Pro Tools-based, with a TDM farm for DSP," says One Union owner and facility director John McGleenen. "Next month we are upgrading to Pro Tools 24, which we loved when we heard it demoed. We actually don't even have an analog master tape machine here, except for one 2-track which we keep in the storeroom and pull out from time to time because CBS still supplies elements for their shows and commercials on 2-track."

One Union does use DATs for initial voice recording on animated projects, McGleenen says. "We just put in a pair of timecode DATs and let them roll, because the minute the voice session is finished the tapes go out the door to Pixar. But everything else we do gets recorded to our workstations first. Working direct to the workstation is faster and cleaner. We put some bells and whistles in front of it, such as tube compressors or tube mic preamps, to give us a warmer starting point to digitize. If we were going to analog, I probably wouldn't be so worried about warming it up first. But if you compare going to DAT with going to the work-

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station, I don't think there is any difference in sound, except that when we get Pro Tools 24 we will have higher bit resolution."

For McGleenen, the speed and editing capabilities he gets working direct-to-DAW result in smoother, more productive sessions. "Because of the workstation functionality, the minute we record we can start working with the audio, building the mix by adding each element as we go," he says. "And you can do whatever your client asks of you in real time. We'll take a syllable from one reading and cut it into another take literally as our producers are telling us what they want, and then we can play it back to them straight away while the talent is still there. Try doing that with tape!"

McGleenen also credits the workstation's flexibility with saving him some of the drudge work inherent in the commercial business. "You can create multiple alternate versions of a commercial, or you can have one commercial with 50 or 60 different dealership tags at the end of it. In a tape medium I would have to mix the spot all those times, whereas now I can just stack alternate pieces on the same channel."

ADR AND FOLEY

Sound One in New York City is more of a traditional film mixing facility than One Union, but DAWs are also used there for direct recording of ADR and Foley. The company uses Sonic Solutions systems for much of the more complex editing work, but chief engineer Jonathan Porath says that it is "not that common in big film facilities to find a Sonic or Pro Tools system used for direct recording." Instead, Sound One relies on the Akai DD-1500, which Porath says is very popular in Europe.

"The DD-1500 has been our main recorder and editor for Foley for the last three years," Porath says. "We used it on films like *In and Out* and *Picture Perfect*. We are now also starting to use it for ADR on the new Brian Di Palma film *Snake Eyes*. [The DD-1500 is] a 16-track recorder with a screen-based interface that records to hard drive or magneto-optical. On screen you see all your tracks, and you can arm them, punch in and punch out. The machine is extremely fast, and it behaves just like a tape machine, even though you have a lot of basic editing functions on it at the same time. And it has a very powerful remote that feels like it was designed by people who work in the business." Using the DD-1500, Porath says, "has made our operation faster and much more productive. Our setup times are much faster, and we have very little down time."

Are disk-based media actually as safe to record to as tape?

Tapeless Tracking

SAFE TRACKS

The benefits of DAW recording in terms of speed and functionality would mean little, of course, if confidence in the integrity of the recordings were undermined by problems with the reliability of the recording media. Are disk-based media actually as safe to record to as tape? "I probably have more faith in my workstation now than I would have in tape," McGleenen says.

"You can pull down a multitrack tape in September that you worked on in February, and you will probably hear print-through. But with storage on a drive, you can go back three years later and have it play back exactly the way it was."

"Years ago there were problems with corrupt files," McGleenen acknowledges, "or you might crash and lose your session. But those days are fairly well behind us." The trade-off, he says, is that he has "had to become a lot more knowledgeable about computers, even down to system configuration, hard-disk defragmentation, SCSI

chains and other issues that I didn't use to need to know about. Preventative maintenance in all these areas stops us from having a lot of problems, but we have to spend a lot of time managing these systems, which is a cost of doing business."

Becker agrees that reliability is no longer an obstacle. "I feel extremely confident recording into the SADiE system," he says. "I've never had any failure whatsoever recording straight to the internal hard disk. Any errors that I have encountered have always occurred on a removable medium like a Jaz drive or an MO drive. So internal or external SCSI hard disks are absolutely the most reliable for direct recording."

But even though Becker would "trust going into a studio session with a bunch of musicians and recording directly to SADiE," he does not advocate throwing caution to the wind. "I always learned to record to two sources," he says. "So if I am going straight into the workstation, I might also run a DAT as a backup. And I always try to back the drives up to Exabyte before any editing, if possible."

Backing up is also a regular part of Tassin's routine. "I use an Exabyte Eliant 820 high-capacity 8-mm tape drive to back up projects on the MFX," he says. "If anything, I feel more confident about storage, since I always have multiple copies from backing-up every day during a project."

MULTIPLE FORMATS

A related issue for Tassin is format interchangeability, because his work is independent of a specific facility, and he may not be the only engineer on a given project. "If I'm tracking on the MFX," he says, "I'll usually make a 48-track safety via my Otari UFC-24 format converter, because the 48-track is standard in the record-oriented studios here, and that gives the producer the flexibility to continue overdubs anywhere he or she chooses."

Interchangeability is also an important consideration at Sound One, where elements recorded and edited on the DD-1500 are later used on the mixing stage. Sound One generally records to removable SCSI hard drives, with backup on MO disks. The company's mixing stages are equipped with Akai DD-8s, which can read eight tracks off the DD-1500 MOs, allowing elements to be brought directly into the mixing environment without first being transferred to another format. "Using Akai machines in recording, ADR and Foley

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creates an integrated in-house system for us," says Porath, "so we can move MOs around very fast." Even so, the Akai DD-8s don't talk to the Sonic Systems that are being used to edit music and dialog, meaning some transfers still have to be made.

Another consideration in interfacing is the question of how the DAW fits in with existing gear. At Sound One, direct recording posed more of a problem in ADR than Foley because, as Porath explains, "most of the traditional ADR controllers don't really talk to newer equipment." But the company was eventually able to figure out new ways to get the different generations of equipment to work together, allowing what Porath says has been a "very successful" switch-over so far.

Aside from the DD-1500's crossfade limitation of two seconds, Porath says he has yet to find any downside to Sound One's switch to direct DAW recording. McGleenen agrees, saying that One Union's transition was "painless," while Tassin warns: "You have to find something else to do with all those leftover boxes of razor blades."

Becker is just as enthusiastic but notes a few areas where the new technique can trip up the unwary. "When you record to a tape machine," he says, "you can always lock the tracks so there is no way of accidentally losing something; you always know where it is. With a hard disk system, it is so easy to edit and move stuff, you have to be more careful about not making mistakes, or moving things accidentally without knowing it."

Another potential problem area has to do with ensuring that the host computer is up to the demands placed on it by the audio system. "The more processing power that you are demanding of the computer, really pushing it to its limits, the more you need to start listening for any infraction on your audio quality," Becker says.

Lastly, Becker points out that "you can't always just put up a new reel of tape. You can insert a new Jaz drive or optical disk, but my preference is to always record to a hard drive. So you always need to plan ahead for the limitations of your hard drives."

SHOPPING TIPS

The hard-drive capacity issue, Becker

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says, is a major consideration when purchasing a DAW system. "I would definitely look for a system with a large amount of disk space, either internal or removable hard drives. Buy as much time as you can afford. If you want to have a whole album in your computer, you need to figure out how much space you need, or how long it will take to off-load to some off-line backup."

Tassin, meanwhile, suggests that the DAW shopper first determine whether "the amount you have budgeted will buy a machine capable of meeting your expectations. After all, a tape machine that works is a lot better that a DAW that's buggy. Technical support is also critical. At some point, you'll have a question, and a manufacturer that takes two days to call you back could cost you a client. Transferability and interfacing with other formats are also important, as is an upgrade path. And be certain the personal commitment to learn a new system is there, because any DAW will only work as well as the

person running it."

For McGleenen, the biggest factor to consider is "the functionality of the workstation beyond being just a digital multitrack: DSP functions, plug-ins, what third-party developers are writing for your platform, how long it has been around and what the track record is of the company that makes it."

Finally, Porath points out that there is no one "best" system; the specific application for which the DAW will be used should guide the choice. Even within the general field of film, for instance, the needs of mixing facilities differ from those of editing facilities. "If you talk to editors and some of the people that work with us," he says

"you find that a lot of people like the Sonic for its great editing ability. So they will use Sonic for music or heavy dialog editing. But in sound effects, people will go for the Audio Vision or the Pro Tools. The Akais that we have

> **Look for a system with a large amount of disk space, either internal or removable hard drives. Buy as much time as you can afford. —Bernie Becker**

are very good at cut-and-paste, and move fast as editors, which works very well for ADR and Foley but not necessarily for dialog or music. So everybody chooses the machine that works best for them." ∎

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MULTICHANNEL I/O CARDS

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BY GEORGE PETERSEN

Workstation Alternatives

Once upon a time, buying a multichannel workstation was a comparatively simple process: First of all, there weren't many companies offering multichannel products at all, and once you decided on the system that met your needs, then the hardware and software were supplied as a package from the same company. However, over time, the practice of sourcing hardware and software from the same manufacturer began to change. In 1990, Opcode showed Studio Vision, the first MIDI sequencing program that offered control of another company's digital audio hardware, in this case, Digidesign's Sound Tools.

About a year later, Innovative Quality Software introduced its Software Audio Workshop (SAW) program, which offered an alternative software front-end for Digital Audio Labs' CardD I/O for the PC. And a few years after that, OSC's DECK (now DECK II from Macromedia) took the concept a step further by accomplishing the (then) seemingly impossible feat of doubling the number of available tracks on a Pro Tools system by running the Digidesign hardware using the DECK software.

Today, users can create a customized workstation by combining third-party software with various I/O cards or hardware systems. If, for example, all you want is a card with ADAT or TDIF digital I/O and a couple of analog I/Os, or simply a multitrack I/O card to run with a digital audio sequencer for your MIDI system, then pick your platform, find the software you want and select the card with the feature set you require.

There are, of course, a few caveats here: First and foremost, not all cards will

work with all software, and even though most cards use PCI bus interface—that fits in newer PCs and Power Macs—nearly all the cards listed here will work with Windows-based software, thanks to the (almost-always) plug-and-play ease of the Windows95 audio (.WAV) driver. However, all cards designed for use with Macintosh-based applications require an application-specific driver

written for the card and whatever software you're using. Unfortunately, the dream of a universal Mac sound card driver remains just that—a dream—but someday...

Another thing to consider is support. If you buy a Sonic Solutions workstation, you'll be using their hardware and software, so if a problem occurs, you know exactly who to call. As soon as you start to mix and match cards and software from various vendors, problems can be harder to sort out, especially when the hardware company says it's the software's fault and vice versa.

Currently, there's no shortage of single-vendor sources to buy a computer-based workstation from, in an assortment of sizes, prices and configurations; manufacturers include AMS, Avid, Creamware, Digital Audio Research (DAR), Digidesign, Doremi Labs, Ensoniq, Fairlight, Merging Technologies, Metalithic Systems, MicroTechnology Unlimited, SADiE, Solid State Logic, Sonic Solutions, Soundscape, Spectral and Waveframe. And there are compact, stand-alone systems from companies such as Akai, Fostex, Otari, Roland and 360 Systems.

Musicians looking to integrate digital audio into their MIDI sequencing software have numerous choices in PC or Mac platforms. Among these are Cakewalk's Cakewalk Pro Audio, E-magic's Logic Audio, Opcode's Studio Vision, MOTU's Digital Performer, Passport's Master Tracks Pro Audio, Steinberg's Cubase and Cubase VST, Tracer Technologies' Audio Master and Voyetra's Digital Orchestrator Pro, to name a few. If you're planning to go the digital audio sequencer route, chances are you already know what you'll be using (or currently have) and are simply looking for a compatible card with the features you need.

Software products offering *non-se-quencer-based* audio recording/editing applications include Berkley Integrated Audio Software's (BIAS) Peak, CanAm's Audio Pro, Entertainment Data Services' SPOT, Macromedia's DECK II and SoundEdit 16, Minnetonka Software's

MxTrax, SEK'D's Samplitude, Software Audio Workshop's SAW series, Sonic Foundry's Sound Forge, Steinberg's WaveLab and Syntrillium Software's Cool Edit Pro. Following the lead from a couple of years back, when The Synclavier Company developed Synclavier software for Pro Tools Systems, even Digidesign has gotten into the act, offering a version of Pro Tools software for its Audiomedia III card or stand-alone for use with any Power Mac.

Of course, the world isn't entirely Mac/PC-based, and Steinberg has shown Nuendo, a mixing/editing/processing environment for post-production applications, with native processing on the Silicon Graphics platform. The Nuendo/SGI package has real-time, floating-point DSP, integrated destructive editing and a networked interface. Up to 32 channels of 24-bit ADAT I/O are supported, with sampling rates as high as 96 kHz. SGI has also shown its PCI-AUD-8C ($1,000), a PCI multichannel audio option card for OCTANE and 02. Each card adds ADAT optical I/O for eight channels of 24-bit digital audio; AES3 input and output for two channels of 24-bit serial digital audio input/output, which also serves as a sync source (AES11) and provides professional jitter continuation; video composite sync input (blackburst); and PAL

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or NTSC for audio lock to video sample clock generation.

Many digital I/O cards are bundled with software ranging in power from a few simple functions to some very elaborate programs, making the value of bundled software another option for you to weigh. As an analogy, my computer came bundled with Microsoft Explorer, although I prefer using Netscape Navigator for Web surfing. However, as with digital audio cards, it's nice to know that I have an alternate software system available, should the need arise.

The following is a list of some of the currently available digital I/O cards suitable for multitrack work. Each has four or more outputs and two or more inputs. Some are simple I/O devices; some have elaborate onboard DSP processing/mixing functions; others include breakout boxes or fan-out cables with 1/4-inch or XLR interfacing. Digital I/O possibilities include AES/EBU, S/PDIF (coaxial or optical), ADAT Lightpipe and Tascam TDIF ports. Sync capability ranges from nothing (wild sync) to MIDI, SMPTE, wordclock and more. So whether you're upgrading from a 2-channel sound card (or built-in audio in your computer) or looking for something new, rest assured that there are cards and systems for every budget and need, listed here alphabetically by manufacturer. Note: Most use PCI bus interfacing, and unless otherwise stated, most offer support for Windows 95 drivers only.

DEALING THE CARDS
The Aark 20/20 ($995) from **Aardvark** is a 24-bit capable PCI I/O card with eight channels of 20-bit ADCs and DACs and stereo S/PDIF I/O in a breakout box. Features include ten simultaneous record/play channels, word clock I/O and video sync input. Aardvark also makes the Studio12!, a 12-channel I/O card, with I/O for eight ADAT tracks plus four more channels for audio editing on the PC, with track bouncing to/from the ADAT. Features include 18-bit conversion, 8-channel ADAT optical in/out, 2-channel S/PDIF in/out, and two channels of analog

in/out.

Alesis unveiled its ADAT PCR, a $499 PCI I/O card that offers eight channels of ADAT Lightpipe I/O (also useable as S/PDIF optical I/O) and 9-pin ADAT sync ports. Essentially, the PCR allows your computer to act as another ADAT in your system, functioning as either master or slave to the tape transports and providing sample-accurate sync for transferring materials into/out of the ADAT system, with up to 24-bit resolution. ADAT PCR is slated to be shipping this month, and Alesis says drivers for all popular editing systems (PC and Mac) will be available.

Antex StudioCard is a 4-channel PCI board with four channels of balanced analog I/O (+4 dBu or -10 dBV) and AES/EBU or S/PDIF digital I/O, SMPTE (LTC and VITC) and MIDI Time Code support, onboard digital mixing with internal 32-bit floating-point processing and a PLL-based sample clock generator that can be locked to an assortment of clock sources. Up to four StudioCards can be installed in a single PC for up to 16-track recording, and an onboard expansion connector accepts optional daughter cards for compression or enhanced DSP operations. Retail is $1,595.

OnStage from **Applied Magic** offers 20-bit editing, with four balanced XLR analog I/Os and AES/EBU digital I/O. Signal-to-noise is said to be greater than 100 dB, with a dynamic range of greater than 99 dB. SMPTE LTC time code and MIDI are also supported. The card lists for $1,595.

Digigram makes an array of computer sound cards intended primarily for developers of automation systems in live broadcast, post-production and other no-failure-tolerance applications. The $3,300 PCX440np is a PCI bus card with 20-bit converters for its four balanced analog inputs and outputs, word clock input and digital I/O and video sync options. Onboard DSP handles both linear PCM and compressed MPEG Audio operating modes. Numerous software functions, such as time-stretching, pitch-shifting, noise reduction and format/frequency conversion are supported, and the PCX440np includes Xtrack multitrack PC editing software.

Digital Audio Labs' V8 is a PC-based system of ISA audio cards, ADAT and DA-88 interfaces, digital and analog I/O modules, and peripherals that, combined with third-party software, form a customizable 16-track workstation. The rackmount AD/DA and audio breakout box has eight channels of

and-play support for Windows 95. Priced at $499, and shipping this summer, the Wave/824 is a PCI interface card that includes eight inputs and eight audio outputs. With full 24-bit audio converters, it achieves dynamic range performance greater than 100 dB. Additionally, it includes an integrated MIDI interface as well as a low-cost expansion option for S/PDIF digital I/O.

The SoundLink DRS Model 1212 from **Korg** is a multichannel I/O audio interface on a PCI card. As its name implies, the 1212 features 12 inputs and 12 outputs configured as two analog I/Os, an S/PDIF I/O and an 8-channel ADAT optical I/O. Retail is $1,250.

The **Lexicon Studio** provides a variety of hard disk recording tools: high-quality analog conversion, digital connectivity, format conversion, signal routing, synchronization, system acceleration and audio DSP—hardware solutions designed to work with your PC or Mac software. Lexicon Studio offers 32 simultaneous audio record and 32 simultaneous audio playback channels. The Lexicon Studio will also interface to tape-based MDMs (including ADAT and Tascam DA-88), allowing editing and processing of previously recorded material. The system is expandable, with up to 44 simultaneous I/O sources from as many as two Lexicon LDI-16S racks and one LDI-12T, all controlled by the internal router. A 24-bit multichannel digital signal bus can communicate with other Lexicon cards to expand system processing power. A $3,000 starter system includes Core-32 card, LDI-12T interface and PC-90 processor.

The Dman 2044 from **MIDIMAN** is a PCI digital audio card with four independent analog inputs and outputs, using 20-bit delta sigma converters with 128x oversampling. Dman 2044's four audio outputs have independently programmable pan, tremolo, vibrato and tone filtering, and onboard DSP for effects such as reverb, chorus or flange independently on any audio channel, as well as an onboard 56-voice wavetable synthesizer. The 2044 is fully Windows 95 Plug-and-Play compliant, and Win95 drivers are included. Retail is $349.95.

From Cambridge, Mass., comes **Mark of the Unicorn**'s 2408 hard disk recording system, with 24 I/O connections—expandable to 72. The basic package includes the PCI-324 card and rackmount 2408 I/O unit; up to three I/O units can be attached to one card. Additional 2408s are $695. Each 2408 has a bank of eight analog RCA I/Os, coaxial S/PDIF connectors, three TDIF and three ADAT optical connectors. For main stereo output, analog outs 1 and 2 are duplicated as balanced ¼-inch TRS (+4 dBu), S/PDIF out and a ¼-inch headphone out. Word clock I/O is standard. ADCs and DACs are 20-bit with support for 24-bit, and the 2408 also functions as a stand-alone ADAT/TDIF converter. All I/O processing is handled independently of the host CPU and acts as a 72x72 patchbay, routing any input to any output. The card also has a 9-pin ADAT sync input for sample-accurate lock to ADATs; alternatively, the system can connect to MOTU's Digital Timepiece for sample-accurate sync with Tascam MDMs.

A Core 2408 system is $995, including a Windows .WAV driver, a Mac Sound Manager driver and Macintosh

DAW software (offering multichannel waveform editing, automated mixing, real-time/32-bit effects processing and support for MOTU Audio System and Adobe Premiere plug-ins). Mac users can also use the system with Digital Performer. The number of simultaneous record/playback tracks is dependent on the computer's performance.

The Analog ARC 88 from **SEK'D** is a PCI-based multitrack recording card with eight TRS analog inputs, eight TRS analog outs and stereo 16-/24-bit S/PDIF optical digital I/O. Up to three cards can be cascaded for additional tracks. All analog connections are via a breakout cable to RCA connectors, and the card supports the Windows stereo driver standard (Cubase VST support and drivers for Windows NT are in development). Retail is $799. A similar

version—Analog ARC 88 Studio— which includes Samplitude Basic Studio software is $1,199. For those on a budget, SEK'D also makes the Analog ARC 88, a 4-input/4-output analog interface ISA card (no digital I/O) for $399.

SEK'D's Digital ARC 88 is a half-length ISA-format I/O card with ADAT Lightpipe and two channels of S/PDIF (on RCA and optical connectors). Both 16- and 24-bit data transfer are supported, and four inputs modes are available: ADAT optical (8-ch), stereo S/PDIF optical (2-ch), stereo S/PDIF coaxial and stereo S/PDIF electrical via internal CD-ROM cable. Output modes are ADAT optical and S/PDIF co-ax (10 independent channels) or S/PDIF optical *and* S/PDIF co-ax (four independent channels). MIDI I/O is supported via a breakout cable. Digital audio format conversion includes ADAT to/from S/PDIF and S/PDIF coaxial to/from S/PDIF optical. Digital ARC 88 retails at $999 and includes SEK'D's Samplitude Studio 4.0.

SEK'D's Prodif Gold is a PCI-bus, 16/20/24-bit, 2-channel digital I/O card that includes 8-channel ADAT Lightpipe interfacing, allowing the transfer of up to eight channels per card (16

with two or 24 with three cards) between a PC and an Alesis ADAT. Prodif Gold uses bit clock synchronization— the same PLL sync method used by the Alesis ADAT—for sample-accurate transfers. The Prodif Gold works exclusively in slave mode, but with Auto-Sync enabled, starting a recording on-the-fly (or any time during playback) is possible without the need to sync the card to the input signal. Digital I/Os are optical or coaxial S/PDIF and ADAT optical, and a cable adapter allows stereo AES/EBU I/O. Retail is $699, including Samplitude Basic Studio software.

Sonorus' STUDI/O is a 16-channel digital audio interface for PCI-based computers. STUDI/O includes two 8-channel Alesis ADAT optical interfaces and a high-resolution, 18-bit stereo analog monitor output. For mastering applications, one or both ADAT interfaces can be software-configured for optical S/PDIF optical I/O, with or without sample rate conversion. STUDI/O is shipped with Windows 95 and Steinberg Cubase ASIO drivers (for Mac and PC), so STUDI/O works with most current audio editing software. Other drivers are in the works. Retail is $989; optional is

a sync backplate ($150), providing ADAT 9-pin sync, MIDI Time Code input and word clock I/O.

Soundscape recently introduced MaxMedia, a PCI interface card with the ability to run 16 tracks of digital audio using two standard TDIF ports, in combination with the V2 MIXER software from the SSHDR-1. Intended for use with a wide range of PC software, including Sound Forge, Logic Audio and Cakewalk, the card retails at around $700, includes the V2 MIXER software and offers MIDI In/Out/Thru and optional S/PDIF I/O. In addition, the TDIF ports allow integration with systems such as the Yamaha 02R and 03D, as well as the Tascam DA-88. To support the card, Soundscape is offering two I/O units, offering TDIF to 8-channel (with 20-bit A/D/A converters and RCA connections) and TDIF to ADAT I/O. Both units are half-size, 1U rack units and retail for $600 each. Two units can be combined to offer 16 I/Os in a rackspace.

Yamaha made a major splash a few months back with its DSP Factory family of components for multitrack recording, editing and mixing for Windows. The first product shown was the backbone of the system, the DS2416 PCI card: Priced at $999, the host CPU-independent card offers mixing features of the 02R such as 24-channel, 32-bit mixing with ten bus outputs and six aux sends, plus 104 bands of parametric EQ, 26 dynamics processors and two effects processors (comparable to the REV500), in addition to 16-track recording capability. The DS2415 can be cascaded and features 2-channel, 20-bit A/D conversion, plus stereo analog and coaxial 20/24-bit digital I/O. An AX44 expansion unit ($299) installs into a standard tower drive bay, adding four analog I/Os. MDM interfaces and a Mac driver are in the works. Control software is being developed or integrated by leading companies such as SEK'D, Steinberg, Sonic Foundry and Cakewalk; the first DSP Factory should ship sometime this month. ■

George Petersen is the editor of Mix.

Otari RADAR II
24-BIT/48kHz DIGITAL RECORDING SYSTEM

Announced at the NAB show in 1994, the Otari RADAR (Random Access Digital Audio Recorder) digital recording system was an immediate hit: A self-contained, stand-alone platform, it was an affordable (less than $1,000 per track), professional-quality (16-bit) disk-based system that combined the power of random access with an easy-to-use interface modeled after that of a standard analog multitrack. The RADAR quickly proved to be a success; more than 500 units have been sold

Although designed as a replacement, RADAR II maintains file compatibility with the earlier units: RADAR II's 24-bit-format files cannot be used on an original RADAR, but 16-bit files are backward-compatible. Conversely, RADAR I files can be restored on a RADAR II as a 16-bit file.

Another advantage is more flexible (and bigger) storage capabilities. Where the RADAR I system needed three drives to handle 24-track operation, the new generation incorporates a 9GB removable hard disk, enabling 42 minutes of 24-bit 24-track recording (or about 4.6 minutes/track per MB), or 64 minutes of 24-track recording in 16-bit mode (or around 7 minutes/track per MB). RADAR II's configuration can accommodate two drives internally; front panel drive-bay slots are designed for either

narrow devices such as hard drives, Jaz and Travan drives, or wide devices such as an Exabyte drive. Additional drives can connect via the rear panel SCSI port. (A list of qualified drives is available from Otari.)

RADAR II's new "reliability features" maximize hard disk functionality and stability. A Custom SCSI Configuration feature allows the user to assign different tracks to different drives, enabling longer record time and even greater reliability. The system incorporates intelligent recovery of bad (unreadable or unwritable) sectors by remapping them to spare sectors in a reserved area of the drive. Also added is distributed/redundant playlist storage: The system automatically switches to the second copy if the primary playlist file becomes inaccessible or corrupted. And an Auto Reclaim function auto-

to date. Four years later, the next generation of RADAR has arrived, with last month's introduction of the RADAR II at the NAB show in Las Vegas. RADAR II keeps the ease-of-use of the RADAR but adds enhanced sound quality and flexibility.

One of the biggest advantages RADAR II offers over its predecessor is 24-bit/48kHz recording capability. The unit features 24-bit architecture and records 24-bit to disk. The 24 A/D and D/A converters are 24-bit; a TDIF Link 24-track digital I/O card allows RADAR to communicate directly with digital consoles.

BY SARAH JONES

matically restores disk space whenever the system determines that a file is no longer available.

RADAR II has a new remote control—the RE-8 II, which is an expanded version of the original RE-8 but designed to further emulate the look, feel and operation of a standard analog recorder remote. Major upgrades include 48-track arming controls and more direct access to commonly used menu items. (By using RADARLink software, two RADAR IIs can be linked to provide sample-accurate 24-bit, 48-track recording capability.) The RE-8 II adds a set of macro keys for programming and recalling common button-press sequences; additional key features include Zoom In, Zoom Out, RADARLink, RADARLink Solo, Mark Sync and Auto Reclaim. New remote menu items include additional user preferences and more extensive diagnostic tools. Additionally, a new Sync User Interface allows for a more comprehensive selec-

The main unit's rear panel

tion of available sync parameters such as timecode rate etc., and includes a look-up-by-project feature.

A new, detachable meter bridge allows the main RADAR II unit to be located away from the control room, thus eliminating machine noise. The bridge features 12 LED meters and can be mounted to the RE-8 II, behind the console meter bridge or under the RADARVIEW monitor. For 48-track monitoring, an optional second meter bridge can be mounted alongside the first.

At approximately the same cost as the original, RADAR II's new features, expanded functionality, improved sound quality and familiar, recorder-style user interface should make it a strong entry into the hard disk recorder market. A fully fitted 24-track system with 24 channels of digital I/O, plus backup drive, costs less than $25,000.

Otari Corp., 378 Vintage Park Drive, Foster City, CA 94404; 650/341-7200; fax 650/341-7200; Web site: www.otari.com. ∎

Sarah Jones is an assistant editor at Mix.

PREVIEW

LEXICON DUAL-CHANNEL PROCESSOR

The MPX 100 dual-channel processor from Lexicon (Bedford, MA) offers 20-bit A/D and D/A conversion, 24-bit internal processing and 240 presets, including multiple stereo reverb, pitch and modulation effects programs, and up to 5.7 seconds of delay. Dual-channel processing allows independent control of left and right channel effects; a front panel rotary knob adjusts effect parameters, and a Balance knob controls the direct signal/effects mix. Effects level, program adjust, bypass, tap and mix controls are controllable via MIDI, and tap tempo can be set with the front panel Tap button, footswitch, external MIDI control or even the audio input. The MPX 100 provides both analog and S/PDIF digital outputs. Price is $249.

Circle 327 on Product Info Cord

TELEX COBALT SE60 CONDENSER MIC

Telex Communications (Minneapolis) has introduced the Cobalt™ SE60, a cardioid condenser mic aimed at project studio and live sound applications. Boasting a frequency response of 30-19k Hz ±5 dB, the SE60 is said to handle SPLs of up to 141 dB without distortion. The SE60 may be phantom- or battery-powered (AA battery life is projected at 1,000+ hours). Price: $179.

Circle 328 on Product Info Cord

YAMAHA 01V 8-TRACK DIGITAL MIXER

Yamaha (Buena Park, CA) introduces the 01V, a compact digital mixer featuring snapshot storage and recall of all functions; motorized faders; and onboard dynamics, EQ and digital effects. Twelve input channels offer parallel XLR and ¼-inch input connectors, mic preamps with pads, 48-volt phantom power and 60mm motorized faders, while an additional two stereo faders control four line returns. These 16 primary inputs feature the same 4-band parametric EQ and limiter/compressor/gate found in the Yamaha 02R, plus a 250ms delay line, and may be routed to eight direct digital outputs and six aux sends. An additional eight inputs (17-24) are designed as digital tape returns and feature 2-band parametric EQ and four aux sends. All inputs may be routed to the stereo mix bus and to any or all of four analog Omni-Send outputs. Optional digital I/O cards ($299) interface the 01V to popular 8-track MDMs, workstations and outboard processors; output formats include ADAT, TDIF and AES/EBU. Two 01Vs may be linked to create a 48-input digital mixing system, and RS422 and MIDI connections provide remote control options and interface flexibility. Additional features include a high-density 320x80 backlit LCD for graphic depiction of mixer settings and up to 300 ms of delay on analog outputs. Price is $1,999.

Circle 329 on Product Info Cord

NEOTEK MICMAX STEREO MIC PRE

Martinsound (Alhambra, CA) announces the Neotek MicMAX microphone preamp, a 2-channel, single-rackspace unit based on the Neotek Elite console's stereo mic pre. Input gain is controlled by nudge buttons in 5dB increments; output stages feature a ±5dB trim pot. Exceptional headroom offers +30dBu output with less than 0.001% distortion. Additional features include completely balanced circuitry from input to output (an unbalanced output is also available), subsonic filter, polarity reverse and ground lift switches, phantom power, highly visible bar graph metering and switchable input impedance. Price: $1,200.

Circle 330 on Product Info Cord

TC EFFECTS FOR YAMAHA 02R

TC Electronic (Westlake Village, CA) announces TC UNITY, the first plug-in effects card for the Yamaha 02R digital recording console. TC UNITY provides two independent 24-bit mono in/stereo out signal processing engines; the 02R automatically senses the card's presence in any I/O expansion slot and activates specifically designed preset and editing screens. Effects include reverb, chorus, delay, pitch shifter, etc. TC UNITY will be available with and without an 8-channel AES/EBU digital I/O Sub D25 connector. Due to ship this spring, TC UNITY retails at $1,495 with digital I/O, $1,195 without.

Circle 331 on Product Info Cord

PREVIEW

FURMAN HEADPHONE SYSTEM

Furman Sound (Petaluma, CA) offers a new headphone distribution system comprising the HDS-6 single-rackspace distribution module and up to eight HR-6 remote mixers, which connect to the HDS-6 via Ethernet cabling. The HDS-6 accepts up to six inputs and provides four mono submixes and a stereo mix at the HR-6, allowing for multiple individual headphone mixes, using rotary pots. A switch mutes all mono inputs. System price of $349 includes one HDS-6 and one HR-6; additional HR-6 units are $129 each.

Circle 332 on Product Info Card

ANTARES AUTO-TUNE RACK

AnTares Systems (distributed by Cameo International, Los Gatos, CA) now offers its pitch correction technology, first developed for the AnTares Auto-Tune Pro Tools plug-in, in a rackmount device. The ATR-1 Auto-Tune™ Rack corrects pitch automatically, either live or from tape, in real time, without distortion or artifacts. The ATR-1 includes preset scales, including major, minor and chromatic scales in any key, and allows any combination of notes to be defined as a scale. Over 100 memory settings store scales and presets, and any scale may be detuned to a new pitch. The ATR-1 can be programmed to ignore vibrato and note-bending, and can add vibrato with programmable delay, depth, rate and waveform. Scales, keys and notes may

be controlled from any MIDI device. Price: $1,199.

Circle 333 on Product Info Card

SPIRIT DIGITAL 328

Spirit by Soundcraft's (Rocklin, CA) Digital 328 is a digital 8-bus console with a total of 42 inputs (including 16 mic/line ins and 16 tape return channels), comprehensive moving fader automation, onboard dynamics processing and internal Lexicon reverb and effects units. The channel inputs, tape returns and all group/master controls are accessed by switching them in banks of 16 to the control surface. An "E-Strip" running across the console provides the interface for all control and processing parameters, which

include 3-band parametric EQ and four external aux sends plus two internal Lexicon sends per channel. Two stereo dynamics processors are assignable to any input or output, and recall of all console functions is via 100 memory scenes or MIDI. Metering is via ten-segment bar graphs. The Digital 328 also supports SMPTE and MTC control and includes a timecode display. AES and S/PDIF digital I/Os may be freely assigned, and dual TDIF and ADAT I/Os are standard. Price is $4,999.95.

Circle 334 on Product Info Card

TC DIGITAL MIC PRE

TC Electronic (Westlake

Village, CA) introduces the Gold Channel, a 2-channel digitally enhanced mic preamp. Features include 24-bit A/D conversion, EQ, an expander/gate and Softlimiter™ compressor/limiter. EQ and dynamics processing is at 96 kHz. The rackmount unit has mic and line inputs plus Word Clock synchronization and multiple digital outputs (AES/EBU, optical S/PDIF and ADAT). Additional features include polarity reverse, +48V phantom power, pad and muting, high-resolution metering and 200 memory locations for instant recall of custom user presets. Price is $2,495.

Circle 335 on Product Info Card

MARANTZ PORTABLE DIGITAL RECORDER

The Marantz PMD690 portable digital recorder from Superscope Technologies (Aurora, IL) uses standard PCMCIA cards as a storage medium and offers a choice of linear PCM or MPEG compression recording. Tracks are stored as MS-DOS-compatible and .WAV files, easing transfer to DAWs. The PMD690 can record up to one hour of stereo audio with a 20kHz bandwidth (120MB memory required) and accepts analog

PREVIEW

mic/line and digital inputs/outputs. Power is supplied by conventional or rechargeable batteries; operating time is approximately three hours. Price: $999.

Circle 336 on Product Info Card

ROCKTRON MULTIVALVE EFFECTS PROCESSOR

Rocktron (Rochester Hills, MI) introduces the Multivalve effects processor, a single-rackspace device that emulates the sound of vintage tube electronics using a 12AX7 tube section and 24-bit DSP. Effects such as rotary speaker, phaser, flanger, compressor, delay and parametric EQ can be selected via front panel rotary controls. Two gain settings for the tube section add warmth and "fatness." Output is +4/-10 dB switchable. Price: $899.

Circle 337 on Product Info Card

SONY DPS-V55 MULTI-EFFECTS PROCESSOR

Sony Electronics (Park Ridge, NJ) introduces the DPS-V55 multi-effects processor, an economical but powerful 4-channel effects processor based on the company's DPS-V77, using the same DSP chip and two-bit converters. Offering 45 effects types and a wide range of presets created by leading engineers, the DPS-V55 features a large rotary knob with variable velocity, a search function and a tap tempo button. Price is $555.

HOT OFF THE SHELF

Recording Console Concepts' No More Tape™ is an innovative labeling accessory, an alternative to adhesive tapes for labeling recording consoles, sound reinforcement mixers, patchbays and miscellaneous rackmount accessories. Call 612/588-6430 or visit www.musicstores.com/nomoretape…The Tascam MM-RC Remote Control Unit can control any combination of up to 100 MMR-8 and MMP-16 recorder/players via the MMR Bus. The unit provides function keys and macros for executing strings of commands with a single button. Price is $2,599. Call 213/726-0303…Signature Music, a supplier of buy-out production music, now distributes Mokal Music and Flying Hands collections. Call 800/888-7151…Canare's 1998 Catalog 9 includes cable, connectors, digital video patchbays, snake systems, cable reels and related accessories. Call 818/365-2446…Version 3.5 software for the TC Electronic M5000 Digital Audio Mainframe is available. Registered M5000 owners can download the update from www.tcelectronic.com, or call 805/373-1828…WhisperRoom's SE Series sound isolation enclosures come in various sizes,

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SOFTWARE AND HARDWARE FOR AUDIO PRODUCTION

DUY DSPIDER FOR TDM

Barcelona-based DUY (distributed in the U.S. by Cameo International, Los Gatos, CA) introduces the DSPider TDM plug-in. DSPider is a modular processing/synthesis package consisting of 40 linkable modules and operators for custom creation of virtual effects processing and audio generating devices. A wide range of modules is included, from operators for addition, subtraction and shifting to functions such as shapers, envelope followers, delay modules and pitch trackers. Users can work from predefined patches or create their own modules, and graphical representations of objects such as sliders, plasma meters and scopes make "drag-and-drop" editing easy. Pro Tools 24 is supported; retail for the plug-in is around $799.

Circle 338 on Product Info Card

SIBELIUS VMP FOR MAC AND PC

Sibelius Software (U.S. offices in Los Angeles), creator of the Acorn RISC-based Sibelius 7 notation software, has gone cross-platform with Sibelius VMP (Virtual Manuscript Paper), notation software for Power Mac and Pentium PCs. Written by composers, VMP features an intuitive interface and high-speed operation, updating and reformatting scores in a fraction of a second. Music is input from any MIDI keyboard, or via computer mouse and keyboard, and features include checking that rhythms add up, extensive user customization, and an Expressive feature that uses artificial intelligence to produce a lifelike performance straight from the score. VMP is an open architecture design and offers Internet capabilities. Prices will be announced.

Circle 339 on Product Info Card

XYTAR 1616CD

Xytar Digital Systems (San Francisco) recently announced the DMS1616CD, the latest in its ADMS family of "recording and production studios in a box." The DMS1616CD is a 16-track hardware-based system designed for mastering. Features include punch-in/-out, EQ, filtering, reverb, time and pitch shift, sample rate conversion and an FFT function for restoration/noise removal. Hardware features include a 1GB internal drive, with an additional 1GB Jaz drive for extra space/backup (1.5GB SyJet optional), and an onboard CD recorder. List is $9,999.

Circle 340 on Product Info Card

BITHEADZ RETRO SOFTWARE SYNTH

New music software company Bitheadz (Capitola, CA) debuts the Retro AS-1 Analog Synthesizer, a fully programmable, polyphonic, analog synth implemented in software for the Mac OS operating system. Retailing at $259, the Retro AS-1 comprises a synthesizer engine, editor, control panel, mixer application, 100 built-in sounds, a direct serial port MIDI application, OMS and FreeMIDI drivers and an on-screen keyboard; the software is designed to integrate seamlessly with most sequencers. Additional features include matrix modulation controls, multiple filters and oscillators, effects and an arpeggiator that imports and exports standard MIDI files. The AS-1 is multitimbral and offers 24-bit, 44.1kHz sound quality.

Circle 341 on Product Info Card

UPGRADES AND UPDATES

Digidesign's Pro Tools 24 Version 4.1.1 upgrade features d24 Sound Output Drivers (allowing non DAE-based applications from Digidesign developers to use the d24 card for 16-bit output via Sound Manager) and compatibility with Audiomedia III and PowerMix, among other software enhancements. In addition, Digidesign released Pro Tools 24 Expansion kits, which support expansion of to up to 64 tracks of record/playback. Visit www.digidesign.com... Tracer Technologies is now shipping DART PRO 32 ($399), featuring 32-bit capability, CD making, pitch shifting and 3-D spectrum analysis; Diamond Cut Audio Restoration Tools

Version 2.0 ($199); and the Studio 8-track software recording program ($199) for PC. Visit www.tracertek.com...Power Technology debuts an enhanced version of DSP•FX Virtual Pack that supports 96kHz effects processing. Check www.dspfx.com for information...Digital Audio Labs (www.digitalaudio.com) announces new supporters of the V8 workstation platform. QSound Labs introduced three V8 plug-ins featuring QSound 3-D encoding technology; Waves announced the V8 Pack plug-in bundle; and AnTares will soon release Auto-Tune as a V8 plug-in...Seer Systems announced SeerMusic, its proprietary new Internet music delivery technology. For more information, check out www.seersystems.com... New from Spatializer: Version 1.4 of its PT3D plug-in for Pro Tools. The update is compatible with Pro Tools 4.1 and adds automation capability and Mackie HUI support. Visit www.spatializer.com... Waves (www.waves.com) introduces the streamlined EasyWaves AudioTrack and EZVerb, a package including 4-band EQ, compression, gating and reverb, for Mac and PC. Also from Waves, the De-Esser multiband dynamics processor Pro Tools plug-in. ∎

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AB International SUB3600

THREE-CHANNEL AMPLIFIER WITH INTEGRATED CROSSOVERS

AB International has been making amplifiers with integrated crossovers for almost two decades (my monitor system reference rack still contains the AB 710c bi-amp that I bought in '83). The company's Professional Series SUB3600 is a full-featured 3-channel amplifier, but each channel also has its own 24dB-per-octave Linkwitz-Riley crossover filter. The SUB3600 is, in effect, an entire amp rack with processing and offers a robust system solution in the space normally occupied by a simple amplifier.

Channels 1 and 2 are generously rated at 500 watts into 8-ohm loads and 800 watts into 4 ohms. The third channel, generally intended for powering subwoofers, is rated at 1,500 watts into 4 ohms and 2,000 watts into 2 ohms. When measured with all three channels driven, the amp easily exceeded its spec and produced 4,300 watts total into 2-ohm loads without clipping.

The SUB3600's front panel includes detented level control knobs for the three channels and nine-LED output metering. Four standard crossover frequencies are front panel-selectable: 80, 1,200 and 1,600 Hz are available on all channels, and the fourth frequency for channels 2 and 3 is 800 Hz; channel 1's fourth frequency is 5 kHz, useful for tri-amp applications. Custom frequencies can also be ordered. Along with ¼-inch and XLR "combo" inputs and five-way binding posts for outputs, the rear panel includes a ground lift switch and dual high-power fans with temperature-activated speed control. The rear panel also includes three balanced ¼-inch TRS jacks for feeding the line-level output of each crossover to other amps. At

5.25 inches high, the SUB3600 uses only three rackspaces and is less than 17 inches deep. Chassis construction is 14-gauge, cold-rolled steel with a ³⁄₁₆-inch aluminum front panel. The amp weighs 65 pounds.

The SUB3600 can provide an integrated single-chassis solution for many speaker systems, and, because the crossover settings are recessed, rental companies can confidently package it with speaker systems. One obvious application for the SUB3600 is as a complete

system amplifier for stereo mains (full-range, passively crossed over) and a mono subwoofer. In fact, the SUB3600 I reviewed has been used for the past year to bi-amp a pair of Technomad three-way Cairo pole-mount speakers, with the Radian coaxial 12s crossed over at 80 Hz and the system powered in stereo. The single Electro-Voice 15s in each cabinet are both powered (in mono) by the third channel.

Mix talked with engineer Mark Heath, who mixes the Portland, Ore., band Pepe & the Bottled Blondes. The band has used this system for a variety of gigs, hauling it in and out of clubs and ballrooms for dances, socials and weddings. Heath pumps Pepe's unique style of Latin dance music from a Mackie SR24, and the system is required to cover up to 1,000 people with a full mix of rhythm section, horns and vocals. Because the amp is rated to 2 ohms, Heath is able to add on

BY MARK FRINK

Bag End TA-15 speakers and single-15 subs in parallel to pump up the dance floor for the largest shows. The amp held up brilliantly in this typical, if abusive, situation and allowed the band to carry production easily in their van.

"We always have plenty of clean power," Heath says. "It's a little heavy, but not much more than the amps and crossover we replaced, and it's quite a bit smaller." One easily overlooked feature is that the SUB3600 runs on a single 15-amp circuit—just plug it into an Edison on the wall.

The SUB3600 is more than a fancy amplifier. It's a Swiss Army knife-type solution for a wide range of speaker applications, including tri-amping, bi-amping with an extra channel for monitors, or even 3-channel operation with an external processor. Channel 1 also has a half-power switch, which is helpful for tailoring its output down for compression drivers in tri-amp applications.

At a list price of $2,490 the SUB3600 may seem a little expensive until you consider that the price includes a stereo amp plus a high-power mono amp and built-in crossovers, all in a rugged three-space package. Two related products in the same line are AB's SUB2000 ($1,849) and the SUB 1850B ($1,572), which offer the same features at power points 2 and 4 dB lower. Other multichannel amps in AB's line-up include 4- and 6-channel amps at three different power points.

AB International Electronics, 1830 Vernon Street, Ste. 6, Roseville, CA 95678; 916/783-7800; e-mail: abamps@aol.com. ∎

Mark Frink is Mix's sound reinforcement editor.

BENSON STUDIOSTAT 8.2

ELECTROSTATIC NEAR-FIELD STUDIO MONITORS

Electrostatic loudspeakers were first introduced into the home hi-fi market in 1956 by QUAD Electronics and have been the source of lively debate ever since. Though they're revered by a segment of the audiophile population, a constant complaint about electrostatic speaker designs has been that they are more suitable for classical or jazz music and don't have adequate punch for rock and other styles. And, despite more than four decades of acceptance of electrostatic speakers in the home stereo community, no one to my knowledge has ever used electrostatic elements in professional studio monitors—until now.

Enter the StudioStat 8.2 from Benson Audio Labs. Rather than employ an expensive all-electrostat design—which also equates to a very large surface area to create the air motion required for low frequency reproduction—the StudioStat 8.2 uses a hybrid approach, combining a conventional cone woofer crossed over at 1,600 Hz to a single electrostatic panel handling the upper mids and highs. This allows the extended high-end performance (to 25 kHz and beyond) of an electrostatic design, while reducing the size of the cabinet (which measures 17.75x11x12 inches), providing punchy bass response and keeping the cost of the system down to an earthly $1,399/pair.

Operating much like a condenser microphone in reverse, the StudioStat 8.2's 4x4-inch electrostatic element works by charging a large 19.3-square-inch diaphragm surface with a high voltage. Changes in the input signal cause the polarizing potential to vary, and the ultralow-mass (0.1 mil) Mylar diaphragm vibrates to re-create the input.

Physically, the StudioStat 8.2s are a front-ported design. There is no grille, and the front baffle and cabinet edges are smooth to reduce

diffraction effects. Centered between the drivers is an "Optimum Listening Plane Indicator," a blue LED fitted into a custom light pipe that's designed to help the listener find the center of the listening sweet spot. The LEDs also double as a power-on indicator for the electrostatic panels. Inputs are gold-plated, five-way binding posts, and each StudioStat has an input jack for an external wall-wart DC adapter (two are included with each pair of speakers) that powers the electrostat panel.

I hooked the speakers up to an Australian Monitor power amp, which has excellent specs and delivers about 400 watts per side. Benson says the speakers can handle 250 watts over long periods, so the 400-watt amp would offer plenty of headroom. The monitors were set up with the speaker centers at ear level, and the LED indicators

BY GEORGE PETERSEN

Lab Analysis: Benson StudioStat 8.2

by Mike Klasco
PHYSICAL CHARACTERISTICS

The enclosure is 0.75-inch-thick MDF wood stock construction with thick vinyl wrap on sides and back. The sides have a 1-inch radius curved edge. No grille cloth is provided, although there is a protective screen over the electrostatic tweeter element. The drivers are recessed flush to the front baffle, and the woofer mounting has threaded screw inserts. The bass reflex port is flared to reduce air turbulence noise. Enclosure packing is 2 inches thick and appears to be polyester fiber.

The woofer appears similar to a popular Vifa model and features a rubber surround and a straight sided paper cone with a wet-look glossy surface finish that might contribute some humidity resistance and damping of resonances. A flat spider is used, providing more linearity than a cupped spider. The frame is cast and therefore does not drain magnetic flux from the magnetic structure. The magnetic structure (pole piece) is vented, which should help keep the voice coil cool and reduce power compression.

The electrostatic tweeter is a 4x4-inch panel. A 12VAC external power supply is used to bias up each tweeter panel. A rear panel switch toggles +2 dB, 0 and -2 dB. There is no "waveguide" profile or acoustic lens, so the pattern becomes progressively more narrow as

shining brightly.

I began my listening with a B&K test disk, that has material ranging from symphonic and chamber ensembles to pop acts such as Little Feat and Jennifer Warnes. Bass was nicely damped and well-defined, and in balance with the vocals and midrange instruments. The top end seemed overly bright, and as I leaned across the console to check the EQ, the HF response dropped off dramatically. By moving my head slightly, I determined the speakers' sweet spot was about six inches wide, due to the beam-like dispersion of the electrostatic tweeters.

On my next session, I was recording an acoustic ensemble with some Earthworks mics, Millennia preamps and dCS 96kHz/24-bit ADCs/DACs, storing to a Nagra D. On this session, I really wanted to hear some upper-end response, and by re-aiming the StudioStats to about 10 to 12 degrees off-axis, the HF performance became more in balance, and I could appreciate the speaker's ability to go out to 25 kHz. But I was still working within the narrow confines of the sweet spot, which also precludes anyone else being in the listening area at the same time.

This tight sweet spot relegates the StudioStats to applications where the user stays in place during a session—while problematic for engineers working a big board, this could work in desktop audio, where the user remains in front of a computer screen or small digital console. In these "cockpit audio" applications, magnetic shielding is often necessary on the drivers; perhaps Benson could add this as an option, as the speakers distorted video screens when placed near a display.

Overall, the Benson StudioStat 8.2s have much to offer, including a frequency response that's flat (±2 dB) from 80 to 7k Hz—an impressive accomplishment in a critical audio range. The LF response stated in Benson's specs says the speakers go to 40 Hz, but at that level they're -6 dB down. The -3dB down point (which is more realistic in defining usable bass energy) is around 60 Hz—respectable for an 8-inch driver in a compact cabinet. The high-end response is more enigmatic and with a bit of experimentation in placement, can yield good results in single-engineer setups.

Benson Audio Labs, 4017 Washington Rd., Suite 320, McMurray, PA 15317; 412/914-0575; fax 412/914-0571. ∎

On-axis, 15° off-axis and 30° off-axis frequency response: Rising on-axis response (top trace) will make the speaker sound airy and drooping, while off-axis response (bottom trace) will make the speaker sound very dull. The 15° off-axis curve (middle trace) will sound fairly neutral.

Impulse response test shows that woofer and tweeter are not in time alignment. Small pulse at 4.4 ms is internal reflection coming out of the port.

Spectral contamination test compares a series of input signals (tall spikes) to speaker output. Clarity is very good in woofer range and good in tweeter range.

Distortion (THD+N = Δ trace; 2nd Harmonic = O trace; 3rd Harmonic = ⊐ trace) remains under 0.2% from 100 Hz to 1k Hz. This is excellent performance.

—FROM PAGE 140, LAB ANALYSIS: BENSON STUDIOSTAT 8.2

frequency increases. This effect is significant, as can be seen with the rising on-axis response and off-axis droop. You'd best have a favorite listening position or you will get largely varying HF impressions of your mixes. An LED at the end of a blind hole lets you see if you are on axis—far more elegant than a bite bar!

The passive crossover has an air core inductor for the woofer, a large laminate core inductor for the tweeter, and Mylar caps and sand cast resistors, all mounted on a thick copper-clad board.

ACOUSTIC CHARACTERISTICS

The impulse response measurement is good, but the StudioStat 8.2 woofer and tweeter appear to not be in time alignment. Frequency response is extended and smooth. For flat frequency response, the ideal listening position is about 15 off-axis. We tested distortion at 90 dB SPL at one meter. The woofer measured excellently, and the mid/high range measured very well. Spectral contamination is typically 50 dB down from the signal tones on the woofer and 40 dB+ on the electrostatic element. ∎

Mike Klasco operates Menlo Scientific, an independent acoustical measurement and consulting firm based in Berkeley, Calif. For more information on testing methodology, refer to the Feb. '98 issue of Mix, or visit www.mixmag.com.

AUDIO-TECHNICA AT4054 & AT4055

HANDHELD CARDIOID CAPACITOR MICROPHONES

Nine years ago, Audio-Technica began setting its sights on the pro studio market with the introduction of its AT4031 and AT4051 condenser microphones. In the years since, these models—which were followed by the introductions of models such as the AT4033 and AT4050—have estab-

lished Audio-Technica as a serious contender in the eyes of professionals. Over the same time period, A-T also developed higher-performance handheld mics such as the ATM61HE dynamic and the ATM89R condenser. Audio-Technica has now applied some of the principles of its 40 Series studio mics to a high-end vocal design for live performance. The result is the AT4054 and AT4055.

Priced at $499 each, the two microphones are essentially identical, except the AT4054 incorporates an LF roll-off curve, while the AT4055 has a linear LF response. To keep the two mics distinctive, the 4054 has a thin blue line surrounding its windscreen basket.

Physically, the mics are 7 inch-

es long and weigh 10.6 ounces. The baked-on, non-reflective black finish is tough, and the body fits nicely into the hand and balances well. The mics are shipped with a stand adapter but will fit snugly into standard mic clips.

The windscreen is a tough, stainless steel mesh basket that unscrews easily. Beneath the mesh, an open-cell foam screen provides a second layer of pop protection and can be removed for cleaning. The mic capsule, which was derived from the technology used in A-T's popular AT4050 studio mic, is housed in a hardened steel enclosure. A true condenser design, the AT4054/55 uses a medium-diameter, two-micron-thick, gold-sputtered diaphragm, which goes through a five-step aging process. According to A-T, the pre-aging process helps provide consistent performance characteristics over the life of the mic. From the capsule, the signal is routed through a low-noise, transformer-balanced preamp, ending in a male XLR (wired pin 2 hot).

After a quick reassembly, I clicked on the console's 48-volt phantom power and checked the mics out. Although the 4055 provides response down to 20 Hz, I was surprised by the mic's smooth low frequency response, even on low baritone and bass voices. The degree of proximity effect was just about perfect—just enough to provide an extra boost to a performer who really knows how to "work" a mic, while not being boomy or mushy. Obviously, with the 4054's LF roll-off, proximity effect was substantially reduced, but I liked the fact that the LF attenuation curve is a gentle -3 dB/octave be-

ginning around 180 Hz, then going into a -6dB/octave roll-off about 90 Hz, continuing downward. The curve has a more natural (and far less drastic) sound than the type of LF attenuation typically offered by mics with roll-off switches. Also, the 4054's built-in roll-off is particularly well-suited for use with consoles that lack sweepable HP filters.

Further up the spectra, the midrange was nicely balanced relative to the high frequencies. As with most live vocal mics, the 4054/55's upper response exhibits a presence boost designed to improve vocal intelligibility. But in the case of these mics, the HF rise is a long, gradual slope starting about 1 kHz and ending in +3.5dB peaks centered around 4.5 and 10 kHz. The net effect is a very natural sound that worked well for male and female vocalists.

The mic's polar response is a fairly tight cardioid pattern throughout the midrange. The tightness of the pattern offers ample rejection of unwanted sounds, and isolation from sounds coming from 180 (behind the mic) was excellent. This feature maximizes gain before feedback, though the tightness of the pattern could be a problem with untrained singers who fail to stay on-axis. The mics' off-axis sound was impressive: essentially an attenuated, uncolored version of the on-axis sound.

In creating the AT4054 and AT4055, Audio-Technica has achieved its goals of producing live vocal condenser mics that have a natural studio sound, yet provide excellent feedback rejection. The tight polar pattern may be problematic for some artists, but professional vocalists who are willing to learn how to work this mic should be pleasantly surprised at what they hear.

Audio-Technica U.S., 1221 Commerce Drive, Stow, OH 44224; 330/686-2600; fax 330/688-3752. Web site: www.audio-technica.com. ∎

BY GEORGE PETERSEN

TASCAM TM-D8000

DIGITAL RECORDING/PRODUCTION CONSOLE

So far, 1998 is definitely the year of the low-cost digital mixer. With as many as a half-dozen leading manufacturers entering the market with powerful, affordable designs, a growing number of users and facilities can now take the binary plunge.

Tascam, a company well-known

based V1.0 Dynamic Automation Software.

The TM-D8000 console features 40 input channels, eight mixing buses, six stereo returns and six aux sends. Of the 40 input sources, 16 are provided with mic preamps and 20-bit ADCs; the remaining 24 are intended for digital connection

returns (L + R on a single fader) via the right-hand section. Similarly, the lower bank accommodates tape returns: three sets of TDIF-compatible inputs from DA-88/98/38 decks, etc. Analog input channels are also provided with individual 48-volt phantom power, mic/line trim controls, mic/line selection and a 20dB pad. (These analog controls are the only nonautomated functions on the console.)

For added flexibility, the upper left-hand and center bank can be switched to accommodate TDIF-format digital inputs, while the center section offers an additional choice with AES/EBU format via XLR connectors. (These same four 2-channel inputs also appear as alternate sources to the lower right-hand bank, for hook-up to suitably equipped workstations, etc.)

The control surface is compact and easy to follow, the lower fader bank being tilted very slightly from the horizontal, and in-line with the assignable rotary shaft encoders to the right, along with four group masters plus a stereo monitor master. The center section is further angled to provide easy access to the upper faders and interrogation screen, plus other functions, while the uppermost section houses the various peak-reading meters, timecode display window, etc.

The front panel color scheme is a flat gray, with colored legends to designate important sections and functions. The only major oversight is a lack of moving faders, though, given the system's price, this is an understandable economy; the VCA-style automation, with null lights and familiar read/write/update controls, is easy to understand and use.

SETUPS AND ASSIGNABLE CONTROLS

All input-source selection and output routing options are displayed on a central 640x480-pixel, back-lit LCD screen; selections are made via a bank of four nudge buttons,

for producing cost-effective analog mixers, tape decks and peripherals, in addition to modular digital multitracks, has come up with a clever solution. Combining a very elegant user interface with great-sounding analog and digital I/Os, the TM-D8000 40-input/8-bus Digital Recording/Production Console includes a full-function machine control section and 5.1-channel panning.

Now, with just a few simple interface cables, it is possible to put together a five-machine record/playback configuration, connected via digital ports to the TM-D8000. In fact, for this evaluation session I was using a Doremi V1 video player connected via a 9-pin P2 serial port as the master timecode and picture source, replaying tracks from a single DA-88 plus multiple DA-38 decks, while laying multichannel mixes onto an MMR-8 hard-disk recorder. And all of this mixing power is available for just $9,999, complete with Mac-

to a user-selectable choice of TDIF or AES/EBU format signals. For full compatibility with up to five DTRS 8-track decks (or perhaps a multichannel workstation and/or a couple of ADAT machines), the analog ports can also be switched to accommodate digital sources. Master clock source—either generated internally, or locked to an external word clock stream—can be set to a 44.1 or 48kHz sampling rate, with the usual video-based pull-up/downs. No sample-rate converters are built into the mixer.

The TM-D8000's front panel is laid out with 24 upper short-throw and 24 lower long-throw faders; a convenient Swap function enables sources to be flipped as necessary. Normally, the upper bank of modules handles inputs: eight mic/line-level analog sources via the left-hand module, eight more mic/line-level analog sources via the central section and six stereo

BY MEL LAMBERT

plus a familiar scroll wheel. Effects returns and aux sends are normally 20-bit, oversampled analog; the user can also select AES/EBU-format digital ports for Stereo Return 6, while Mono Aux Send 3 and 4 can also be routed to a similar-format output. A companion Transport Control Center incorporates a jog/shuttle wheel for controlling single or multiple audio/video transports.

Four assignable insert points can be accessed post-EQ/pre-fader, and routed to a bank of dedicated A/D and D/A converters. (I was unable to determine the exact processing delay time required to send a signal from and then back into the console, but it seems to be small enough to be inaudible.)

Four-band parametric EQ is available on all input channels, plus the stereo bus output. After selecting a channel to be modified—either by accessing the Select button above the corresponding channel fader, scrolling through a screen menu or simply moving the fader—a bank of 20 assignable rotary encoders and 32 soft switches below the LCD screen provide access to center EQ frequency, cut/boost and bandwidth settings. Upper and lower EQ bands can be set to shelf or peak/dip operation.

For added flexibility, each EQ band runs from 20 to 20k Hz; overall response is displayed on a section of the screen. In use, the EQ is very elegant, precise and sounds very sweet.

A bank of eight dynamics sections can be assigned to signal channels or the stereo bus on an individual basis; insert point is post-EQ/pre-fader. Gating, compression or expansion settings are again mapped to the assignable rotary controls (including threshold, attack, release, ratio, decay and hysteresis); input-output response is displayed on a section of the LCD screen. Four Cut Groups are available, in addition to four VCA-style Fader Groups with individual master faders.

The numerous input/output connections on the back panel include XLR and balanced ¼-inch jacks for the mic- and line-level analog inputs; XLRs and RCA jacks for stereo line-level outputs; two pairs of XLR/RCAs for analog 2-track inputs; unbalanced jacks for the analog aux sends and reverb returns; ¼-inch TRS jacks for four assignable inserts and 16 analog-source inserts (for patching analog processors, etc.); MIDI In, Out and Thru (for MIDI Machine Control of external decks, as well as SysEx dumps of

snapshot automation data, etc.); a pair of jacks for GPI outputs; XLRs and RCA connectors for the various AES/EBU and/or S/PDIF digital I/Os; timecode in; word clock in/out/thru (via unbalanced BNCs); plus five 25-pin D-Sub digital I/O connectors for interfacing TDIF-compatible recorders. A single 15-pin D-Sub provides machine control for DTRS recorders; additional decks and systems can be accessed via daisy-chained interconnects.

After selecting each channel's signal source via a dedicated Setup Page, outputs can be routed to any or all of the eight buses or master L/R stereo bus. If anything other than a stereo pan is selected on any channel—for example, 4-channel LCRS or 5.1-channel surround with subwoofer—then the buses are reassigned accordingly. Now each bus becomes a dedicated output designation, with full post-fader surround-sound panning and routing—no need to use up a spare aux channel(s) to provide front-back panning. MIDI-capable joysticks can also be patched into the circuit for dynamic pan control.

Currently, if LCRS or a similar 4-channel pan law is selected, then all channels route to the same four buses. A

software revision in the near future should enable split busing for the TM-D8000 and will provide, for example, LCRS M&E plus LCRS dialog stems to be printed simultaneously from the TM-D8000. (Of course, you'll also need some form of external monitor switching, but that shouldn't be too difficult to set up.) All in all, the console's current and planned surround sound routing and pan capabilities are outstanding in a unit at this price.

Once bus outputs have been routed to the various multitrack decks (use-fully, all eight buses are paralleled to each of the five TDIF connectors), a Menu Setup selects which deck will be master, and the types of slave relationships you need for the others. As might be expected from a company like Tascam, the system can be set to automatically interrogate each of the transports connected via the 15-pin Tascam machine control interface and related ports, and then display the type of decks it finds.

The TM-D8000 includes the functional equivalent of one of the firm's RC-898 Remote Controllers, with the ability to store up to ten setups in the mixer's memory, including autolocate points. Rehearsal mode, auto punch in/out and track record select are also available. Other species of tape- and disk-based machines can be controlled via MIDI Machine Control and/or P2/RS-422 machine-control protocols.

If the mixer recognizes a Tascam transport with additional control functionality, most of these can be controlled from the menu screen. For example, the TM-D8000 can remotely control such parameters as track delay, generator functions, timecode offset, pre-/post-roll, clock sources, etc., for DA-series MDMs.

BUILT-IN SNAPSHOT AND EXTERNAL DYNAMIC AUTOMATION

The TM-D8000's built-in snapshot automation handles 99 complete console-wide Scenes, plus 99 individual EQ setups (19 modifiable factory-set, and 80 user-programmable), 99 dynamics set-ups (19 factory-set) and ten input/output/group routing setups; memory contents can be off-loaded as SysEx data to a MIDI-capable sequencer or recorder. Any one of the 99 Scenes can be stored and recalled from a library either manually, via MIDI program change, or assigned to SMPTE or MIDI Time Code offsets.

In addition, dynamic automation of console parameters is processed internally, but can be controlled via a high-speed serial interface from an external Power Mac (7100 or above). Using a series of setup screens on the Mac, a variety of mixer parameters can be scanned and memorized to hard drive, including faders, cuts, EQ, pan and aux sends. Users can also set up ten custom views with icon-based displays of level-control elements and other adjustments on the Mac's monitor. (You may want to see all EQ settings for example, or selected output group faders; using drag-and-drop techniques, it's possible to quickly build customized, re-positionable screens to suit the specific requirements.)

The integrated meter bridge houses an array of 15-segment bar graphs that can be set to display output levels from upper or lower banks of signal sources—either pre- or post-EQ—or a choice of stereo returns, bus levels or aux sends. In addition, the meters can be set to display fader positions when the mixer is under automation control, or when faders are assigned to fader groups. Below the meter are separate record function keys used to arm the record-ready mode of external DA-Series MDMs, and indicators that show the

record status of assigned tracks.

A dedicated pair of 30-segment meters monitor levels on the main stereo bus. Dual-mode operation shows average levels on the main segments, with a single LED displaying peak values. An "over" light can be set to follow user-selectable -16dB FS (Tascam), or -20dB FS (SMPTE) reference levels.

Monitoring functions on the TM-D8000 are comprehensive. With so many sources available to send to the 2-channel control room and studio monitoring system, the user needs some way of quickly setting up different assignments and sources, depending on what is occurring during the session. Normally, the upper faders feed the various multitrack decks and/or workstation, while the lower faders monitor the bus sends/multitrack returns into the stereo bus that connects to the CR monitors. Alternatively, during remix, all sources can be routed to the two mix and monitor buses. As mentioned earlier, system I/O setups are available at the press of a button.

A wide selection of monitoring sources are available, including stereo mix, 2-track return 1 and 2, one of four stereo digital inputs, or any of the aux sends. Mono summing and dim switches are provided. And individual solo is available from each channel, either PFL or solo in-place.

Should the TM-D8000 crash for any reason—a rare occurrence, as I discovered during extended evaluation sessions—the entire console reboots within just a few seconds and returns to its previous configuration.

IN A NUTSHELL
Some five years in development, the Tascam TM-D8000 truly represents a unique solution for users who are searching for a cost-effective digital mixer. Realizing that budget-minded recording and production facilities need an integrated solution—and will probably be using MDMs, in addition to disk-based workstations—the designers obviously decided that machine control was an essential part of the equation, rather than an add-on. Also, the need for surround sound mixing functions seemed to be high on their list of essentials.

The result is a powerful system that packs a great deal of processing power into a compact package. The control surface is clearly laid out and a breeze to master, with fixed and assignable controls exactly where you would expect to find them. And the array of analog, TDIF, AES/EBU and S/PDIF

interconnects is versatile, to say the least; no extra plug-in cards are required to accommodate different formats.

My complaints are both major and minor. I really would like to have seen moving-fader automation offered, at least as an option. (The competition seems able to provide such functions; why not Tascam?) And I would like to have seen a larger LCD screen—it is rather petite, but usable. (For complex reasons, it would be expensive to offer a separate VGA-compatible video port.)

But these gripes are offset by the integrated functionality provided by the TM-D8000, plus the powerful static and dynamic automation of all front-panel settings and I/O routing. With onboard machine control that supports a variety of industry-standard protocols, the TM-D8000 easily integrates into the most demanding production environments. All in all, it's a system that fits its intended market perfectly.

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AUDIX OM-6

DYNAMIC MICROPHONE

Audix has been creating a buzz in the industry with its studio monitors for some time, but in my opinion it is the company's stage microphones that have really put Audix on the map as a major player in the industry. It seems that Audix has a grasp on what live sound engi-

neers need in today's competitive sound reinforcement market, where the need for sound quality sometimes gets lost in the fight for increased volume.

The OM line of live sound microphones has been quite successful for Audix, and the OM-6 is a good example of why. A hypercardioid dynamic stage vocal microphone, the OM-6 has a frequency response of 48 to 19k Hz and offers incredible gain before feedback. From its VLM (very-low-mass) capsule type D design down to its gold contacts, the OM-6 is a solid, well-designed microphone. Outstanding off-axis rejection, a >30dB background noise rejection and an extremely high SPL-handling capability (>144 dB) are all features that recommend the OM-6 for the stage environment.

IN THE FIELD

From the time I picked up an OM-6 for testing until the night before I had to return it to *Mix* magazine, I had this microphone working, and working hard. On my first night out with the OM-6, I used six of them as front line vocal microphones in a festival situation.

During sound check, the monitor engineer had some trouble getting used to the OM-6. We quickly realized that you have to hit the gain a little harder with an OM-6 than, say, with an SM58. The mids and highs were smooth and full-bodied with very little color, yet they maintained a characteristic all their own. The low-end response was flat with very little boominess, which meant that the microphone lacked weight on the lower end of the audio spectrum.

BY JAVIER ALCAREZ

This was only a problem with female vocalists; their voices were not cutting through in the monitor mix, and we had to increase the vocals significantly.

Fortunately, an increase in volume was not a problem for the OM-6—with its hypercardioid pattern, high-volume environments did not affect its performance. In fact, feedback was never an issue when using the OM-6, even in the most demanding situations. I was on one show where the lead singer decided to climb on top of the main stack and dive into the audience, with the OM-6 in hand. From the front-of-house position, I saw the lead singer surfing across the crowd, in front of the mains, singing (well, actually screaming); there were absolutely no feedback problems whatsoever. Show after show, I found myself reaching for the OM-6. It took some getting used to, granted, but like any quality piece of equipment, once you feel comfortable and confident with it and you know which applications it excels in, it can become an effective weapon in your arsenal.

CONCLUSION

At $349, the OM-6 is strong enough to challenge almost any microphone on the market. The sound quality was great, durability was outstanding, the mic is cosmetically pleasing and it fits into a standard microphone clip. What more can you ask for? Used in the right application, the OM-6 will far exceed your expectations. I am quite sure that, in time, Audix will design a microphone that will set standards for the industry.

Audix Corp., P.O. Box 4010, Wilsonville, OR 97070; 503/682-6933; fax 503/682-7114; www.audixusa.com. ∎

Javier Alcarez is a live sound engineer in the San Francisco Bay Area.

CinemiX –
The New 5.1 Standard

ENSONIQ PARIS

PROFESSIONAL AUDIO RECORDING INTEGRATED SYSTEM

Best known for its sampling keyboards and synthesizers, Ensoniq moved into pro audio with its popular DP/4+ and DP/Pro line of signal processors a couple years ago. Ensoniq's newest product is PARIS (Professional Audio Recording Integrated System), a cross-platform, card-based hard disk recording system.

PARIS was developed as a joint venture with *Mix* columnist

Stephen St.Croix's company Intelligent Devices designing the user interface and writing most of the associated software, and Ensoniq developing hardware, DSP and effects, which are very good. (PARIS features 12 real-time, 24-bit effects, including reverb, delay, chorus, compression and expansion.) However, it should be pointed out that St.Croix applied no pressure on me concerning this review, and the opinions stated in this piece are solely my own.

The system is based on several components and uses PCI technology. Installing the EDS-1000 card on either a PC or PowerMac is straightforward. I used PARIS with Power Computing's Power Tower Pro

2000—it's a solid machine that's very stable. The EDS-1000 card has six ESP-2 chips handling all of the audio processing and effects, leaving the computer's CPU free to handle screen functions and communicate with the card itself. According to Ensoniq, when the system expands to include playback of 128 virtual tracks, some of the EQ functions will be handed over to the computer's CPU, but currently the host processor is not taxed in this fashion.

PARIS is available in a variety of I/O configurations: The PARIS 1 bundle ($2,895) features an Interface 2, with a single pair of analog ins and outs; PARIS 2 ($3,395) is bundled with the Interface 442 (four analog ins and outs and a pair of S/PDIF connections). The system currently records at 24-bit resolution, and the sound quality is sumptuous. By the time this review prints, Ensoniq/ID will ship PARIS 3 ($3,895), which includes hardware (MEC—Modular Expansion Chassis) to expand the system, and a software update that allows playing up to 128 tracks at one time,

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BY GARY ESKOW

rather than the 16 tracks that the system can currently handle. In addition, 24-bit, 8-channel I/O cards are available at $499 each, and more expansion options are in the works.

The final hardware component is the Control 16, a sleek 17-fader (16 tracks plus one Main stereo output) surface that operates much like a JLCooper CS-10. If you're used to working on analog mixers where each knob handles a single function you might grumble at the learning curve involved here. From the perspective of a composer/operator whose only tactile interface has been the mouse, the Control 16 is a great bonus—the faders have a solid throw, soloing a particular "track" or assigned output source is easy, and getting to the various functions becomes second nature quickly.

Displaying all of the functionality of a system that serves as a mixing board and track editor on a computer monitor such as my 17-inch screen necessitates compromise. By and large, Ensoniq and ID have done an excellent job of giving the user a variety of Windows—each contains enough information to handle specific tasks in a thorough manner. The mini mixer, which shows all 16 faders in reduced size, is extremely useful, but serious users will probably use PARIS in a multi-monitor setup. PC owners with a Miro Twin display card will be able to spread displays out across several monitors, just as Mac users can.

PARIS lets the operator set up a variety of different Views—up to 99 per Window—which makes it easy to home in on a given task. Let's say that your piece has 16 tracks, with a duration of 2:34. You'll probably set up one view that lets you see all 16 tracks on the editor Window, with the entire length of the tune in view. As PARIS provides control over how many tracks are visible at one time, and lets you

scroll the time window down to less than a second, you may also set up a more detailed view for fine editing, say two tracks (which will, of course, be quite a bit larger now) and eight or nine seconds' worth of music.

PARIS has eight discrete stereo aux sends, in addition to individual channel inserts, and four bands of parametric EQ per channel, so you'll probably want to create a view within the Mixer window that will expand a number of aux sends, and another that gives you access to all of the EQ bands. Is this as easy to use as a traditional console? No, but to my thinking it's a well-thought-out compromise, and at its price point, an easy trade-off to make.

I would have liked to see waveform editing within the PARIS environment and have heard that it will be offered in the future. As things currently stand, PARIS ships with PEAK LE and Steinberg's WaveLab Lite; tracks that have been cleaned up in these editors may then be slotted back into their original place within your PARIS project.

Most PARIS users will be using the program in conjunction with a MIDI se-quencer. Anybody using OMS, use care when configuring your system: PARIS, like other systems, uses OMS to take command of any sequencer that works with this Opcode-designed MIDI proto-col. I have several MOTU MIDI Time Piece patchbays, which means that gear from four different companies—Op-code, Ensoniq, MOTU and Steinberg (the piece I recorded was developed in Cubase)—was involved in the sync process, and it was challenging trying to get everything to work together. In my case, these were caused by incompati-bilities between OMS and MOTU's FreeMIDI extension.

PARIS organizes recorded audio files in a three-part structure. The highest ar-chitectural group is the audio file itself. Segments—parts of the whole—reside in the Object Bin. When you take a seg-ment from the Object Bin and move it to a track you will probably want to ma-nipulate the data within the editing win-dow environment, which is called the Playing Field.

Let's say you copy a 2-bar tom fill and paste it to a second location. This edit, an Object, stays on the Playing Field and will not clutter up the Object Bin unless you feel it is important enough to be stored there as a Segment. The terminology is somewhat confusing in that the Object Bin is designed for Segments and not Objects themselves! However, aside from this inconsistency, this three-part way of working is well-thought-out.

The Playing Field has lots of fea-tures. For starters you'll want to turn on a few rulers, say the bars/beats and minutes/seconds ones. As you hit disk with your first pass, you might drop in markers on-the-fly and edit them to or-ganize your tune by section. These are SDII-style markers with a few limita-tions—for example, you can't type in descriptive texts. (I tested Version 1.0 software, and given the good job that ID has done, I don't doubt them when they say that this feature will be added.)

I particularly liked the fact that you can use either a time-locked Constrain Selector tool to grab data on a track or the regular selector that is not refer-enced to a given place. This lets you move data around any way you choose, using the tool that is un-locked. Once you select the Constrain Selector tool, the data may be assigned to any track, but it goes to its original

project time location, so you're never in danger of losing the internal synchronization of all tracks that have been laid to disk.

Speaking of time functions, the Nudge and Slip feature is happening. This lets you take a track that doesn't feel quite right and push it around. If you want to give a laid-back feel to that snare part, you can take the track and push it back (or forward) by increments of 1, 5, 10, 25, 50, 75 or 100 milliseconds. I took a bass part that came over from the sequencer a bit out of time and locked it up very quickly.

PARIS has lots of features—I could easily fill three times the alloted space with detailed descriptions—but by and large they are intuitive, which is good because the manual leaves a great deal to be desired. What it gives is written well, but many of my questions had to be answered by Ensoniq's support staff because they were not discussed in the manual. A supplementary "Introduction" manual that does a better job of laying out the basic operations is now offered.

Can PARIS be improved? Certainly. Some easy fixes—I would prefer for the color scheme on the mixer knobs be rewritten so that all volume knobs are one color, EQ knobs another, etc.—seem simple, although avoiding overtaxing a marginally powerful CPU might have been a concern here. Others—such as the lack of an automation editor and audio scrubbing in V.1.0—will be addressed in future software revisions: Version 1.2, shipping in March, includes a full automation editor and is available as a free download, and scrubbing is in the works.

The bottom line for me, however, is audio quality. In session, I wanted to record four pieces that combined MIDI tracks with live performances by alto player Baron Raymonde. I previously dropped all of the 28 sequenced tracks to hard disk using a popular sequencer/hard disk recording package, going analog in from my console to a Panasonic 3700, using its converters to output a 16-bit S/PDIF stream to my computer by way of a popular card. Ultimately the equalization limitations of the sequencing package forced me to avoid tracking this way, but I was very impressed with the sound that got into my computer—until I recorded the very same tracks with PARIS.

The sound of this system is, simply put, gorgeous. Oberheim Matrix 1000 fans know that many of the great bass sounds on this box (I used preset #60, untweaked) have wild harmonics floating around. These sounds are among the hardest to reproduce accurately on tape or disk. PARIS captured almost the entire frequency range of this patch with little loss of the highs or the gutsy low end. As the MIDI data—which consisted of 909 drums, the bass, acoustic guitar samples and several pads—was given MIDI compression to max its output, the 20-bit A/D converters of the Interface 422 do not strike me as the sole reason why the tracks sound so rich. Rather, the filters that Ensoniq employs must be given a great deal of credit for the sound.

Ensoniq/ID has told us that many of the features I'd like to see—waveform editing, MIDI sequencing, more tracks—will be available in the future, possibly by the time this review is published. Keep your eyes open for developments as they are brought to market.

Thanks to engineer Paul Wickliffe and saxman Baron Raymonde for their assistance with this review.

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LAWSON L47MP

TUBE CONDENSER MICROPHONE

I often find the pro audio products made by small companies to be more compelling than those mass-produced by larger corporations. The niche designer (frequently also the president of the company) usually has an idealism and obsession with audio that I relate to. Unfortunately, the result is often a stringently engineered, rapturously musical product that costs too darn much for my pocketbook. Not so with the Lawson L47MP, a supremely crafted, stunningly musical microphone that, at $1,995, most professional studio owners can readily afford.

STRIKING APPEARANCE

The L47MP is a multipattern, large-diaphragm tube condenser. Straight out of its bombproof (airtight and watertight) Pelican storage case, the L47MP makes a bold statement. Shaped much like an U47 and measuring an impressive 9¾ inches long and 2⅜ inches in diameter, virtually its entire body—including cable connector and double-mesh head grille—is plated in 24-karat gold. It's a look you'll either love or hate. Virtually all of my clients think it looks gorgeous, and I agree.

Underneath the gold veneer, the mic's body is machined from solid brass, bead blasted and plated with nickel. Its substantial weight (2 pounds) and solid construction inspire confidence.

The Pelican case ships with the mic. Also included is a sturdy, proprietary power supply and companion 6-foot, three-prong, detachable IEC power cord. A knob on the power supply allows you to make continuously variable adjustments to the mic's polar pattern, from omni to cardioid to bidirectional (and all patterns in between). A 30-foot, shielded Mogami cable (fitted with gold-plated Neutrik connectors) is provided for hooking up the L47MP to a locking 6-pin XLR

connector on the power supply; this delivers power to and audio from the mic. Other features of the power supply include a switch for padding the mic 12 dB, a power switch with inset red LED and a 3-pin male XLR for audio output to your mixer/mic pre.

The 12dB pad comes after, not before, the output stage. From a user's perspective, I think most tube mics are better off padded than pre-attenuated. The latter scheme often degrades the already critical signal-to-noise in tube designs past the point of usefulness. Lawson's design makes sense.

A swiveling mic adapter, made

BY MICHAEL COOPER

of high-impact plastic, is also supplied with the L47MP. As the capsule element is internally shock-mounted, an external suspension mount is not needed. The mic is secured by sliding its wide-diameter connector base into the adapter's split O-ring clamp, which is opened and closed by tightening a knurled knob. This arrangement is the most hassle-free and foolproof scheme for hanging a mic (upside down or right side up) I've seen. In fact, the complete microphone system—right down to the rubber feet on the power supply—demonstrates extensive forethought and impeccable construction quality. This product is a joy to use.

INSIDE DETAIL

The L47MP's capsule features dual 1-inch-diameter, gold-sputtered membranes. Gene Lawson (president of Lawson Inc.) modeled the capsule's design after the M7 capsule used in the Neumann U47 and M49 microphones, with modifications. For example, the diaphragms are only 3 microns thick (the original M7's were 7 microns) to optimize transient and high-frequency response. Each capsule is precision-machined from solid brass and then hand-lapped in the Lawson lab.

At the heart of the L47MP is the venerable 6072 vacuum tube, coupled through a Jensen transformer. Lawson stringently tests and selects the tubes for all its mics to meet low-noise guidelines. Additionally, a low-loss tube socket is employed, which uses military grade, heavily gold-plated beryllium copper contacts for better grip, low contact resistance and extended life.

The L47MP's sensitivity at 1 kHz is rated a modest 11.4 mV/Pa, and the A-weighted equivalent noise level is 22 dB SPL—typical specs for a tube mic. The maximum SPL for 1% THD at 1 kHz is

a very modest 117 dB, suggesting careful placement on loud signal sources.

A cardioid-only version of the L47MP, the L47C, is available for $1,695. Both mics are only sold factory-direct, which partially explains how the prices can be kept so low.

THE SOUND

As with all multiple-pattern condensers, changing the L47MP's polar pattern results in a change of timbre, making for a very versatile mic. The omni pattern exhibits a dip in the 3 to 5kHz range, and a broad peak centered roughly at 10 kHz. As you increase the L47MP's directionality, the timbre becomes more and more present as midrange response is boosted and very high frequency response is diminished. The mic sounds quite bright in bidirectional mode.

My first critical listening test was an A/B/C comparison of the Lawson L47MP, RØDE Classic and AKG C-12VR microphones, all set to cardioid and recorded to separate ADAT tracks via a Millennia Media HV-3 preamp and the Yamaha 02R's 20-bit converters. The sound source was female spoken word. The L47MP has a deeper bottom than the Classic; I liken it to an AKG TLII on steroids in this regard. But the L47's bottom is not accentuated in the upper bass as with the C-12VR, which has by far the overall biggest bottom of the three mics (not necessarily always a good thing). The L47MP is more present in the midrange frequencies than both the Classic and the C-12VR, which have a darker sound even though they both offer more high-end sizzle and better transient detail. All three mics have an uncanny ability to make a sound source fatten or grow in perceived size, a cherished characteristic of the best tube mics. In this regard, the L47MP sounds fatter than the Classic, but the C-12VR takes the grand prize. The C-12VR is also the smoothest-sounding of the three mics.

IN SESSION

When you tuck vocals recorded with an L47MP into a mix, something magical happens. The track somehow manages to sound incredibly fat, yet retains its presence. All the warm, lush texture you would want from a tube mic is there.

Male rock and jazz vocals both had a tight, full bottom and a velvety fat yet clear sound. Although these tracks were not extraordinarily detailed up top, they nevertheless sounded more than adequately articulate. This quality makes the L47MP a good choice for recording sibilant singers.

Next up were some female vocals, recorded via the HV-3 to 24-bit digital (the 02R's V2 software allows you to record 24-bit audio onto two ADAT tracks; you *gotta* hear this!). Six inches from the mic in cardioid mode, the singer sounded warm yet clear, with a beautifully soft and shimmering high end.

The L47MP has a very flattering proximity effect, but tends to overload when you're screaming right on top of it. The "wide cardioid" position usually yielded the best results for recording lead vocals; the figure-8 pattern often sounded too bright for this application. The hypercardioid mode's moderately boosted presence was just the ticket for recording male rock backing vocals. A testament to this mic is that I rarely had to employ any EQ to vocal tracks at mixdown (the one exception being some low shelving EQ for a vocalist who almost ate the mic).

The next task was recording a variety of Native American wood flutes with timbres ranging from dark and soothing to bright and almost shrill. The deeper and darker the inherent tone of the instrument. the more directional pattern was called for. On mid-sized flutes, the L47MP's cardioid pattern was chosen for its softer, darker midrange and breathy highs. The mic's figure-8 pattern sounds more present yet less detailed: this was a more complementary timbre for some bassier flutes that had a raspy or beady high end.

Overall, the L47MP lent a rich, fat, warm, golden tone to the bigger flutes. But on the smaller, soprano range flutes, the L47MP was a tad too bright. The C-12VR produced a more flattering, softer, darker timbre on those instruments.

The L47MP's combination of warmth and presence make it a natural for recording electric jazz guitar. The mic never sounded harsh or glassy; instead, the sound was soft and round. Perfect! Similarly, I got excellent results miking up the Leslie cabinet on an XB-2 Hammond organ with the L47MP's mode set approximately to supercardioid (only the omni, cardioid and bidirectional modes are marked on the power supply).

Finally, I miked the cabinet of an electric bass guitar in figure-8 mode. This pattern's hyped midrange and understated highs gave me the hard-driving tone I was looking for on this rock 'n' roll session. The timbre was perfect for rock bass: present, huge and with a big, tight bottom.

CONCLUSIONS

If you're in the market for a world-class tube condenser, you cannot go wrong with the L47MP. It has the uncanny ability to sound great on almost any vocalist, as well as on a wide variety of instruments. The L47MP's construction is impeccable, it looks great, and it's quite affordable. What more could you ask for? I cannot praise this microphone enough. Don't wait—buy it.

Lawson, 2741 Larmon Dr., Nashville, TN 37204; 615/269-5542; fax 615/269-5745. Web site: www.lawsonmicrophones.com; e-mail: mail@lawsonmicrophones.com. ∎

Michael Cooper is fat, rich and very present.

P O S T

EDITING BEFORE THE EDIT

GATHERING YOUR PERSONAL EFFECTS, PART 3

by Larry Blake

I don't envy my colleagues who had to start recording and organizing sound effects libraries in the early days of Hollywood film sound. It's not their lack of a good database program or even the nonexistence of stereo recorders that draws my sympathies. Having to search through card files never held anyone back creatively, and all films were in mono, so

S C R I P T

sound, when all sound was recorded in this manner. Just take a quick look at what we take for granted today: rewinding tracks in sync, punch-in recording, recording on separate stems, total console automation. The closest we come to optical recording—making the matrixed stereo soundtrack that is transferred to a stereo optical negative—is when we are monitoring through calibrated optical clash simulation. And to make the process even easier, in the case of SR-encoded tracks, we have more headroom than we should ever need.

Enough of my guilt. The fact of the matter is that Hollywood sound personnel made the most out of their state-of-the-art equipment. There is the final frontier that

In the days when all sound was cut on 35mm (either optical or magnetic), reprints of the master sound recording would be in a box, and when the last one was used, a transfer order would be put in to replenish the box. God help you if you cut the master into your film; this fate undoubtedly befell many a mag master in the middle of the night at the hands of a desperate sound editor.

This obviously couldn't happen to sound effects masters that were recorded on ¼-inch tape, a procedure that began in the '60s with the introduction of Nagra tape recorders, which would become the standard of the film industry (with due respect to Stellavox and Uher). Battery-operated ¼-inch ma-

PHOTOMONTAGE TIM GLEASON

what did they care?

What did piss them off, I'm quite sure, was the fact that they were recording on huge 35mm optical sound cameras. (I would put quotes around that word, but optical recorders really *are* cameras.) Once you added up the power supplies and electronics, you needed a truck to carry them around. And it gets worse.

Because optical sound recording is a photochemical process, you have to develop and print the negative before you can hear what you've recorded. You really have to respect what mixers (both production and re-recording) went through for the first 20 years of film

the technophile in me regards as the one piece of equipment that has indisputable benefits over "prior art," as they say in patent applications: digital audio workstations. Brilliant, original observation, I know, but what does this have to do with the topic at hand—sound effects libraries?

Workstations can be a powerful tool not just in editing sound against picture but in editing the original field tapes before they are entered into the effects library. This month's column, the third in a four-part series on sound effects recording and organization, will deal with some simple techniques that I've developed for feature films.

chines gave effects recordists the ability to shoot (see how that word has remained in film sound parlance, even in nonoptical sound usage) sound effects anywhere, anytime.

Once the tapes came back, it made sense to edit them, but since you were editing the original field tapes, any edit was permanent. Additionally, that edited ¼-inch tape was a master and was exposed to wear and tear simply in the act of rewinding and auditioning.

The procedures have changed substantially with today's near-universal use of DAT in field effects recording. (Now, even a Nagra

BAD ANIMALS SEATTLE

by Tim Moshansky

For a time in the early 1990s, Bad Animals was a shining example of the "post-all-day, rock-all-night" wave sweeping through facilities in secondary markets. Suits would come in from the ad agencies, lattes in hand, for an afternoon slot on a McDonald's spot, while a television show was being prepped in an adjacent suite and a CD-ROM audio track was being mixed next door. Down the hall, young rockers from Seattle's booming grunge scene would be tracking an album. Companion facility Studio X was going full-bore with music and had gained a national reputation very quickly, and Bad Animals was attract-

ing major-label bands from around the country.

Then, seemingly out of the blue, a press release was issued last summer announcing that owner Steve Lawson was pulling out of the music business and concentrating exclusively on audio post. It came as a surprise to many, but in retrospect, it was a solid business move. Today, Bad Animals is right where it wants to be.

"Our marketing and advertising clients had really dropped off," says Lawson, last year's chairman of the Society of Professional Audio Recording Services. "And a lot of the reason it had fallen off was that our resources were spread very, very thin. Because we had two divergent clienteles, even though they are both very cool, it was really hard to make it work.

"The biggest issue was being able to find staff who could interact with both sides without having to double-hire," he continues.

Above, left to right, Bad Animals sound designers Mike McAuliffe and Suzie Brutke, president Steve Lawson, and sound designers Dave Howe and Gary Littell. At right, The Red Room.

"It got to be where they weren't really complementary businesses; they were very jealous of each other. If we bought something for the music side, the post-production side would be jealous, and vice versa. It was prudent for us to make a decision as to which business we wanted to be in. We saw that the record budgets were dropping, and the

Seattle music scene had kind of passed by. The quantity of work wasn't there, especially for three rooms. There was also a lot of competition. When we put Studio X in, it kind of raised the bar all over town; people were putting in SSL boards. other people upgraded their old Harrison

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BASH, BOOM, BANG INC.

A SOUND DESIGN QUARTET IN THREE-HOME HARMONY

by Kim Wilson

Bash, Boom, Bang Inc., based in Pacific Palisades, Calif., specializes in composing music and sound design for broadcast advertising in the national and international markets. Executive producer John Bashew, along with a strong creative team of Chris Desmond, Alan Pasqua and Roger Bashew, have developed spots for Toyota, Acura, Kmart, Eastman Kodak and Intel, among many others.

"What we offer is a strong team of individuals," declares John Bashew with confidence. "Unlike other music houses, we have no creative director. Each one of us has a broad range of talent and experiences and is capable of taking an idea from concept to completion. These three guys attack every project with the same passion and creativity, whether it calls for a 60-piece orchestra or simple guitar part."

"Every one of us has worked with clients before," adds Desmond. "In this environment, clients work with the musicians directly. There is no need for a filtering process. We seem to get a more open and creative dialog in this relaxed setting."

A native of South Africa, John Bashew learned the art

PHOTO ED COLVER

Clockwise from top left: Executive producer John Bashew, composer/sound designer Chris Desmond, composer/sound designer Roger Bashew and composer Alan Pasqua.

World Radio History

ON THE SET WITH THE BLUES BROTHERS

by Jeffrey Wolpert

Okay, so *Blues Brothers 2000* came and went, but as Clint Eastwood once said as head judge at the Cannes Film Festival, there's something to like in every movie. In *BB2000*, that would be the music, specifically the closing "battle of the bands" scene.

The music for the movie included a who's who of R&B, soul and blues, with artists such as Aretha Franklin, James Brown, BB King, Eric Clapton, Erykah

Badu, Dr. John and many others performing live or for the soundtrack. Some of the bed tracks were recorded in New York at Sound on Sound by Harvey Goldberg, who mixed the soundtrack, as well. Tracks used in the film were mixed by myself and Goldberg at McClear Pathe Recording Studios in Toronto, with music producer extraordinaire Paul Shaffer assisting.

Tracks such as "R.E.S.P.E.C.T.," "New Orleans" and "John the Revelator" were recorded live off the floor

(only vocals were overdubbed), and the first take was almost always used. Studio One at McClear Pathe is fairly large (41x31 feet) and has a good-sized isolation booth (20x14), which helped to keep everyone comfortable. Principal singers were generally available in Toronto for two days, so vocals were recorded and tapes prepared for playback on the set. These tapes were 8-track DA-88s, with vocals separated

Above: (L-R, foreground) John Landis, Paul Shaffer, Jeff Wolpert (console), Aretha Franklin.
Left: (L-R) Paul Shaffer, Harvey Goldberg, Hohn Biondich and Jeff Wolpert.

from the band in order to facilitate monitoring for lip sync. (A note of caution: Simply plugging a video reference into the video-in jack and running the DA-88's clock-on video will NOT ensure the playback speed. I've tested this, and there is no change when feeding a 29.97 or 30Hz reference. However, the DA-88's internal reference is solid enough to ensure lock if the original source was resolved to the desired speed.) Occasionally, the vocals were recorded live on set by Doug McClement of the Live Wire Mobile.

There was one major exception to this format. The ending sequence of the film takes place at a battle of the bands,

so songs were shot and recorded live on the set. The first tune, "How Blue Can You Get," was played by the Louisiana Gator Boys, with a lineup including BB King, Eric Clapton, Bo Diddley, Travis Tritt, Jimmy Vaughn, Jeff Baxter, Gary US Bonds, Lou Rawls, Koko Taylor, Isaac Hayes, Tommy McDonnell, Charlie Musslewhite, Dr. John, Billy Preston, Steve Winwood, Grover Washington, Clarence Clemens, Joshua Redman, John Faddis, Willie Weeks and Jack DeJohnette.

The second song, "New Orleans," has the same lineup plus the entire Blues Brothers Band, which complicated matters because the Gator Boys were live but the Blues Brothers synched to playback except for vocals, which were live. Westbury National Sound handled the FOH, monitor mixes and playback levels. Doug McClement and the Live Wire Remote handled the 48-track analog recording, while I had a separate split and mixed live 8-tracks for safety and playback. (Sound recordist Glen Gauthier and his Noize Boyz handled the on-camera dialog.) This was the one instance where we mixed after the picture was cut. Director John Landis cut between takes, which meant that we had to construct a final mix by editing the multitracks. This was accomplished at McClear Pathe using a new Pro Tools 4.0 24-bit, 32-track system.

With 22 songs to mix, Harvey Goldberg came to Toronto, and he and I ran two studios simultaneously in order to meet the delivery deadline. Wherever possible, we went back to the original session recordings. This meant running any combination of three analog 24-tracks, four DA-88s and 16 tracks of Pro Tools. The SSL 6000 consoles at McClear Pathe were well-suited to this type of work, allowing for simultaneous stereo and split mixes. Total Recall was also invaluable as decisions were made and approvals delivered. All the film mixes were 16-track LCR splits sent to Todd-AO in Los Angeles for final dubbing. The record mixes were on ½-inch, 2-track analog with Dolby SR. Mastering was by Ted Jensen at Sterling Sound. ∎

Jeffrey Wolpert is an engineer at McClear Pathe Recording Studios in Toronto.

feels like a ton.) But for all of the advantages of DAT—and we're not going to get into a "but guns sound better on analog" discussion here, are we?—there is one enormous disadvantage: It can't be edited.

Of course, it *can* be edited machine-to-machine, but this is cumbersome at best due to the time-honored problems of any editing (such as classic ¼-inch offline) that involves copying from one linear piece of tape to another. The slightest change in the program results in having to redo every edit that comes after it. Not too cool.

The simple solution, of course, is in the workstations. Not only can you edit your field recordings (regardless of what analog or digital format they were recorded on), but you can edit them with a precision that is simply impossible any other way. In short, I'm talking about editing a field recording and then bouncing a new, clean recording to another file within the workstation. What begins life as raw sounds scattered among a pile of DATs is now a series of files, ready to cut—no waiting for transfer, no worry if the tones were checked.

But one of the problems with the flexibility of editing field tapes on work-stations is that you (or, at least, I) get lazy. You know you're personally going to be transferring all the material in and editing the tapes before your sound editors get ahold of them, so it's tempting to get sloppy with organizational niceties. The act of making written logs in the field is becoming something of a lost art.

Give yourself a head start in the editing process by, at the very least, numbering tapes as you record them and making clear voice slates. Some people find elaborate voice slates to be *de facto* unnecessary because a sound is what it is. Why do you need to know exactly how fast the car is going when it passes by, or the exact year and model number? Or the fact that it's noon vs. 6 a.m., or spring vs. fall, or that you are in the Everglades as opposed to the Atchafalya Basin? As long as you identify the recording as being of a swamp with insects and a few birds, you have all the information you'll need short of listening to the effect and putting it up against picture to see if it really fits.

Well, that's one theory, but not one to which Larry "The Archivist" Blake subscribes. I readily acknowledge that literalness can sometimes present itself in the guise of precision: Just because it is a recording of the Atchafalya Basin at 6 a.m. in the summer doesn't mean that it meets the dramatic needs of the scene that takes place at that time. Still, dramatic needs aside, we are at some level documenting the sound of our world, and if your bar walla was made in the bizarre Saturn Bar in New Orleans as opposed to a yuppie wine bar uptown, this should be duly and accurately noted for future generations.

Some basic rules: Load effects into edit files by subject so that you will have, say, all bar walla recorded for your film together. Also, finish a given subject first—i.e., load everything in, edit and bounce the files—before moving on. If you just load all your recordings in a grab-bag fashion, you will end up with like material spread across multiple disks and will need a lot of hard disks online to deal with one subject.

As you're loading everything in, keep logs (probably handwritten, unless you have two computers at your disposal) of the original source location. Yes, I know that you're going to all this trouble so that you only have to do this once and for all practical purposes can throw away the original tapes. That is the goal, but I believe in an audio audit trail.

The crucial, absolutely necessary

parts of these logs are the descriptions of what happens in the take and its length. You should give each edited section a name at this point, although it need not be the final one, which will be given during the bounce.

To reduce the chance of having a fragmented disk, I load source material onto one drive and bounce the edited versions onto a fresh, separate drive. This way, you can compare the final bounced track with the edited original before wiping the original track from its drive (after it has been backed up, of course). I think it would therefore also be smart to keep a separate set of hard disk backups, one for the original field files that you load in and edit and one for the final bounced tracks. This way you know that the set of tapes or disks that contain your library's bar walla recordings will contain only the final files that you will be editing into your films, although you can have access to the original files in the odd event that you want to do any re-editing. Anal retentive? Yes. But libraries are about options after all.

As I am creating the bounced tracks, I place them in an edit session with two seconds of silence between cues. This collection of tracks is placed within an 8-track-by-60-minute playing field. In other words, no track is longer than 60 minutes, and there are a maximum of eight tracks, or four stereo pairs. The final edited block can be copied to the widest possible choices of media, some of which (such as DASH or 2-inch multitrack) have a 60-minute maximum length, while Red Book CDs have only slightly longer running times. I know it seems like anathema to weld this series of fluid files onto a clunky linear medium like a DTRS tape or a semilinear one like a CD. However, the first time that you have to cut that sound in immediately and don't have access to restoring a backup (or access to a server that you can use to download to your local hard drive), you'll be happy that you did.

Yet another unique benefit of workstation editing is that you can easily edit multichannel material (either recorded on one machine or on multiple stereo recorders). You need to think the process through if you have some multitrack material (as in multiple recorders rolling) and some that is just from one recorder. I usually put the recorder that covered the most material on tracks 1-2 and the other recorders on the following six (or more) tracks. Group the multitrack material together at the head of the 60-minute section as much as you can, even if it does not represent the chronological order of recording or even the most similar material. (This whole issue becomes real hairy if you are dealing with long backgrounds and your recordings start to drift away from each other, either because of slight sample rate mismatches between digital recorders or because you recorded on analog machines with no sync reference. If you do find yourself walking out of sync, don't regard the material as multitrack because you will create all sorts of phase havoc when you create your matrixed printmaster.)

Editors frequently disagree on the necessary length of backgrounds. True, while you don't want to have your library filled with 30-minute takes of nondescript room tones, your films will be better served if you have long takes of wallas, as I discussed last month. If you can cut your backgrounds so that they are self-looping, i.e., the heads and the tails match seamlessly, that's great. But don't spend too much time on this one because it's not essential. Along these lines, I think it's clear that you shouldn't

begin and end a take on a fade in or fade out.

And finally, cut out all voice slates—that's part of the reason you need to keep good logs. You should create a simple database or spreadsheet template to log everything, with separate fields for cue name, description, length, original source location (DAT # and PNO or ABS time). If you are recording concurrent with the "first unit" while shooting the film, you might want to include a field for scene/take and also a box to check if a given take is part of a multitrack recording. The printed logs that you create will be the most handy

reference when you need to find which of your 20 swamp BGs will fit at a moment's notice.

Next month I'll talk about the final aspect of sound effects recording and editing: library organization. As always, I can be reached at P.O. Box 24609, New Orleans, LA 70184; fax 504/488-5139 and via e-mail at 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 he gets his mail at a post office one block away from where he grew up.

of filmmaking as an assistant director, assistant editor and camera operator for various television, film and documentary projects before choosing to focus on production. When he moved to Los Angeles in 1980, he fell into the advertising industry, working on both the agency and production sides. He has produced for such advertising agencies as Saatchi & Saatchi/Pacific, Grey Advertising, GSD&M and Foote, Cone & Belding. He also worked as a consultant to MCA/Universal Studios Tour Hollywood in the pre-production research for the "Back to the Future" ride. Prior to starting Bash, Boom, Bang, John Bashew helped develop the sound design/music company Endless Noise Productions.

Pasqua joined Bash, Boom, Bang as a composer/musician. He has two solo jazz albums (*Milagro* and *Dedications*) under his belt, as well as several successful commercial scores for clients such as Nissan and Infiniti. Besides collaborating with some of the biggest names in jazz, including Joe Henderson and Peter Erskine, Pasqua has a passion for rock. He formed the heavy-metal band Giant in 1991 and topped the charts with "I'll See You in My Dreams." He also has toured and recorded with Bob Dylan, Carlos Santana and John Fogerty.

Chris Desmond cultivated his multifaceted and eclectic sound design and musical scores through the study of music in Iraq, Iran, Afghanistan, Greece and Tahiti. He has been combining music and sound design since 1983, when he co-founded Visual Music Productions. In late 1995, he opened his own shop, Entropy, where he continues to compose for long-term advertising clients.

Recognized for his rhythmic and textural scores that often blend Western and African musical styles, Roger Bashew was a Clio honoree for Planet Golf's "Planet Nine." He also was part of the creative team at Endless Noise Productions, before becoming part of Bash, Boom, Bang.

Currently, each musician works out of his own Los Angeles-based studio. Macintosh computers equipped with Opcode's Studio Vision are integral to each of the three facilities. Desmond mixes off a D&R Dayner 28x24 console, while Pasqua and Bashew prefer the Yamaha 02R. Each is set up with Sony monitors and ¾-inch VTRs.

Most of the sound design is prepared in Pro Tools, though Roger Bashew has been experimenting extensively with

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samples using the Kurzweil K2500XS. While sampling takes more prep time, he feels it is creatively more flexible. Desmond has been looking into upgrading his Pro Tools to 24-bit when Apogee releases its 24-bit A-to-D and D-to-A converters.

Most compositions use up at least 28 channels, and most are mixed to stereo or surround and sent out on DA-88. Desmond has done one Toyota spot in discrete 5.1, to be used as a theatrical trailer.

Functioning as both sound designers and musicians, Roger Bashew and Desmond strive to combine the two elements creatively. "When you organize your sound design from a music perspective, it takes on a whole different character," Desmond says. "Technology takes us to a new creative level, allowing us to integrate musical and non-musical elements to support the visuals in ways never approached before. I also think clients' expectations are higher: They are less impressed by the amount of toys you have and more demanding in what they want. Because of the technology now available, they know anything is possible."

"While technology makes it possible for us to make instantaneous decisions, too many choices can complicate things," adds Roger Bashew. "Technology, oddly enough, doesn't get the job done faster; it just offers more options."

Most of the musical soundtracks are recorded at the individual facilities unless orchestration and Foley are required. Some time this year, the group plans to consolidate, bringing all three musicians under one roof with a brand-new facility that will have a live room, with three writing rooms and a conference room for clients. "I started Bash, Boom, Bang because I wanted to build a music and sound design boutique that would be musically diverse and creatively flexible," John Bashew says. "With this organization, I feel we've been able to strip away the layers that often separate the client from the creative process." ∎

Kim Wilson is a freelance writer based in the Los Angeles area.

boards to used Neves. By this time, we had already closed Studio A and B, and we found that having one music room just didn't work, especially when you're trying to pay off a $2.5 million

John Bashew (standing) and Roger Bashew

investment."

Lawson has been a fixture in the Seattle production scene for more than 20 years, beginning as a radio personality at King Broadcasting under the assumed name of Scott Terry. He then worked his way up to production manager at the station, and after three years in that position, he decided to open his own 8-track studio, Steve Lawson Productions. That facility grew into three studios—two 24-track rooms and an 8-track room—by 1985.

Around this time, Lawson was approached by music producer Terry Date, who proposed the idea of coming in at night with music clients. This was the precursor to what was to become Bad Animals: Lawson did commercials by day, and Date did music at night. By 1990, they had outgrown the facility and moved into the old Kaye/Smith Studios.

In 1991, Lawson sold a minority interest in the business to Ann and Nancy Wilson of Heart, and together they built a mammoth recording facility called Studio X. It featured an SSL 4064, two Studer 827s, Sony 3324s and just about any

microphone you could think of. This was the official launch of Bad Animals Studios. Again, the company was split between music production and audio post-production. The studio capitalized to some extent on the popularity of the Seattle grunge scene by hosting a plethora of music acts over the next five years, including Screaming Trees, Heart, Tad, Sweaty Nipples, Soundgarden (two albums), Pearl Jam (multiple albums), and R.E.M. (two recordings).

But by 1997, Lawson realized that the studio was being pulled too hard in the different directions. At the same time, the Wilson sisters decided to take their careers in different directions, according to Lawson, so the Studio X facility was sold to Charlie Nordstrom, who still runs it as a music recording studio.

Now on its own, Bad Animals has a new focus and a new look. Studios A and B, which had been big rock 'n' roll rooms, were converted into three post-production suites called the Blue, Red and Green rooms. The facility also sports a large lounge fitted with a 60-inch TV and 5.1 Dolby Digital consumer

system, for client approvals. All of the studios feature Yamaha 02R consoles and Avid AudioVision workstations for recording and editing. Sennheiser 416 microphones are used for vocal recording, and engineers lay back to Digital Betacam and Beta SP. For connecting to other studios via ISDN, they use an APT system managed through EDnet, as well as the CCS 2000, which connects easily to the Telos Zephyr. The Telos is the system most widely used by announcers working from home, according to Lawson.

"As far as outboard gear goes, we have a lot, but we don't use a lot," Lawson says. "We do equalization right inside the Avid, and there are two SPX 1000s in the 02R. The 02R is an unbelievably awesome console." The studio has Summit tube EQs, tube preamps and tube compressors, Eventide Ultra-Harmonizers, Symetrix 601s and other effects devices. Power is supplied by Crest amplifiers, and tracks are monitored through Meyer HD-1s and the new Mackie HR 824 speakers.

Bad Animals is currently doing commercials for clients such as McDonald's, Nordstrom, Lamonts and AirTouch Cellular and has been involved in numerous software and CD-ROM projects, including work with Humongous Entertainment on titles like *Putt Putt, Fatty Bear* and *Freddy the Fish*. The studio also does a lot of television work, including four seasons of sound design and mixing for *Bill Nye the Science Guy*, for which they have won two straight Emmys for sound.

Not all the work, however, is conventional. Crow's Nest Entertainment hired the studio to design a recent installation for CompUSA in Chicago. Bad Animals was given the task of creating an aural soundscape for the store entry. "The whole lobby has a sound design," Lawson says. "There's light jazz music playing in the lobby, and they have a three-story escalator, and we envelop you in sound as you go up it. There's four speakers going up the length of the escalator on the left and two on the right. So there's conversations going on around you, there's sound effects going on around you. We have the world's first three-story pinball game going on. It was really fun to work on that one."

Much as he would like to extend into more feature film work, Lawson admits that even with all of the film production work being done just north of Seattle in Vancouver, there is little or no offshoot work coming across the bor-

der. "The border could just as well be an Iron Curtain," he says. "Part of it is that the Canadian government and the province of British Columbia have really made the film industry their focus tax-wise and support-wise. The funding sources in Canada have been instrumental in saying, 'We'll fund your movie, but you're going to film it and do the post-production in Canada.'

"And L.A., even though it is so close, is really far away," he adds. "Just as Canada made a push to keep the film work there, so L.A., too, is making the push to keep everything in L.A. They were losing work like crazy." Still, Bad Animals has attracted national clients like Disney, Showtime and Paramount for remote ADR sessions and the like, and Lawson plans on further expanding into feature film and TV audio post-production in the years to come.

Lawson quickly points to his staff as being his greatest asset for turning over projects quickly and efficiently, adding that the greatest challenges are sometimes the most fun. "Dave Howe is our senior sound designer who came up to Seattle from Orlando for the lifestyle and pace of the Pacific Northwest," he says. "People have been trying to woo him away to Los Angeles and New York since he's been here, but he wants to stay here. Sound designers Gary Littell (formerly of Waves in Los Angeles), Mike McAuliffe and Suzie Brutke have also done an incredible job, as has the rest of the team."

On one occasion, they received a half-hour sound design and editing project that was delivered to them two days before deadline. They got the final locked print of the show at 4 in the afternoon the day before it was to be broadcast. "We had to feed it at 3 a.m. to New York so they could put the commercials in," Lawson says. "It was called *Incredible Inventions and the Search for Flubber*, hosted by Bill Nye, that talked about various inventions over the years and had clips of the movie edited in. It was one of those projects that was really tight for time, but I was extremely pleased with the way it turned out. The biggest reason for our success is that we really focus on the team approach and our clients' needs. Everyone here is extremely seasoned. It's pretty hard to throw a curve ball at them. When they swing the bat, they hit the ball." ∎

Tim Moshansky is the author and publisher of the A-Z Guide to Film Production Terms.

by Bob McCarthy

HOW TO MANAGE SOUND

Navigate a Safe Course Between

Input Channel

Input Trim | **Equalizer Section** | **Channel Fader**

Get maximum gain possible short of clipping.

Apply attenuation as required to prevent summation overload and achieve desired mix.

Output Section

Summing Amplifier | **Submaster** | **Summing Amplifier** | **Master** | **Balanced Outputs**

From Input Channels

From Other Subgroups

The summing amp must be monitored to detect possible overload.

Apply attenuation to desired mix and to prevent summation as described previously.

The summing amp must be monitored as before.

Set level to achieve desired SPL.

The output section should be able to drive up to +26 dBu.

Master Output

To FOH Rack and on to amplifiers

he successful management of sound system gain structure may be likened to the task of piloting a ship down river to the sea. As captain, you must steer a course between the ominous Cliffs of Clipping and the sand bars of Noise Floor Shallows. When piloting a sound system, you must steer each signal channel through the mixer, processors and amplifiers and out into the open auditorium. At every stage, gain must be sufficient that you neither lose control and crash into overload, nor run aground into noise.

SYSTEM GAIN STRUCTURE

Gains and Losses, Clipping and Noise

You can think of gain structure as directions for getting from point A to point B. At each stage you need gain (+), loss (-) or unity gain, which is neither gain nor loss. Successful gain management depends on using these three tools appropriately.

GAINS & LOSSES

Gain is needed in two places. Gain at the microphone preamp amplifies delicate mic-level signals, measured in millivolts, up to line-level signals in the 1- to 10-volt range. The second place we need gain is at the end of the signal chain at the power amplifier, where the signal voltage and current are increased to speaker level. Gain may also be useful at other points in the system—gain is always "nice to have"—but it is not always necessary and can easily be misused.

Attenuation, or loss, is also necessary in two places. Wherever multiple channels are summed together, as in a subgroup or matrix, attenuation allows for control of the relative levels and prevents overloading any summing stages that follow. Finally, attenuation at the output master controls overall output level into the amplifiers.

Unity gain is the standard for most other places in the signal chain. Inputs and outputs for equalizers, delay lines, outboard gear and other processing gear are typically unity gain. To explore all the possibilities, let's follow the gain structure path in a typical sound system.

THE MIC PREAMP

The mic preamp must have enough gain to bring the signal up to line level. How much gain is enough? Just enough to almost clip the preamp on the loudest signal. Shout, bang on a drum, or get a musician to crank up his or her instrument and increase the preamp gain until it overloads. Decide on the overload point by means of an LED clip meter or your ear, not a VU meter (see sidebar for more on monitoring). Back off the mic pre gain a few dB to protect against a musician's ability to turn up further.

Why so close to the clip point? Console audio circuits typically exhibit lowest THD figures and highest S/N ratio just below clipping. One of the most common and costly gain structure errors occurs at this first step when you set gain such that signal level at the mic preamp peaks at around 0 dBu (0 dBu = .775 volts). If the signal only reaches 0 dBu and the board can reach +26 dBu, you have given away 26 dB of S/N ratio and will be operating with higher average THD.

Don't give away usable gain at the mic preamp. Signal-to-noise ratio lost here can never be recovered, and if you have to bring the level up later you will bring noise up too. Set the input gain for the biggest peaks in the program material. If the musicians get really carried away you may have to back off the preamp, but you will probably notice flashing red LEDs long before you hear serious clipping.

SUMMING CHANNELS

In a very simple signal chain (such as a one-microphone or tape-playback setup) you can run every stage of the signal path from mic pre to amplifier at unity gain—there is little chance of clipping. But when you sum multiple inputs to a subgroup or auxiliary bus, and then sum multiple subgroups to a master, the combined energy of the signals will usually exceed that of the individual channels. Individual channel attenuation may be required in order to prevent overloading the summing stages.

OUTBOARD GEAR

Next in the signal chain are the various processing devices, such as external equalizers, delay lines and speaker processors. These devices are generally run around unity gain.

Digital devices such as delay lines can cause gain problems for the unwary. In digital devices, distortion rises dramatically in the "lower" bits; the noise specs of even the best devices are not as good as for analog circuits. So it is critical to drive the input hard, just like for the mic preamps described above. However, in an effort to force users into the upper bits some manufacturers set up the gain structure in their digital audio devices with 20 dB of gain at the input and 20 dB of loss at the output. Total gain is unity, but this +20/-20 arrangement makes it impossible to use the last 20 dB of headroom in the "upstream" driving devices. If your digital devices have input level controls, adjust the input and output stages to true unity and drive the devices at line level.

MONITORING GAIN STRUCTURE

A ship's captain has instrumentation available to ensure the safe passage of the ship. Radar can read the distance to the rocks, while sonar tracks the depth below the keel.

An audio engineer must choose his or her instruments for monitoring gain structure carefully. VU meters are visually appealing and widely available, but they suffer from some incurable ailments. First, VUs offer a usable range of only 20 dB, while the typical mixer has at least 100 dB of dynamic range. Furthermore, VU meters are usually calibrated so that 0 VU is around 0 dBu, which means there is 26 dB of usable range above the "red line" of the meter. Finally, VUs are too slow to accurately monitor signals with fast peaks. A hi-hat transient may overload its channel and yet the meter may only reach -10 dB. A pure-toned instrument, such as flute or organ, can pin the meter yet the signal may be totally clean. A VU meter on your console is like having a depth finder on your ship that only reads a small range and can't see sharp objects rising from the depths.

Peak LED meters that show the full range of the mixer's output are a better choice. They have a faster response and wider range, and are much more accurate than VUs. In a pinch, a clip LED alone can tell you what you need to know.

"UP 'SCOPE"

A useful, if underused, tool for gain structure monitoring is an inexpensive oscilloscope, which allows you to watch the music signal continuously and simultaneously monitor for clipping. Also, a 'scope does not have the slow ballistic characteristics of VU meters, which are notoriously slow to move. Feed the 'scope with a pre-fader solo bus signal, which allows you to check all points in the signal chain without repatching. Monitoring pre-fader (PFL) is important so that you can see the actual voltage levels.

Regardless of which tool is used, it is critical to establish what points in the signal chain are being monitored. Are they pre- or post-fader? Are there ways in which the system can be overloaded without being de-tected? Any system has its overload point, but let's make sure we know about it if it does. Here's how.

Put in a sine wave and crank up the input preamp to just below clipping. If the fader is at 0 dB you should be in the neighborhood of +24 or +26 dBu at the channel direct out. If you have VU meters they will be pinned. Forget about them and find something that can measure dB. A VOM, oscilloscope or analyzer will do. If you don't have any instrumentation at all, use your headphones and listen for audible clipping (the addition of odd harmonics to the fundamental). Use the solo bus, but turn the headphones way down so that the clipping is only in the signal chain, not the headphone preamp.

If you set all submasters and masters to 0 dB, the output level should be the same at each stage and there should be no clipping. Check them on the solo bus. If they are not the same then the mixer's silk-screened markings do not match its actual response. Adjust faders to their actual unity gain positions.

Now let's find out if overload is detectable at the summing stage. If the input channel fader has range above the 0dB mark set it to +6 dB. If not, get a "Y" cord and patch the tone generator into a second channel and set its level identical to the first. Route both channels to the same submaster. The level into the submaster has now been raised 6 dB—it should overload. Check at the submaster and see if your metering indicates clipping. Now turn down the submaster by 6 dB. The level at the submaster output has been reduced, but is it still clipping at the submaster input? Listen and check the metering. If you hear clipping but it is not shown on the meter, you have a problem—the summing amplifier is not monitored by your meters and can be overloaded without warning. This occurs when the monitoring point is post-fader. In such a case there is no danger as long as you run your submasters at 0 dB, where pre-fader = post-fader. But this limits your ability to mix if you can't safely turn down your submasters. Fortunately, most modern consoles do not have this problem, but beware.   —Bob McCarthy

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CIRCLE

The above figures demonstrate the effect of amplifier gain on dynamic range. In both cases, a 600-watt amplifier is used. Therefore the maximum power remains constant.

In Fig. A a voltage gain of 26 dB is used, which leaves 15 dB of headroom at the mixer output and a maximum dynamic range of 85 dB between amplifier clipping and the noise floor. In Fig. B the amplifier gain is increased to 40 dB. This creates 29 dB of headroom at the mixer output, yet the overall dynamic range is reduced to an undesirable 71 dB due to the large increase in noise amplification.

CROSSOVERS

Most professional systems are bi- or tri-amplified and include a crossover between the console output and the amplifier inputs. Many modern sound systems include speaker controllers, proprietary devices that are matched to the speaker cabinets and components and generally include crossover, limiting, equalization, delay and phase-correction circuitry. In addition to tailoring the sound of the speakers to a consistent standard, speaker controllers provide the facility to adjust levels in each listening area independent of the console output levels, which allows for standardized amplifier gain settings. Since speaker controllers do not have a flat frequency response, driving them at unity gain is not always necessary. For a two-way crossover or controller, set the input level so that the crossover point is at unity gain.

POWER AMPLIFIERS

The last point in the line-level control signal chain, the power amplifier converts the signal to speaker-level. This is the point in the system at which gain calculations get most complicated.

As an example, let's use a power amp rated at 600 watts into an 8-ohm load, which represents a voltage drive level of +37 dBu. A 300-watt amplifier

creates a voltage drive level of +34 dBu (half the power, so 3 dB less), etc. A typical line-level device will drive up to +26 dBu, so we need a minimum of 11 dB of gain in the amp. With this amount of gain, the line-level devices and the amplifier would clip at the same time. This, however, is not desirable. The best scenario is that the amplifier clip first. In a bi-amplified system, the harmonic distortion caused by clipping in the low-frequency amplifier is filtered by the LF driver, which cannot reproduce the higher harmonics. However, if the clipping occurs before the crossover the distortion harmonics are passed to the HF driver, where they are clearly audible.

If we add 15 dB of gain to the amp for a total of 26 dB of gain, the amp will clip long before the line-level stages, unless there is already excessive attenuation in the gain structure.

Why not get 40 or 50 dB of gain? Then you won't have to even think about clipping any of the line-level stages. It is true that no line-level clipping will occur, but it also true that the quietest operating area of your mixer, the last 30 dB before overload, can no longer be used without running the amp into clipping. Remember that the amplifier raises the noise and signal together. Keep the amp gain under 30 dB and you will do fine.

Correct gain structure is easy to understand in theory, but once you start juggling 48 inputs, eight subgroups, eight outputs, delay lines, equalizers, controllers and amplifiers it can easily get out of control. A common mistake is to try to accumulate losses through a complex signal chain and then add makeup gain at the end. While this conservative approach prevents overloading in the line-level stages, it will raise noise levels.

The best strategy is a methodical approach. Get your gain early. Squeeze it down just enough to get through the summing stages. Then you have clear sailing to the amplifiers where they will give you full power and leave the noise in your wake. Bon Voyage! ∎

Bob McCarthy is an independent engineer specializing in sound reinforcement alignment and design. He teaches Meyer Sound's SIM course and has written four books related to sound system alignment and design. He can be e-mailed at bobmcc@sirius.com.

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Model	Watts per channel		
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1.0HV	300	500	NR
1.5X	600/450	795/700	950/1.10K
1.6HVX	700/725	450/1.10K	NR/NR
2.4MB	1000	1550	2400

1KHz, 1% THD

World Radio History

NEW SOUND REINFORCEMENT PRODUCTS FROM WINTER NAMM

OUR ROVING CORRESPONDENT PICKS A BAKER'S DOZEN

The Winter NAMM show is the annual showcase that determines which sound reinforcement products will appear in retail outlets across America and around the world. Because its traditional winter home in Anaheim is undergoing renovation, Winter NAMM '98 moved to the Los Angeles Convention Center, familiar to many attendees and exhibitors as the site of the November 1996 AES show. This writer found the change of venue unfortunate. Gone was the casual campus atmosphere; the Jolly Roger, the Candy Cane and the Anaheim Hilton lobby at midnight were all missed. The good news was that the spacious West Hall had room for all those pro audio manufacturers whose senior status among exhibitors and/or clout saved them from banishment to NAMM's marketing Siberia, a basement hall that constantly reverberates to the sounds of conga

Beyer MCE-94

Beyer TG-X 10

new products and returned with this 13-manufacturer selection.

AKG (Nashville, Tenn.) showed the new IVM1 wireless in-ear monitor system ($4,500). It includes Individual Virtual Acoustics (IVA) DSP that implements binaural sound effects and allows custom response curves to be tailored for individual

Beyerdynamic (Farmingdale, N.Y.) introduced four new wireless systems. The U400 and U500 UHF systems (each includes a handheld dynamic mic) are priced at $1,999 and $2,100, respectively. The new V200 and V300 VHF systems are almost half those prices. Beyer also introduced the 90 Series of studio,

BSS Opal DPR-944

drum and Karaoke demonstrations. Undeterred by smoke machines and disco lights, I dutifully scoured the aisles in search of interesting

users. The frequency-agile IVM1 operates on one of 16 frequencies in the 766 to 952MHz range. AKG also introduced the WMS 60 VHF wireless mic system, available with four different capsules: the D880 from the AKG Emotion Series and the D3700, D3800 and the C5900 from the company's Tri-Power line. The WMS 60 operates on one of 12 frequencies in four frequency groupings from 138 to 250 MHz. Other big news from AKG is that prices for C-535 and C-3000 microphones have been slashed to $322 and $438.

handheld and instrument cardioid condenser mics (at prices from $649 to $599). A fourth member of the 90 Series, the MCE-94 instrument mic, can run on battery power. Finally, Beyer's new TG-X 10 ($239) is a small supercardioid dynamic with an integral stand mount.

BSS (Nashville, Tenn.) introduced the newest and most intriguing member of the Opal series of rackmount processors. The DPR-944 ($899) has four independent channels of dynamics processing. The two gates have parametric key filter control, and the two compressors each have a single parametric

AKG IVM1 wireless in-ear monitor system

BY MARK FRINK

ELTON JOHN
Big Sound for "The Big Picture"

PHOTOS STEVE JENNINGS

E lton John's 30-year career is as stuffed with su-perlatives as his closets were once full of outlandish costumes (in recent years John has raised millions of dollars for AIDS charities by auctioning his clothes and personal possessions). He has successively broken sales records set by Elvis, The Beatles and, now that sales of "Candle in the Wind 1997" stand above 31 mil-lion units, Bing Crosby. 1995 saw sales figures of 12 mil-lion for his own records, plus another ten million for the Oscar-winning soundtrack to *The Lion King*, plus Gram-my, Golden Globe, Brit, Polar Music, ASCAP and BMI awards. Topping off an extraordinary year, Elton John appeared on the 1995 Queen's Honor List as a newly minted Commander of the British Empire. Now 50 years old, the recently knighted Sir Elton John CBE shows no signs of slowing down and, several months into a world tour currently scheduled to continue into 1999, brought his seven-piece band into Oakland's New Arena in early February. *Mix* spent an afternoon and evening in the New Arena observing the setup, sound check and show.

Front L to R: Alan Richardson, monitor mix engineer; Clive Franks, FOH mix engineer; Mark Dowdle, system engineer. Back L to R: Kirk "Eek" Shreiner, sound technician; Tom Foehlinger, sound technician.

HANG 'EM HIGH

P.A. and control systems were all supplied by Clair Bros. (Lititz, Pa.). To achieve 360-degree coverage, system en-gineer Mark Dowdle hung 80 Clair S4 cabinets in 12 "bumpers," each bumper comprising two columns be-tween two and five cabinets deep. Six long-throw P-type S4 cabinets were hung per side, arranged three across in the top two rows of the three inner-most columns. All of the remaining

S4s were the standard F-type. The "high hang" con-figuration, a Clair Bros. staple for arenas, relies on a half-ton chain hoist motor on each bumper to pull the lowest cabinets back and create a smoothly arced profile. The curved form not only helps create even coverage of the floor area, but it also improves sight lines for the most elevated audience sections.

Though the lowest S4 cabinets were angled down at the arena floor, a row of four Clair P2 cabinets sus-pended from a down-stage lighting truss supplied more focused front fill coverage. "The coverage is very pre-cise," explains Dowdle. "The high-frequency coverage is aimed so that it matches up to the lip of the stage, which keeps the P.A. mix out of the vocal mics."

"Tuning" the P.A. system for the room was a joint ef-fort by Dowdle and Clive Franks, who has been Elton John's FOH mixer since the early '70s. Dowdle made a first pass at EQ'ing the system using CDs as a test signal, and Franks then created a set of EQ curves using his own voice as a test signal through a Shure Beta 87, Elton's vocal mic. Since the P.A. was divided into six "zones"—left and right short throw,

BY CHRIS MICHIE

ALL ACCESS

CHUMBAWAMBA

TEXT AND PHOTOS BY STEVE JENNINGS

With a radio-friendly hit, "Tub-thumper," topping charts around the world, Chumbawamba has been touring extensively since October last year, hopping back and forth among Europe, the States and Japan. *Mix* caught the tour on its third leg, while the band were playing U.S. clubs and arenas.

Only keyboardist/vocalist Lou Watts wears in-ear monitors, the new Shure PM-660s. "I'd heard good reports about it," says monitor engineer/production manager Danny Stead, "so we're trying it out with Lou; she sings in two positions, and she likes the same sound, so it's easier with in-ears. They're custom-molded, so it cuts out a lot of noise onstage, and she can feel kind of closed in. We'll try different things though, like playing with the reverb; with it she feels more alive."

Stead (L) and FOH engineer Neil Ferguson have worked with the band for two and 11 years, respectively. Ferguson also serves as the band's co-producer and engineer in the studio. "Because we've worked together so long on the records," Ferguson says, "I know what's going through their minds; I know what they're after soundwise."

All five singers use Shure SM58 UHF mics. "I chose Shure because I like the sound," Stead says, "and also because of the 64 channels, which are switchable."

Stead rented a Ramsa SB40 Series monitor board from Electrotec for this leg of the tour, using 26 input channels for a 12-way mix. At his suggestion, the band is now using sidefill monitors.

This time out the band isn't carrying any FOH gear, though Ferguson specs an Eventide H3000 UltraHarmonizer or a Yamaha SPX990 for use on vocals. The band are also traveling with ADATs, radio mics and drum modules. Ferguson says it's a big challenge working with different mixing consoles for every venue, as four of the eight bandmembers switch instruments and vocal positions throughout the show.

On drums are a Getz mic on kick and snare and various Beyer mics for overheads and on toms. Drummer Harry Hamer wears headphones and listens to a click track from ADAT. "Also on the ADAT we've got six channels for things like reverse cymbal sound, loops like a snare going round and round and other weird sounds that are on the album that you just can't reproduce live," says Stead.

THE SPORTS PAGE

SUPER BOWL SOUND

Sound for Super Bowl XXXII was a new contract for Burbank's AudioTek (ATK), which has also provided services for the Grammys, Oscars and Olympic ceremonies. Executive-in-charge Mike Stahl put together a stellar package of personnel and equipment. Heading the design of the entertainment system was Patrick Baltzell, a veteran of all the previously mentioned events. On the first day, I found myself at the top of a ladder with Jim "Redford" Sanders, CS&N's FOH engineer, hanging 70-volt speakers. Under the direction of engineer-in-charge Scott Harmala, site coordinator Bob "NW" Sterne and project manager Paul Liszewski, the equipment was installed over three weeks. They were assisted by Dave Lohr managing the compound and Geep Parker ramrodding the crew.

The speaker system was mounted on 18 custom-fabricated carts ringing the field. Each cart had a column of four L'Acoustic V-DOSC speakers aimed into the stands covering 20 degrees vertically, with each speaker bent 5 degrees from the next. The mix to the V-DOSC speakers was delayed by 85 milliseconds to synchronize with the Electro-Voice 1152 DeltaMax speakers hung under the stage in the center of the field. The speaker carts also had ATK M-5 proprietary double-12 monitors pointing back onto the field. From the lowest stadium section, Baltzell's Yamaha PM3500 controlled the entertainment system on the field, the V-DOSC carts and subwoofers. At the 50-yard line, Mike Parker's PM4000M controlled wedges on the stage and the wireless Garwood IEM mixes. Up in the press booths, a control room was set up for Dan Schipper's Soundcraft Series 5 console for Qualcom Stadium's scoreboard system and various sub-systems.

TV entertainment engineer Andrew Waterman, engineering his seventh Super Bowl, manned the Neve 8058-FF console in the Le Mobile truck which rolled two locked Studer A-800 24-tracks. Ed Greene mixed halftime on a PM3500, and a Spirit 8-bus handled 24 feeds to the Internet. The live mics heard on the broadcast were shipped to the trucks on QSC's RAVE (Routing Audio Via Ethernet) system over fiber-optic cable.

For those still curious about the "live or Memorex" angle to the halftime show, Baltzell says: "Queen Latifah, Martha Reeves, Boyz II Men and the two young rappers at the top of the show were live, and so was Smokey's introduction of The Temptations."

—*Mark Frink*

NBA ALLSTAR WEEKEND

Concert-level coverage for Team Up, the game, and live half-time shows was provided by arrays of EAW KF860 loudspeakers positioned above the scoreboard at center court, providing full-bandwidth throw to the furthest seats in the Garden, about 250 feet.

Over the years, the NBA Allstar Game has expanded to include a weekend full of events. This year's festivities, held in February at Madison Square Garden, included "NBA Team Up," a program promoting involvement in youth activities and community service; the show included appearances by NBA stars such as Patrick Ewing, Tim Duncan and young Kobe Bryant, as well as performances by LL Cool J, 98 Degrees, Wyclef and others. In addition, the game's halftime show featured performers from ten current Broadway productions.

Sound reinforcement for the All-Star events was provided by On Stage Audio (Chicago). The system, designed by OSA's Jim Risgin, centered around arrays of EAW KF860 loudspeakers hung above center court. Risgin mixed on a Yamaha PM4000 console with sidecar. Jerome Fox, also from OSA, designed and mixed monitors on a Midas XL3 board. OSA engineer Dan Kasting managed the performers' wireless mics, which included 32 Sennheiser UHF and several Shure UHF systems. ∎

The OSA team on hand to provide sound reinforcement during NBA All-Star weekend, courtside at the monitor mix position at Madison Square Garden. Left to right: Dan Kasting, Jim Risgin, Jerome Fox.

dynamic equalizer, similar to those in BSS's four-band DPR-901. In other BSS news, the FDS-355 Compact OmniDrive, Sound Bench PC software and the PPC-900 remote controller are now all cross-compatible, along with the other OmniDrive and VariCurve products. The new Version 1.1 software for the FDS-355 will be available on floppy disk, PCMCIA card or as a download from the Internet (www.bssaudio.

Crest Audio V-12 live performance mixing console

co.uk). New features include improved screen graphics, a single edit screen for each EQ band, a new limiter design and a fully implemented Master/Slave mode for operating two FDS-355s in stereo. The PPC-900 remote can also control the TCS-804 delay, which will be included in Sound Bench soon.

The X-Four from Crest Audio (Paramus, N.J.) is the company's most compact and affordable console. The 4-submaster X-Four features true LCR panning, six aux sends (two of them configurable as a stereo pair), four-band EQ with overlapping swept mids and an 80Hz highpass filter. The same EQ is available on the six aux send masters and on the 8x2 matrix, and EQ can also be switched to the subgroups and main mix. "Fader-swap" facility allows the board to be instantly reconfigured as a six-mix monitor desk. Inserts are dual ¼-inch connectors and feature ground-compensated sends with balanced returns. The attention to detail throughout is obvious. For example, attractive illuminated cue switches appear at the

EAW JH15 monitor

bottom of each strip. The X-Four comes standard with four stereo inputs and is available with 8, 16, 24 or 32 mono inputs; prices range from $5,000 to $10,000. The construction features a steel frame, and the board's profile is only nine inches high. Depth is 27 inches, and the largest model is less than five feet long. At the other end of the monetary scale, Crest also showed the new V-12 large-format console, which features 12 VCAs and is loaded with many thoughtful refinements. V-12 consoles and sidecars may be linked for a maximum configuration of 220 channels. Price is $82,000 for 48 mono and four stereo inputs.

EAW (Whitinsville, Mass.) unveiled two new speakers. Designed in collaboration with JHE Audio Ltd., the JH15 floor monitor ($1,299) contains a 15-inch woofer and a 1.4-inch exit compression driver on a large 60° CD horn. Slated for use on the upcoming Page & Plant tour, the JH15 features a steeply angled front baffle, which increases coverage area. The newest addition to EAW's Linear Activation Series is the LA 460 ($2,399), a compact three-way trapezoidal enclosure. Less than three feet tall, the LA 460 includes the same components as the JH15 plus a horn-loaded 8-inch midrange driver.

Electro-Voice (Buchanan, Ill.) has revamped the N/DYM° line of dynamic mics and now markets them as purpose-designed for specific applications. The four handheld N/DYM models include two cardioid models, the entry-level 267 ($140) and the female vocalist's 367 ($200), and two super-cardioid models, the lead vocalist's 767 ($242) and the top-of-the line concert vocalist's 967 ($282). Cardioid instrument mics include the 868 kick drum mic ($282) and the 168 snare mic ($182). The classic "egg" mic has been redesigned as the super-cardioid 468 ($232).

Meyer Sound (Berkeley, Calif.) has completed its line of self-powered speaker systems with the addition of the USW-1P dual-fifteen subwoofer ($3,900)

and the UM-1P/UPA-100P floor monitor ($4,900). (The UPA-100P substitutes a 100°x40° horizontal horn for the UM-1's 45° conical horn.) Based on familiar and established nonpowered products, the Meyer self-powered speaker family now includes a model in every category.

OAP (Buford, Ga.) has added the SM-210 ($1,279) dual 10-inch wedge to its Stage Monitor Series of floor monitors. This low-profile wedge is only a foot tall and, like its sibling the SM-212, features 6000 Series McCauley woofers and a vertically mounted 2-inch BNC compression driver on a 70°x50° DDS horn. OAP also showed the popular SM-183 three-way drum-box ($2,594). Loaded with an 18-inch woofer and a separately enclosed coaxial 12-inch with a 2-inch compression driver, the SM-183 sits three feet tall and is angled at 35 degrees, making for a robust package that will please the most demanding drummers.

Sennheiser (Old Lyme, Conn.) showed the new Evolution Series, which includes four instrument mics, two with familiar profiles. The 609 ($349) features a super-cardioid capsule and emulates the flat profile and frequency response of the now old but deservedly popular MD-409. The compact cardioid 604 ($249) is essentially a re-release of the 504, features an integral stand mount and comes with a clip for attaching it to a drum rim. The largest Evolution mic, the 602 ($319), is an application-specific cardioid mic for kick drum. The 608

Electro-Voice N/D367 female vocal microphone

($299) is the world's smallest super-cardioid dynamic, weighing only 20 grams. The Evolution Series also includes four new handheld vocal mics at prices from $129 to $299. The 825 and 835 are cardioid dynamics, while the 845 and the 855 are super-cardioid; the latter of each pair offers more highs.

Rapco Cable (Jackson, Mo.) showed a new line of small adapters and gadgets called "Blox," each built into 3-inch-long aluminum cases the size of an XLR barrel. Blox models include a cable tester, iso-transformer, phantom supply, pad and passive direct box. Prices range from a low of $27.64 up to $129 for the continuity checker with probes. My favorite Blox is the phantom-powered flashlight ($55.69), which also runs on an internal battery—its red jumbo LED gets attention from across a room, and I've already thought of several uses for it.

NEWSFLASHES

Sound company Electrotec Productions (Westlake Village, CA) acquired a L-Acoustics V-DOSC loudspeaker system from Cox Audio Engineering (Sun Valley, CA). The speakers were purchased after Electrotec used a rented system for Bob Dylan's U.S. tour…Two of Unitel's mobile recording/broadcast trucks have been fitted with Calrec Q2 consoles. Both trucks have been busy lately with projects such as The Grammy Awards, The Billboard Music Awards, the MTV Music Awards and *Wheel of Fortune*…Doug McClement's LiveWire remote truck recorded two performances live for the movie *Blues Brothers 2000*: James Brown's duet with Sam Moore on "John the Revelator" and the finale, a battle of the bands-style competition between the Blues Brothers and the Louisiana Gator Boys, featuring stars such as Eric Clapton, Bo Diddley, B.B. King, Billy Preston, Lou Rawls, Koko Taylor and many others…Pepsi celebrated its 100th anniversary with a star-studded bash on the Big Island of Hawaii. Artists including Ray Charles, the Rolling Stones and Spice Girls performed in a purpose-built tent fitted with an EAW KF860 loudspeaker system provided by On Stage Audio (Chicago). Prodigy's current tour is also using an EAW system: 200 assorted cabinets provided by Concert

Systems of Manchester, UK…BSS Audio reports that Motley Crüe's tour is carrying a BSS Omnidrive FD388 crossover system. Equipment for the tour is being provided by A1 Audio of Los Angeles…Gospel group the Gaither Vocal Band is touring with gear provided by Stage II Productions of Alexandria, IN. The tour is using Beyerdynamic U600 wireless mics for vocals…Texas is on tour in Europe using Soundcraft Series Five and SM24 consoles for FOH and monitors, respectively…Todd Rundgren's recent tour is using two Yamaha 03D digital mixers and one ProMix01 console front of house. The engineer is Larry Toomey, and the console was provided by Skip's Music (Sacramento, CA)…The Tea Party's Canadian tour is using gear provided by Jason Sound Industries (Toronto, Ontario)…Jands Production Services (Sydney, Australia) purchased 50 DPA4061 mics from Danish Pro Audio. The mics will be used in a local production of *My Fair Lady*…Country artist Toby Keith is singing into an Electro-Voice N/D767 and a Vega U2020 wireless mic on his current tour…P.A. installation company Eskimo Noise (London, UK) purchased five Klark-Teknik DN8000 loudspeaker processors to be used in clubs in London and Amsterdam. Sound Art (Winnipeg) supplied a Klark-Teknik digital EQ system for Blue Rodeo's Canadian tour. ∎

RCF ART 500A self-powered speaker

LIVE SOUND

RCF North America (Upper Saddle
River, N.J.) introduced the ART 500A
self-powered speaker. Bi-amplified with
400 and 100 watts, it has a 15 and RCF's
850 2-inch compression driver. This
high-powered pole-mount speaker is
made of dampened polypropylene plas-
tic and weighs 85 pounds. It has mic
and line inputs, XLR loop-through, and
EQ contours for Music (+4 dB at 100
Hz) and for Speech (+3 dB at 2 kHz).
Other ART models include the lower-
powered 400A and the 800AS powered
subwoofer. Nonpowered versions are
also available for installations.

Symetrix 565E dual compressor

Symetrix (Lynnwood, Wash.) intro-
duced the 565E dual compressor ($429).
Functionally similar to the Symetrix 425,
the 565E uses a new Dynamics
Squared™ topology to dramatically re-
duce distortion during gain reduction.
The two channels of dynamics process-
ing may be stereo linked and features
include expander, compressor and lim-
iter sections with separate threshold
controls and LED metering.

Last but not least, X-Wire (Sacramen-

to, Calif.) has boldly introduced a digital
wireless system; a demonstration CD il-
lustrates the sonic differences between
cable, analog and digital wireless on a
variety of guitars (hey, it was the NAMM
show). The X905 system ($895 for the
guitar system) uses 20-bit digital con-
version and operates on one of five car-
rier frequencies from 905 to 925 MHz.
The 2U rack-mount receiver has a quad
integral antenna inside the chassis, and
an LCD screen indicates operating chan-
nel, audio level, battery life and the per-
centage of data being received. The
transmitter has a range of more than
200 feet under average conditions and
will run for 11 hours on four AA batter-
ies. X-Wire also showed a prototype
handheld wireless vocal mic. I put on
headphones to listen and was amazed
to experience wireless transmission
without the companding and high-fre-
quency roll-off found in most analog
radio transmissions. A handheld digital
wireless system will be available in
June, priced at $1,095. ∎

Mark Frink is Mix's *sound reinforce-
ment editor.*

L/R long throw and L/R P2s—the
process took some time, but, since sys-
tem EQ was effected with TC Electron-
ic's 1128 28-frequency programmable
digital graphics, settings were easily re-
called, compared and updated via a TC
6032 remote head. According to Franks,
he typically arrives at a compromise set-
ting based on both his own and Dow-
dle's preferred curves.

"I've done it that way for years and
years," says Franks, referring to his
room-tuning method. "I hear harmonics
in my voice and in the room—I can
hear a harmonic of a note, and if that
stands out too much in my voice, then
I'll pull that down. When you look at
the graphic after I've finished tuning the
room, it looks pretty much like a roller-
coaster. If a frequency is bad, I'll hack it
out...just to make the room smooth.
Then I find I have to do very little EQ
on each channel."

Franks has tried other "room tuning"

methods, including playing tapes and
CDs and using pink noise and spectrum
analyzers, but the results have been dis-
appointing. "I've tried not doing it with
my voice, but when Elton starts singing,
it sounds cloudy or harsh," Franks says.
"That never shows up when you just
play a CD on its own. It's bizarre, really.
[The record has] been so doctored and
compressed and mastered that it always
sounds good in the P.A., but live—
you're starting from scratch each time.
In the old days, they would send pink
noise through the system at a pretty
high volume and then use the graphic
to try and get the flattest curve on the
analyzer, which technically works, but
then it just ends up sounding wrong. I
found there seemed to be no life in my
mixes. It seemed too flat."

Not content with merely ensuring
that the sound at the console was tonal-
ly balanced, Franks also used a wireless
Sennheiser mic to listen to his amplified
voice in different parts of the arena,

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30 YEARS

calling out the offending frequencies to Dowdle at the mix position.

NEW ARENA, NEW SOUND

Franks had initially anticipated difficulties with the sound of the New Arena in Oakland. Home to the Golden State Warriors basketball team, the decades-old facility suffered many of the sonic characteristics common to multipurpose arenas, including long reverberation times at low frequencies and reflections and flutter echoes from the many exposed surfaces, including the glass curtain wall that surrounds the ovoid building. However, the building was completely gutted and remodeled last year. The floor has been lowered, the seating area now extends almost to the roof line, and two levels of box "suites" have been added. Seating capacity is now 19,600, up from 15,000, and all new backstage and technical systems have been installed. The renovation was completed in November 1997, but Elton was the first major musical act to appear in the prosaically renamed New Arena. Franks was agreeably surprised by the new acoustic character of the building and was soon ready for an abbreviated soundcheck. "It's changed dramatically since they've rebuilt the interior," he reports. "It really tightened up the sound."

Typically, the bandmembers soundcheck each day, but Franks does not insist on a full band performance. "I don't like full soundchecks," he says. "It's pointless with everyone pounding away. Just bass and drums—that's all I need. It's got everything, from the lowest lows to the highest highs."

Working with bassist Bob Birch, Franks quickly found any ringing low frequencies and filtered them out with the system graphic EQs. "I then know that when he hits that one note, it's not going to obliterate everything," Franks explains. "Of course, when people come in, then things generally tighten up. You can sometimes open up the crossover and add a few extra frequencies back in."

Franks created the FOH mix on a 56-input Yamaha 4000 and used every input; in fact, Dowdle had to set up a small Mackie board to route CD and other playback sources. For compressors, Franks used dbx 160s for the lead vocal and spare channels, another two dbx 160s for the stereo bass DI, and six dbx 160As on backing vocals and synthesizers. The drums got Aphex gates, and the reverb inventory included a

Elton John's stage monitor setup includes stereo pairs of Clair 12AMs and 2x15 wedges (the downstage units, not shown, sit side by side to preserve sight lines). Screen at upstage edge of piano is for a TelePrompTer.

Lexicon 480L, two Yamaha SPX1000s, Eventide H3000 and H3500 Harmonizers, a SD3000 Roland delay and two Yamaha SPX1000s. The most recent addition to Franks' equipment list was a TC Electronic M5000, which he first heard when Dave Natale was mixing a Tina Turner show in New Zealand, where Franks has been living since the late '70s. Yamaha NS-10Ms, positioned over the meter bridge, served as cue monitors; a TC 1280 provided EQ and the delay necessary to match them to the P.A. signal's arrival.

Mics onstage included models from Shure, AKG and Sennheiser: All vocal mics were Shure Beta 87s, guitar amps got venerable Sennheiser 409s, and drum mics included an AKG D112 on kick, AKG C3000s for overheads, an SE300B with a CK93 capsule on hi-hat and ride cymbal, and C418s on toms and piccolo snare. The main snare was miked with a Shure 57 on top and an AKG C408 on the bottom. The piano sound was derived from three sources: Yamaha and Roland MIDI devices that sense Elton's keyboard dynamics, plus two Sennheiser 504 mics mounted inside the closed lid.

HERCULEAN MONITOR LEVELS

Elton John is justly notorious for his onstage monitor levels, and monitor engineer Alan Richardson's setup consisted of two Clair 12AM wedges on either side of the piano bench for vocals only, plus a stereo pair of Clair double 15-inch wedges for the piano and band mix, all driven by Crest amps. The resulting SPLs would bring lesser men to their knees; Elton's middle name—Hercules—seems appropriate.

The rest of the monitor setup was fairly conventional: The band got two 12AM wedges each (driven with Carver amps), except for drummer Charlie Morgan, who took a split of the onstage mics and created his own in-ear mix. And the two guitarists, Davey Johnstone and John Jorgenson, each had an additional pair of wedges positioned at the stage lip. "We call them the posing wedges," says Richardson, explaining that the extra wedges allowed the guitarists to stalk the front of the stage without leaving the monitoring environment.

Richardson created the dozen or so monitor mixes on a Yamaha PM4000M and EQ'd them with TC Electronic digital graphics, which he adjusted during setup by means of a remote head. Re-

verb units included a Yamaha SPX900, which Richardson used for a long (3.2 seconds) reverb on Elton's voice, two SPX990s and a Roland SDE 3000. Like Franks, Richardson patched dbx compressors into the stereo bass channels, and he used four channels of gating for the drums.

MUSICAL MIXING STYLE

The single Oakland show was a sellout, and the arena hummed with anticipation as the lights went down and the band took their places. Playing with neither a support act nor an intermission, Elton presented a set lasting about two hours and 40 minutes. Though songs from his latest release, *The Big Picture*, were included, the set consisted mainly of favorites from his extraordinary catalog of chart and radio hits, augmented by an incendiary "Great Balls of Fire" for an encore. With four backing vocalists, additional keyboards and percussion, plus guitarist Jorgenson's occasional contributions on saxophone, steel guitar and mandolin, the sound was full and complex; nevertheless, Franks' mix, though loud, was well-balanced and detailed.

Franks unabashedly admits that his mixing style is more musical than technical. A capable musician—he played bass on one of the three Elton John albums he co-produced—Franks obviously enjoys his job and became totally absorbed in following the musicians' performances and enhancing any spontaneous flourishes. "I listen to stuff possibly in a slightly different way to some engineers," he explains. "I listen to it as a musician; playing four or five instruments myself, I listen to the structure of what is being played and how everything relates to everything else."

Asked for his assessment of the sound of the New Arena, Franks was unequivocal. "Tell them I thought it was fantastic," he says. "It's one of the best-sounding halls that I have played in for a long time. I really enjoyed it, and being a studio-trained engineer, when you're working in an environment where the acoustics are good, it gives you the freedom to express yourself and not have to worry about the limitations. In that room, I could do virtually anything I wanted, and it wasn't a problem. They did a good job, whoever designed it. Congratulations." ∎

Chris Michie is Mix's technical editor.

New Sound Reinforcement Products

NEW PEAVEY AMPS

Peavey Electronics Corp. (Meridian, MS) introduces the PV™ 1200 power amplifier, rated at 600 watts per channel at 2 ohms, 425 watts/ch at 4 ohms and 250 watts/ch at 8 ohms. Bridged, the PV 1200 will output 1,200 watts into 4 ohms, 850 watts into 8 ohms. Peavey also introduces the PV 500 power amp, which is rated at 250 watts per channel at 2 ohms, 210 watts/ch at 4 ohms, 130 watts/ch at 8 ohms. Bridged, the PV 500 outputs 500 watts into 4 ohms and 420 watts into 8 ohms. Both amps feature Peavey's DDT™ speaker protection, ¼-inch inputs and outputs, and a two-speed fan. Prices are $549.99 (PV 1200) and $399.99 (PV 500).
Circle 314 on Product Info Cord

CADAC REMOTE MIC SPLITTER SYSTEM

Cadac (Luton, Bedfordshire, UK) has introduced the Remote Microphone Amplifier/Splitter system, which allows for cable runs of up to 500 meters between stage and mix position. Consisting of two rackmonnt modules—the 16-input Mic Amp/Audio rack and a matching Remote Control rack—the system can accommodate up to 96 mic

inputs (six input racks, six remote control racks). Removable input channel modules provide 60 dB of gain adjustment in 5dB steps, and individual buttons select 48V phantom power and monitor, isolate and mute modes. Once set, local control may be disabled; channel settings may then be manipulated only by remote control via an RS-485 serial interface. The system offers six independent, electronically balanced line-level outputs for each input, up to three of which may be transformer-coupled. Additional features include master global functions for mute, zero gain and lock.
Circle 315 on Product Info Cord

APOGEE STAGE MONITOR

Apogee Sound (Petaluma, CA) offers the FS-2 Ultra-Compact Stage Monitor, a relatively compact (22.5x13.6x19.25-inch) wedge monitor containing a 12-inch woofer and 2-inch throat, fluid-cooled HF compression driver mounted on a 40°x60° horn. The bi-amped system offers a frequency response of 50 to 19k Hz, ±3dB; maximum SPL is 132 dB at 1 meter.
Circle 316 on Product Info Cord

RADIAN ENTERS SR MARKET

Radian Audio Engineering (Orange, CA), best known as a loudspeaker component manufacturer, has entered the professional sound reinforcement speaker market with the introduction of its RP Series. The new loudspeaker range includes five full-range systems featuring coaxial elements and two subwoofers. All Radian models feature 13-ply Baltic birch cabinetry, perforated steel grilles and dual Neutrik NL4 Speakon connectors, and they are finished in waterproof, scuff-proof Duradian.
Circle 317 on Product Info Cord

NADY 2-CHANNEL UHF WIRELESS

Nady Systems (Emeryville, CA) has introduced the Platinum 802 Series 2-channel UHF wireless system. Features include dual front-mounted antennae, XLR mic level and ¼-inch

adjustable line-level outputs, and DigiTRU Diversity™. Transmitter options include handheld, lavalier and head mics and instrument transmitters.
Circle 318 on Product Info Cord

YORKVILLE UPGRADES ÉLITE SPEAKERS

Yorkville (Niagara Falls, NY) announces upgrades to its élite line of pro audio loudspeakers. New features include ¾-inch plywood construction with internal bracing, anti-resonant grilles, inset handles and connector plates, HF driver protection, Speakon and ¼-inch inputs, ATM Flyware options, integral stand adapters and wheels. Prices from $499.
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RECORDING · NOTES

PELL MELL
THE TCHAD BLAKE WAY TO "STAR CITY"

by Adam Beyda and Anne Eickelberg

Long before the much-abused, catch-all label "alternative" proliferated, Pell Mell were making forward-thinking and melodic all-instrumental records. The band started in 1980, and for a few years all the members lived in the same state. Then everyone scattered, and Pell Mell reappeared only sporadically—when they felt the urge, the musicians would gather for a few weeks of jamming, then make DIY

PHOTO: GREG FREEMAN

Spalding in the amp bathroom

recordings. They released one EP and two LPs on the SoCal indie label SST before the post-Nirvana signing frenzy landed them a deal with Geffen. The resulting album, 1995's *Interstate*, made the band a college radio staple. They'd recorded the album mostly with engineer Tim O'Heir at the Boston studio Fort Apache but also did much of the recording themselves in bass player Greg Freeman's 16-track San Francisco studio.

In fact, both Freeman and keyboardist Steve Fisk (based in Seattle) are professional recordists. Fisk has produced and/or engineered for Screaming Trees. Beat Happening and the Geraldine Fibbers, and Freeman's engineering credits include Thinking Fellers Union Local 282, Faust and Royal Trux. With this background, it's no surprise that Pell Mell's records, on top of their musical interest, are loaded with imaginative and provocative sonics.

Their gorgeous recent release, *Star City*, is a treasure-trove of strange atmospheres and driving grooves, loaded with both ringing and noisy guitars, scintillating keys and an array of multisource analog bleeps and warbles. It's suggestive of everything from surf to old-school ambient,

and it manages to be simultaneously a sound bonanza and a model of restraint.

Yet even for a band known for exceptionalism, *Star City* was an anomaly. For one thing, it was recorded for Geffen, but soon after it was mastered, the band's major-label love-affair came to an abrupt end, when, as part of a recent wave of purges, that company dropped them. ("It happens at every major label," Fisk smirks. "It's as if all of a sudden all the bands you signed are like a drunken weekend you want to forget.") New York City indie Matador Records came to the rescue, snapping up the masters and getting the record into stores. And although in

Freeman (foreground) and Beerman, getting into their role as musicians

PHOTO: S. "HUSKY" HOSKULDS

FARM DOGS
CUTTING-EDGE CAMPFIRE MUSIC

by David John Farinella

The $20 bills are flying across the converted home gym at Bernie Taupin's home in California's Santa Ynez Valley. If co-producer/engineer David Cole declares that this is the best band he's ever worked with, members of the Farm Dogs—Taupin, Jim Cregan and Robin LeMesurier—

L to R: Tad Wadhams, Tony Brock, Bernie Taupin, Robin LeMesurier and Jim Cregan

PHOTO: CHRIS CUFFARO

David Cole

gratefully fling Andrew Jacksons at him. And when the band returns the compliments, Cole quickly collects the 20-spots and flies them right back at the trio. This clowning and literal give and take is just part of the light, non-hustle-bustle atmosphere that Taupin originally hoped to find when he put together this band.

Cole has described the band's sound as "cutting-edge campfire music," and that seems as good a descrip-

tion as any, considering the bandmembers' style and pedigree: Taupin's illustrious career as lyricist for Elton John is well-known; guitarists Cregan and LeMesurier and drummer Tony Brock are longtime Rod Stewart sidemen; and bass player Tad Wadhams is fresh off the road with Sheryl Crow. But despite the serious chops, these musicians have a refreshingly low-key approach to music and recording. On their first album, the critically

lauded *Last Stand in Open Country*, the three current members and Dennis Tufano, who left the band to pursue acting, sat around in a circle to record a live, mostly acoustic album. After playing a select number of live shows, the band discovered that their folky setting was fine for the studio, but they wanted to "plug-in" for the follow-up, *Immigrant Sons*.

Before the band and Cole started recording *Last Stand*

VICTOR WOOTEN
FEEL THE FUN(K)

by Robin Tolleson

Victor Wooten is certainly among the most heralded electric bassists of this decade, due to his adventurous playing in Bela Fleck's blu-bop Flecktones (six albums and heavy touring), a stunning all-bass solo debut, *A Show of Hands*, and cameos with Bootsy Collins, Buckshot LeFonque, Mark O'Connor, Steve Smith and others. His second solo album, *What Did He Say?*, is a bold showing of new Nashville sounds and an amazing tale of recording-on-the-fly with the Roland VS-880.

Wooten and co-produc-

ers Kurt Storey and J.D. Blair recorded several basics at the bassist's Nashville home, but many other parts, such as Fleck's banjo and Paul McCandless' soprano sax, were put down in dressing rooms. Bass parts were recorded in hotel rooms and on the Flecktones' tour bus. "On long rides, I can just plug

What Did He Say?

straight into the VS-880 and do it," Wooten says. "I love that machine. It's really made it easy for me. In a lot of ways, it doesn't beat a studio with good outboard gear and mic pre's and a real good engineer. But creatively, it's the way to go for me because if I want to record something on the spot, I can do it, and I don't have to redo it once I get into a real studio."

Wooten came up with the groove for the album's hip hop track, "Don't Wanna Cry," in a hotel room in Japan and recorded the whole thing, other than some bass melodies,

on his other favorite "toy," the Roland DR-5 ("Dr. Rhythm Section"). "I keep the DR-5 with me most of the time because I can

IRON BUTTERFLY'S "IN-A-GADDA-DA-VIDA"

by Russell H. Tice

In the fall of 1967, as psychedelic music began to bear financial fruit for record companies, the young Southern California rock group Iron Butterfly was unwittingly preparing to soar higher on the *Billboard* charts than any of their contemporaries. Following the recording of their first album, *Heavy* (1968), however, they were almost permanently grounded. The album was shelved for nearly a year while the band tried to separate from original manager David Winters. After several months of small gigs and legal harangues, the Butterfly suffered a severe amputation—original guitarist Danny Weis left with bassist Jerry Penrod to form the band Rhinoceros, and were soon followed by frontman/vocalist Darryl DeLoach (who went on to start Flintwhistle). Only organist/vocalist Doug Ingle and drummer Ron Bushy remained. Finding replacements Lee Dorman on bass and Erik Brann on guitar was only half the battle. Bushy remembers, "We had to put a group together and prove to Atlantic/Atco that it was worth their while to put the album out. That took a lot of hard work, probably three months of rehearsing. We pulled it off. They got us on a major tour with The Doors and the [Jefferson] Airplane."

While on the road, they unveiled a new song, entitled "In-A-Gadda-Da-Vida." Ironically, the song's origins are far removed from the heavy metal beast it became. Written by Ingle, the son of a church organist, it was much shorter and quieter when conceived, and it was called "In the Garden of Eden." Lee Dorman says of the song's beginnings, "'In-A-Gadda-Da-Vida' was like a country ballad when we first heard it, but by the time the band got done with it...well,

you can see what happened."

Ron Bushy actually lays claim to the name: "I was supporting the band by making pizza," he says. "I came home at three in the morning from working one night and Doug played me a song he was writing. He had polished off a whole gallon of Red Mountain wine as the evening wore on. He played this song on the keyboard for me and sang it. He was so drunk that it came out 'in-a-gadda-da-vida.' I thought it was real catchy so I just wrote it down phonetically. The next morning we woke up and looked at the writing, 'In-A-Gadda-Da-Vida,' and decided to keep the title."

As the group became more comfortable with the song and its concept, it expanded more and more in live performance. Dorman recalls, "We were about eight minutes into it. Then we got an opportunity to go on the road with the Jefferson Airplane, and by that time, 'Vida' was up to 10, 11, 12 minutes and moving along." When the tour got to New York, it was time to record.

"I believe it was a commitment album that they had to have done for

Atlantic by a certain date," engineer Bill Stahl remembers. "They asked where the Vanilla Fudge had done their album and they told them Ultra-Sonic [in Hempstead, Long Island]. I believe that's how it came about. I think it was done in three days."

Stahl, the owner of Ultra-Sonic, had opened his facility in 1962, and owned one of the first 2-track machines. "I had a sel-sync so that I could do recording on one track and then adding on the second; that was not common in a studio at that time," he says. "Les Paul was the only other one who had it."

The studio had gone through quite a few changes in the ensuing six years, but according to Stahl, it was still quite a pioneering facility: "We went to 8-track probably in 1965. We bought the first 8-track machine off the floor of the AES convention in New York, which was a Scully. The previous 8-tracks were Ampex 300s converted to 8-track, which I think CBS had. But this was the first 8-track machine designed as an 8-track machine. That machine was the first one that showed up the problems in the slitting process of the tape. In the curing process at the time, the 1-inch tape that they were making would curl, so it was very difficult to get spec on the outside tracks. We wound up having all the tape manufacturers sending us tape, coming out and recording things, trying to get the tape to work. So the machine was kind of ahead of the tape,

L to R: Erik Brann, Ron Bushy, Lee Dorman and Doug Ingle

S. "Husky" Hoskulds at Sunset Sound Factory.

Blake regularly works in Sunset's B room, which features a vintage API, modified and fitted with Neve Flying Faders automation. "Once we were [in L.A.]," Freeman says, "we just turned it all over to Tchad, completely. And my mind was just blown 18 hours a day. We'd go in and set up for a basic track, with all four of us playing live. We'd have a headphone mix that was pretty normal, but he runs everything in mix mode from square one, as if he were mixing from the very beginning. We'd listen to the playback, and we'd be speechless because it was so incredible-sounding."

"One thing I really don't like is recording without knowing how things are gonna sound in the end," Blake explains. "So I've always tried to record with, say, the drum sound being the [final] drum sound we want. I'll get a drum sound while the band's playing up the song, put it on tape, listen back, and more times than not it's fine. It's all done very quickly. I try to hear everything at once—not just drums, not just bass—and I like it to be spontaneous."

And indeed, the sessions were freewheeling. Freeman says that the material the band brought into the studio was rough and that a lot of fleshing out happened on the spot. While the band tracked, Blake would be doing his thing and sending lots of compression and effects to the studio's Studer A827 (at 15 ips with SR). Fisk says that Blake would create keyboard themes via editing. "He would fall in love with some detail or something I'd do in between one thing and another—real 'Eno card' kind of stuff, where you accidentally do something that's much cooler than what you could ever think of."

Blake's spontaneous approach was complemented by his innovative methods and use of unusual gear. For instance, a huge part of the drum sound on *Star City* came from the overhead mic, a Neumann binaural head dubbed Gongoli. ("It was named that by S.E. Rogie, a guitar player from Sierra Leone," Blake explains. "I put it in front of him as we were getting ready to record. He looked up, his eyes went wide and he said, 'Oh, Gongoli!' A friendly spirit from his village was named Gongoli, and I guess Gongoli looked like the Neumann binaural head! So it sort of stuck.") Blake placed

Gongoli at just above cymbal level, in front of the kit (see photo). "Then one snare mic, a kick mic, sometimes a hat mic and a floor tom mic, and usually the [binaural] head picks up the rack tom, the cymbals and the hat. But I always put one mic in the center of the kit, fairly close to the kick and snare, that goes through a pretty radical compressor that I'll mix in." On Beerman's kit, Blake used a Shure Level-Lock. "It's a mic-level podium compressor, and drums drive the thing so hard it distorts and compresses like crazy. You can actually make it sound like a backwards drum kit if you turn it all the way up. That's just nice to mix in a little bit. Then I also use SansAmps on the drums; a little bit

Fisk at the keyboard com

of distortion on the kick and snare goes a long way."

Apart from Gongoli, Blake's mic choices and placement tended to be fairly straightforward. He'd get sounds by using unconventional sources (such as cymbals from Toys R Us) and effects or processing. On guitars, for example, Blake would just use either a 57 or a KM84 on the amp, sometimes a Coles, rarely using more than one mic. The B room at Sunset has only one small iso booth (where the kit was set up), so Blake ran a line out to the bathroom, where he placed the guitar amps (all small ones, including Whites and Alamos). He'd run Spalding's signal through a compressor direct to tape, "or if he wanted a phaser or vibrato, that'd be in his guitar line. I usually don't like chorus much. If somebody wants a chorus, I'll break out my vibrato box."

Generally speaking, Blake eschews reverb, preferring a more dry, in-your-face kind of sound. He'll often create ambience using compression. "I almost never record room or ambient mics," he says. "I'll send the head to compressors

and then go to two other tracks of the tape, and those'll be my ambient mics—basically compression. I just mix them in slightly. The compressor I've used the most in the past ten years is the Spectrasonics 610. They're solid-state compressors that distort a bit—even at their lowest setting they're compressing more than you can imagine! I'm not sure what they're doing, but whatever the EQ curve is, it's wild." Blake also has some old broadcast compressors that he'll use occasionally for a kick, a snare effect or a guitar. "My favorite compressor that I use on everything is the Distressor," he adds. "It's amazing. It's great on vocals, and a lot of the guitar sounds for Pell Mell were through the Distressor."

Some of the keyboard parts were replaced during overdubbing, when a lot of percussion and unusual sounds were added, as well. ("Part of the philosophy of the recording is just to have a bunch of junk around at all times," Blake says, "a lot of stuff that can be inspirational to everybody.") Fisk played an array of instruments, including a Compact Fast Two Combo Organ. "It's a non-collectible dinosaur gaffe from Farfisa," Fisk says. "It has its own elliptical speakers, which we miked to get the key click." He played a Baldwin Fun Machine, which he says is "a home organ, probably mid-'70s or later. It has auto-accompaniment universes like Habanera, Waltz, Rock 1 and 2. It has a little interactive bar that you can tap to switch it from major to minor. The rhythm machine is gorgeous; it's all white noise."

More conventional keyboards got a lot of unconventional treatment. "We did a thing on one song where I was playing a Celeste through a SansAmp," Fisk says, "and the SansAmp was going through a wah-wah pedal that Tchad had up on the console; I don't know if he was using both hands or one, because I was in the other room playing, but he was making it sound like this insane Miles Davis fuzz Rhodes at double speed. There were like three or four tracks of it. That was kind of cute."

Leaving the recording to Blake gave Fisk a chance to focus on his role as a musician and to get a wholly different angle on his sound. "It's a matter of trust," he says, "it's a free-fall: I didn't look at the knobs, I didn't ask what compressor he was using. When he would say, 'Oh, I don't want to put it through an amp, a DI would be great,'

PHOTO S "HUSKY" HOSKULDS

Beerman in the booth with Gongoli

I'd think, "Okay, Tchad says a DI is fine. Don't worry about the keyboard sound; don't worry about what I know from my experience as a producer and engineer; this is Tchad doing it, and I love what Tchad's aesthetic is.'"

Freeman also concentrated on being a musician (his bass was recorded direct, with a SansAmp) but paid a little more attention to Blake's machinations and style. "I've never seen anyone apply really basic stuff as well as Tchad," Freeman says. "If something like the bass or a tom or kick is in a certain range, nothing else goes in that range. It's the kind of stuff that, when you read the book, it's chapter one: Keep the frequencies and the instruments separate. He was totally aware of that at all times and took great pains to make space for everything." In the mix, Freeman was jazzed by Blake's sense of arrangement, "like when a part would come in or go out. It wouldn't always be on the one or the change. Things would drag in or tail over or stop for a little bit for no apparent reason, then come back in. That sort of thing was pretty impressive."

"As far as arrangement goes," Blake elaborates, "I rely quite heavily on mute-button arranging—I love it, it's really fun. We all seemed to be into the slash and burn thing when it came time to mix, which I'm happy for."

Sure, it was a fruitful collaboration, but with so many engineers in the house, wasn't there a lot of dissension? "No, not at all," Freeman replies. "We wanted Tchad to do his thing—just sitting back and going for the wild ride was the whole point. I mean, there's like half a dozen people I could think of who I'd enjoy working with like that, and he's definitely the number one guy. It was phenomenal to be able to watch him. I learned tons."

For his part, Blake says that working with musician/engineers didn't pose any particular problem. "Everybody had something to say, but the best ideas won out, whoever's they were. The process was really fun; everybody seemed to be on the same planet. It's one of the most fun records that I've done." ∎

in Open Country, Taupin's home gym and racquetball court had to be converted to a recording space. "Bernie had written these songs at the ranch, and he wanted to bring everybody up there to capture the mood of the Santa Ynez Valley," Cole says, "so he asked me to put together a studio." Cole broke out a tool belt and a book on acoustics written by Jeff Cooper to put together the vocal booth in the racquetball court. (For the second album, he added a drum room in front of the vocal booth for Tony Brock's kit.) After he finished the original construction, he had the equipment completely set up and was planning to have a week or so to test everything out, until the band walked in at about 10 that morning. "By noon, they had written the first song, and Jim turned to me and said, 'Let's put that down.' So that was my two hours of soundcheck," Cole remembers with a laugh. "We hit 'record,' and by dinner time we had our first song recorded. After dinner, we ran in and did vocals. It was baptism by fire from where I was sitting. But it was a very creative, productive environment. Bernie had a handful of finished lyrics that he'd written specifically for this project, and he handed them out, the guys looked them over and they would pick one that piqued their interest. Bernie might have a musical idea of where it should be. He might say, 'I hear this as a Neil Young song if it were recorded by Springsteen on *Nebraska.*' It was pretty amazing being there as they wrote and recorded the music at the same time."

To keep up with the organic situation, Cole kept the technology relatively simple. The songs were tracked on three Alesis ADATs through a Mackie 32•8. If he needed more than 24 tracks, he brought in another ADAT machine and made submixes for the vocals. For microphones, he turned to the Audio-

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Technica family, relying on the 4050 for vocals, 4051s on guitars (which replaced his former favorite acoustic guitar microphone, an AKG 452), and, on Brock's drum kit, a number of Audio-Technica clip-ons for the tom-toms, an EV RE20 for the kick, a Shure 57 on the snare and a pair of Geffel UM70s for overheads. They listened to everything through Sony headphones (powered by a Furman HA-6 amp) and Tannoy PBM-8II monitors. The only other tools he had at his disposal were a handful of dbx 160X limiters and some Boulder mic pre's that he used for the vocals. For a touch of drum ambience and a bit of space around the band, Cole hit an Alesis Quadraverb occasionally.

"One of the challenges and constraints I put on myself was to record this album within the budget that we had," Cole explains. "I didn't have a lot of high-tech gear to play around with, and because we were in the middle of the Santa Ynez Valley, I couldn't call up and just rent something or bring in a bunch of expensive tube gear. I purposely said, 'Okay, this is what I have to work with; how can I get the best possible sound out of it?' I like that challenge. It took me back to my roots of guerrilla recording, where you're thrown in a room, here's what you have to work with, make the best sound."

Though both *Last Stand in Open Country* and *Immigrant Sons* were recorded to digital machines, Cole turned to a Neve desk and half-inch analog at Ocean Way Studios in Los Angeles for overdubs and mixing. "I prefer running the music through the Neves at some point to get that warm analog sound," he says. "And by mixing to half-inch, we get a little of the analog compression."

That analog warmth, in turn, helped the wonderful collection of vintage Martin, Guild and Gibson guitars that Cregan and LeMesurier contribute to the band's sound. In fact, Cole worked hard to get a clean tone from the decidedly non-effected players. "Guitar, in general, is more than just a melodic instrument; it's part of the rhythm and almost percussion track, especially the slide guitar," he says. "What I do is pretty basic; I'll put my head down and listen to where I get the sound and put the mic there. It's amazing how many people just throw a mic in front of an instrument and go and hit an equalizer to dial in the sound they want. Whereas if you start with a great sound, pick the appropriate mic and have a decent instrument, mic placement will give you 90 percent of what you're looking for. I don't recommend it

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for the snare drum, though," he adds, laughing.

The vocal tracks on *Immigrant Sons* were straightforward, as well, with Cole relying on the natural reverberation of the racquetball court for the haunting album closer "Stars & Seeds," and a bit of trickery for "Deep Dark Secret." As he explains it: "I wanted it to be fairly oppressive and have an edge to it, so I pumped Bernie's vocal out through an Auratone [speaker]. I have one of those little kid's toys that has a microphone and a little speaker, and it's a voice changer. You can dial it up or down and it will pitch up or down. I left it at normal pitch, but I liked the cheesy sound with the little speaker on it. I cranked that up, miked the Auratone and miked the little speaker on the plastic toy to get some break-up and radio-telephone kind of voice sound out of it."

Sure, the band plays an organic style of rock reminiscent of the Eagles, Poco, The Band and Warren Zevon, and sure they didn't use a different effect pedal or sample every other second, but the way they recorded the album all in one room, all live, gave Cole pause. "An ideal situation for an engineer would be each guy in a booth with a micro-phone and a pair of headphones," he says. "But part of the charm of Farm Dogs and the way we recorded this was that we were all in the same room together. We were fortunate that the room we recorded it in was complementary to the type of music we were recording. A kind of constructive bleed is what we went for. On some of those songs, you hear clothing moving around, and that's all part of the genuine honesty of the record. Warts and all, here are the Farm Dogs.

"As an engineer, I understand all about distortion and levels and proper recording techniques, but as a producer I also understand that the vibe wins," he continues. "So, if I catch something on a first take that maybe hits the red or wasn't the perfect technical recording, if we listen to it and react to it and it still gives us goose bumps, I'm not about to redo it for the sake of the VU meter. It's important to make those choices, and all these guys are veterans of making tons of records; they know that worrying over some technical aspect has no merit when it comes to sacrificing the creative process. We're all pretty much in accord with, 'Hey, if it ain't broke, don't fix it.'" ∎

plug my bass in and practice with it," Wooten says. "The vocals were recorded later in a dressing room with an Audio-Technica DAT mic. I got the idea for the vocals while sitting on the bus, so I ran in the dressing room, set up and sang them in as a demo. When we solo'd the track later, getting the mix on the vocals, I could hear Paul McCandless warming up in the background on horn, but we kept the tracks because they had the flavor of what I wanted. I didn't want to risk losing that."

Wooten also stacked the vocals for an interesting effect. "On the verses, I would slow the machine down and sing to it so that back at normal speed, my voice is raised and thinned out, and kind of sounds female," he says. "Then I would sing a lower part the same way by speeding the tape up and singing the part in. Then you slow it back down and my voice fills out and sounds like a different person. I would usually sing a couple parts in normal and then put a high one and a low one in."

Wooten also recorded the piano solo on "The Loneliest Monk" on the DR-5, "then we squashed everything to make it sound like an old record was playing,

and then I sampled a needle going off a record and put that on there." Wooten loves the raw feeling of the record and enjoys putting on extra sound bites, bits of conversations, cords buzzing and false starts. "The music's still there, but it makes the listener feel like they're getting something extra," he says. "They want to hear your voice. That stuff's fun.

"And I left a lot of mistakes, because making mistakes is part of what I do best, I guess," Wooten laughs. "Making mistakes and trying to get out of them is part of what makes it creative. How you adapt. I like how I can get out of mistakes. Because I make so many, you have to get good at it. A mistake doesn't necessarily mean it's bad. It just means it's something that you didn't mean to play. So a lot of times when you listen back to it, it's better than what you would have thought of. A lot of times it captures more of what you're actually going for. So working with Kurt Storey and J.D. Blair on this record, I had a couple other pairs of ears to help."

"Vic allowed us to come in and have some input, and that was real cool of him," says Blair, who has been accompanying Wooten on full-size and cocktail-size drum kits in support of his two albums. The drummer was responsible for many of the grooves on *What Did He Say?*, as was engineer Storey. "We did a show in Fayetteville, Arkansas," Blair recalls, "and Kurt had the idea during soundcheck to loop our vocals live and loop the drums. He came up to the stage and was tinkering with stuff, and said, 'Say something Vic.' And Vic was saying, 'What did he say, what did he say,' and we just started playing off that in soundcheck. It was pretty killer, and we tried it live that night. When we got back to Vic's house, we just tried to duplicate the way it went down live that first night."

"We were recording to a Tascam DA-88 at my house, and I was plugged straight into the board," Wooten recalls. "A lot of times I'll go through a direct box into the board, but I'll also use a preamp, and I can blend the two sounds. On rare occasions, I'll mike an amp. I haven't found that I can get the best of sounds miking an amp, for the clarity that I'm looking for in most things. On a lot of my projects, especially if I'm doing solo bass, I'll just put a mic live on the bass to get a lot of that attack, frets and all that. It's like having piezo pickups or something—it just adds that high-end touch and makes it very clear. But most of the time I'll get two tracks—a direct and a pre-

amp of some sort—and blend the two.

"Kurt is good at getting sounds on the drums," Wooten continues, "and he says that the living room is the best drum room at my house. It's a log home, so it's all wood and has a high ceiling." Wooten was recording upstairs with the engineer in the "control room," a then-unoccupied bedroom, and the bassist and drummer only saw each other when Wooten would walk to the top of the staircase to offer instructions or encouragement. In Blair's words, the recording session was "a blast. If Vic is really pumped on something, he rushes out of that room upstairs and is looking at you from the top of the steps, 'Yeah, okay, what would it sound like if we do this?'"

Wooten notes that the album's grandest track, "The Sojourn of Arjuna," was pieced together, starting with the bass. "I had the four-chord groove thing,"

Wooten recalls, "and Bela and Roy [Flecktones percussionist, known as Future Man] liked it when I was messing around with it at soundcheck, so I came up with the melody. Paul McCandless played that melody for me while we were out on the road. I hooked up a Shure 58, put it on the bell of his soprano, and added a little reverb that's inside the VS-880. We recorded Bela in the dressing room, too, with a mic and the VS-880, and we recorded Rod McGaha's trumpet in his living room. Sat on his couch and hooked up a mic and some headphones. Some of those bass parts were recorded in my hotel room, and some were recorded on the bus because I doubled the melodies with fretless bass and electric bass. I did some of that riding down the road. I gave Roy two

tracks on the VS-880, and he played to a submix of it while we were on the road. Two tracks, straight in, and he can get his own blends inside the Synthaxe."

Wooten took the VS-880 back to his parents' home in Virginia to record his father singing "Bro' John" and his mom over the telephone for an appearance before "Heaven Is Where the Heart Is." He hooked his DAT recorder up in the hospital to tape his unborn daughter's heartbeat and brought in a large cast for his reworking of the jazz classic "Cherokee." "I wanted it to be a fast tempo, and I programmed an arrangement on the DR-5 on my way to James Genus' house in New York and had James play to it on the VS-880. Then I did my bass part on the VS-880. I'm not so good at that jazz bebop playing, so I fixed my part quite a bit. And I like the VS-880 because I can set up an auto-punch, try something, and if it doesn't work I just hit 'undo' and it's back to the way it was. I took it home and had my brother Regi add some guitar and my brother Joe add keyboards at my house. Then I had Raymond Massey come over and play a totally different drum set, and Kurt recorded that. I was in Virginia and got my brother Rudy to add one sax part and Jeff Coffin to add a tenor part while he was playing with the Flecktones. I had Rod McGaha come over and add trumpet. Then Roy came over and said, 'Just let me ride all the way through it on the cymbal.' At first I couldn't hear it, but it really helps smooth things out."

John Lennon's "Norwegian Wood" was played on one bass and recorded on the VS-880, "reverbs and all," says Wooten. "We didn't do anything to it in mastering or anything else. This was done in New Orleans before a show with Medeski, Martin & Wood. After our soundcheck, I just went in the dressing room and started coming up with the arrangement. I put it down in pieces and made it sound seamless. There are some alternate changes and things in there that I recorded as I came up with it on the spot. That was my tenor bass, which is strung up a fourth higher. I do a lot of solo playing on that because it brings the pitch up just a little and makes it clearer. When you're playing chords on the bass, sometimes it can get muddy, so that cleans it up a little bit.

"If people are getting the fun vibe from this music, then I'm happy," Wooten says. "Like the music or not, if you can feel the fun that we are having, then that's great. And we definitely are having fun." ∎

MEDIA & MASTERING NEWS

CD ALBUMS DECLINE IN RECORD BUSINESS RECESSION

Bucking trends in most other sectors of the economy, U.S. shipments of prerecorded music product (net after returns) took a 6.5% dive in 1997 to 1.06 billion, falling to their lowest level since 1993. As reported in year-end figures from the Recording Industry Association of America, the value of industry shipments fell to $12.2 billion, a decline of 2.4% compared to 1996.

to 173 million units), and cassette singles (down 29%). Anyone hoping for a continued resurgence in vinyl was disappointed as well, with LP units slipping 7% to 2.7 million and vinyl singles sliding 26% to 7.5 million.

Not all the news was bad, however: CD singles continued their growth streak with a healthy jump of 54% to reach 67 million units. And music videos kept their momentum, as well, climbing 10% to 18.6 million units.

even performance since 1994, the decline in 1997 seems to confirm once and for all that the "CD Boom" (consumers switching their existing collections over from LPs) has run out of steam. Since newly proposed audio formats offer benefits targeted toward the high-end rather than the mass market, the labels can't count on yet another replacement technology to rescue their shrinking revenues. To really snap out of their slump, they may have to fall back on discovering

The Recording Industry Association of America's 1997 Year-end Statistics
Manufacturers' Unit Shipments and Dollar Value (in Millions, net after returns)

		1988	1989	1990	1991	1992	1993	1994	1995	1996	% Change 1995-1996	1997	% Change 1996-1997
(Units Shipped)	CD	149.7	207.2	286.5	333.3	407.5	495.4	662.1	722.9	778.9	7.7%	753.1	-3.3%
(Dollar Value)		2,089.9	2,587.7	3,451.6	4,337.7	5,326.5	6,511.4	8,464.5	9,377.4	9,934.7	5.9%	9,915.1	-0.2%
CD Single		1.6	- 0.1	1.1	5.7	7.3	7.8	9.3	21.5	43.2	100.9%	66.7	54.4%
		9.8	- 0.7	6.0	35.1	45.1	45.8	56.1	110.9	184.1	66.0%	272.7	48.1%
Cassette		450.1	446.2	442.2	360.1	366.4	339.5	345.4	272.8	225.3	-17.4%	172.6	-23.4%
		3,385.1	3,345.8	3,472.4	3,019.6	3,116.3	2,915.8	2,976.4	2,303.6	1,905.3	-17.3%	1,522.7	-20.1%
Cassette Single		22.5	76.2	87.4	69.0	84.8	85.6	81.1	70.7	59.9	-15.3%	42.2	-29.5%
		57.3	194.6	257.9	230.4	298.8	298.5	274.9	236.3	189.3	-19.9%	133.5	-29.5%
LP/EP		72.4	34.6	11.7	4.8	2.3	1.2	1.9	2.2	2.9	31.8%	2.7	-6.9%
		532.2	220.3	86.5	29.4	13.5	10.6	17.8	25.1	36.8	46.6%	33.3	-9.5%
Vinyl Single		65.6	36.6	27.6	22.0	19.8	15.1	11.7	10.2	10.1	-1.0%	7.5	-25.7%
		180.4	116.4	94.4	63.9	66.4	51.2	47.2	46.7	47.5	1.7%	35.6	-25.1%
Music Video			6.1	9.2	6.1	7.6	11.0	11.2	12.6	16.9	34.1%	18.6	10.1%
			115.4	172.3	118.1	157.4	213.3	231.1	220.3	236.1	7.2%	323.9	37.2%
Total Units		761.9	806.7	865.7	801.0	895.6	956.6	1,122.7	1,112.7	1,137.2	2.2%	1,063.4	-6.6%
Total Value		6,254.8	6,579.4	7,541.1	7,834.2	9,024.0	10,046.6	12,068.0	12,320.3	12,533.8	1.7%	12,236.8	-2.4%
Total Retail Units										833.9		817.6	-2.0%
Total Retail Value										10,768.0		10,785.8	0.2%

The 1997 figures do not mark the first time in the 1990s that the music business has contracted from the prior year. But in 1991, the steep 7.4% decline could be explained away by a U.S. economy in recession, while 1995's drop was too mild (0.9%) to provoke deep concern. This time however, the fall affected even the industry's flagship configuration, the CD album, which now accounts for more than 70% of units sold. CD shipments were down 3.3% to 753 million, valued at $9.9 billion. It was the first time in memory that the CD stumbled on its steady upward climb.

Other losers in 1997 included prerecorded cassettes (down 23%

The spin doctors at the RIAA tried to put a happy face on the 1997 results, playing with the statistics to show that shipments to traditional retailers were not so bad (only a 2% decline), and that the real problem was a 19% contraction in "special markets" such as mail order, record clubs and "non-traditional" retail outlets. But a downturn is still a downturn. If anything, the argument that these outlets suffered because they tend to specialize in back-catalog serves only to underscore the real challenge facing the record business.

Considering the industry's un-

and promoting new music that people like well enough to buy.

LACQUER CHANNEL STRIKES BACK AT PROJECT MASTERING

The continued spread of digital audio workstations may be putting mastering capabilities in the hands of more and more users, but it takes more than a computer with EQ and compression capabilities to make a mastering engineer. So Lacquer Channel, a Toronto mastering house with credits including Peter Gabriel, U2 and Rush, has initiated a Project Evaluation Program (P.E.P.) to "reaffirm the need for professional mastering for today's music projects by letting artists 'test

BY PHILIP DE LANCIE

drive' the mastering process."

"We want to prove that any recording destined for release needs professional mastering," says Lacquer Channel's Scott Murley. "A good mastering job can greatly improve a studio recording, whereas a poor job—or no job at all—could undermine months of hard work." Under P.E.P., artists can bring their source tapes to the Lacquer Channel for a free consultation with a mastering engineer, who will review the material and demonstrate how professional mastering could enhance the sound of the final release. The company operates two mastering suites for CD premastering, and Murley says it is "the only mastering facility in Canada that still cuts lacquer for vinyl LPs."

Telex EDAT digital master editing and duplication system

DIGITAL BIN FOR IN-CASSETTE DUPING

Minneapolis-based Telex Communications introduced the EDAT digital audio master editing and duplication system for in-cassette applications in the project studio, radio, religious and talking book markets. The PC-based system uses a 4GB hard drive to store programs for editing, EQ and fades, and interfaces with a variety of in-cassette duplication recorders, including real-time and 2x KABA systems, 8x Telex 6120 XLP machines, and 16x Telex 6120 XL and ACC 4000 systems.

MASTERING NOTES

Engineers David Glasser and Charlie Pilzer of Airshow Mastering won a Grammy for their mastering and restoration work on the Smithsonian reissue "The Anthology of American Folk Music—the Harry Smith Collection." Glasser, who heads Airshow's new facility in Boulder, CO, has also been

Airshow crew: Owners David Glasser (L), Ann Blonston and Charlie Pilzer (seated) are joined by assistant engineer Eric Conn in the new Boulder, Colo., Studio A.

working on a Pete Seeger tribute album featuring contributions from Bruce Springsteen, Ani DiFranco, Roger McGuinn and Judy Collins, among others. Pilzer runs Airshow's Springfield, VA location...Frankford/Wayne Mastering Labs has added two new SADiE systems, making a total of three SADiEs in use at the New York City facility...

Ed Thompson (R), chief engineer for Ivory Classics, recently remastered Grammy Award-winning pianist Earl Wild's (L) original 1945 version of "Rhapsody in Blue" using a SADiE digital audio workstation with a UV22 plug-in. Also pictured (center) is producer Michael Rolland Davis.

SADiE also reports that Ivory Classics, a New York label devoted to classical piano recordings, used one of its systems for the restoration and remastering of Grammy-winning pianist Earl Wild's 1945 recording of Gershwin's "Rhapsody in Blue." The label also used the system, featuring the Apogee UV22 plug-in, for Wild's newly recorded two-CD set of Chopin nocturnes...Quadim Mastering Studios (Westlake Village, CA) reports that engineer David Donnely has been hard at work on projects including Geffen band She Moves, Curb Records's Jonathan Pierce and The Heart of Chicago, Volume II for Reprise Records. ∎

Oasis owner/engineer Eddy Schreyer

LA. GRAPEVINE

by Maureen Droney

This month, L.A. Grape continues a tour of some of the area's mastering facilities, checking in with Precision and Oasis.

Eddy Schreyer's Oasis has been open for going on two years now; a return visit to the two-room facility found Schreyer finishing up Warner Bros.' Recording artists SFP (Something For the People) and putting the last touches on the new Van Halen record.

Watching Schreyer at his desk, it becomes obvious how well thought out the ergonomics of his setup are, with its tilt-down monitor and everything just half an arm's length away. He's fine-tuned the room since opening and is par-

ticularly happy with his Hot House 2000 amps—"The finest I've had in this room," he says. "These Mosfet amplifiers sound terrific with my dual 15 Tannoys."

Other equipment Schreyer favors includes A/D converters by Manley, Apogee and Studer, and the upgraded digital Weiss EQ system with 88.2, 24-bit sampling. "It's much improved with the doubled sample rate," he says. "It has a much smoother EQ curve. We also use various Avalon and Manley analog units."

About 70% of Oasis' masters come in on DAT. "Unfortunately," he laughs. "If something comes in on DAT, I do prefer the 48k sample rate because I'll take that DAT analog; I don't sample-

rate convert. If you are doing a digital mix, I really like the 24-bit Paqrat system. With this format I try to process entirely in the digital domain. However, I haven't heard a

—CONTINUED ON PAGE 215

NY METRO REPORT

by Dan Daley

The Audio Engineering Society celebrated it's 50th anniversary in New York on March 11, a half-century to the day after its inaugural meeting in 1948. The anniversary celebration was held at the Bell Atlantic NYC corporate headquarters at Sixth and West 42nd Street.

That day 50 years ago, a group of audio professionals gathered at RCA Victor Studios on Sixth Avenue to hold their first meeting and to hear a lecture by Dr. Harry Olson on loudspeaker design. The conclave attracted the attention of the staid *New York Times*, which reported the event with the head-

line "Vacuum Tube Used as Record Needle: Noise 'Suppressor' Shown to Sound Experts—It Reproduces Tones Beyond the Range of Hearing. New Acoustic Group Is Told." That small troupe eventually evolved into today's 12,000-plus-member AES, with chapters in North and South America, Europe, the Far East and Australasia.

Scheduled to be among those attending the 50th anniversary celebration were several original members of the AES, including guitarist/inventor Les Paul, past organization executive director Donald Plunkett, Jerry Minter, Edward T. Canby, Emory Cook, Louis Goodfriend, E.L. Grayson, Jack Hartley,

—CONTINUED ON PAGE 216

Engineer Bruce Swedien mixed the latest release from Atlantic recording artist Nicole Renee on the SSL 9000 J Series console at New York studio Right Track.

COAST

NASHVILLE SKYLINE

by Dan Daley

The subject of the overall health of the Nashville studio business is something that I'll be writing more about for the July issue of *Mix*. In the meantime, however, Masterfonics, which is one of the senior members of Nashville's top tier of studios, filed a Chapter 11 bankruptcy petition

at the end of January. The action has become a barometer of the business in Nashville. It reflects the apprehension that many feel in the wake of declining country music sales and because of the general flatness of the U.S. music industry, as well as the rapid growth that the studio community here has undergone in the past two years.

In 1995, Masterfonics owner Glenn Meadows opened the Tom Hidley-designed

The Tracking Room, a $3 million-plus, 5,500-square-foot facility that featured Nashville's first SSL 9000 J console. It was a move that opened the floodgates for a citywide round of upgrades and new high-end rooms. By the beginning of this year, six more major rooms had come online at three facilities, and Nashville had five 9000 boards operating. These upgrades and openings represented nearly $4 mil-

PHOTO: ADAM STOCKSILL

Last year Sausalito, Calif., facility The Plant rebuilt the tracking room in its Studio B and installed a 64-channel Neve 8068 in the control room. Recently in B, producer/engineer Neil King (in the Motorhead shirt) and assistant Chris Manning (glasses) recorded and mixed Vallejo for TVT Records. Studios A and B and the remodeled Mix 1 have also hosted recent sessions for Metallica, Joe Satriani, Kenny Wayne Shepard and Sammy Hagar. The Dave Matthews Band tracked their new album at The Plant, with producer Steve Lillywhite.

Laughing Tiger Studios (San Rafael, Calif.) offers two 48-track rooms. Pictured is Studio A, with its modified AMR 2400 console. Other gear includes a Studer A80 2-inch 24-track, ADATs, KRK 9000 and Tannoy PBM-8 monitors, and an extensive collection of mics and outboard. The studio opened two years ago in its present location and has recorded projects for The Merman (Atlantic), Vinyl (Four Corners) and Jim Belushi (House of Blues). Laughing Tiger also offers mastering and complete lock-to-picture capabilities and recently launched its own production company.

SESSIONS & STUDIO NEWS

NORTHWEST

What's the Frequency?: R.E.M. spent a couple of months at San Francisco studio Toast recording their next Warner Bros. opus with producer Pat McCarthy, engineer Charlie Francis, engineer/studio owner Craig Silvey and assistant

Robert Shimp...Hit Mecca engineer Alex Nesmith co-produced and engineered tracking sessions for Geffen recording artist Kai at Russian Hill Recording in San Francisco with producer Fitzgerald Scott...In at Avast Recording (Seattle): Built to Spill, with producer Phil Ek, and Sleater-Kinney, with John Goodmanson at the helm. The studio recently installed an API Lega-

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great digital compressor that faithfully maintains the depth and clarity of this format, so processing in the digital domain can be restrictive."

Schreyer concurs with the others *Mix* has interviewed—he likes what he's heard of the bit-splitting format. "One of the projects I've done on that format was a Michael Jackson song that Mick Guzauski did using the Paqrat. It was clean and transparent with great depth—of course, that's Mick! He mixed 'Change the World,' which I mastered—last year's Song of the Year—and that came in on DAT. This was a 16-bit, 44.1 master and still sounded great. I think the bit-splitting format sounds excellent, but I still prefer 30 ips ½-inch."

Schreyer has always been an ace with Sonic Solutions and is finding ever more uses for his systems. "As far as the creative process in mastering goes, it's unsurpassed," he comments. "I've done overdubs, and on occasion I've saved clients thousands of dollars in remix costs by taking the TV track and acapella vocals and synching them up. In one instance, we inserted a new lead vocal along with the instrumental and two pairs of stereo background vocals—less than 40 minutes later we had a great mix. People are doing this kind of thing at home; it's not that big a deal, but the fact that you can do it with high quality in mastering, and not have to do that iffy recall, is a real plus."

Oasis is also seeing the resurgence in mastering for vinyl. "People are submitting mixes to go to vinyl," Schreyer comments, "but they often need a lot of work; they need to be sonically tweaked, compressed, balanced. These guys who mix at home often end up with tapes where the bottom is raging, the top is screaming, and you can't physically cut it. One thing about working with vinyl [is] it will teach you how balances should be. It forces you to do the right thing."

Schreyer also finds that improperly maintained and set up ½-inch machines are becoming a common problem. "Because of the simplicity of the DAT recording medium—hit Record and roll—a lot of assistants have not been properly trained on machine alignments, azimuth, record bias, elevated level, etc. If the ½-inch machine isn't set up properly, a DAT will sound better."

In the brief time that it's been open, Oasis' work load has increased to the point that Schreyer is opening a complete second mastering room. "Gene Grimaldi will be operating the second

room," Schreyer informs us. "I personally trained him for four years, and I believe that Gene has a great natural talent and a passion for mastering.

"Probably the most important achievement for Oasis and for myself," Schreyer adds, "was making a client-friendly environment where everyone can have input during the EQ process without being intimidated. That's so important, because the more comfortable the client is, the better the exchange between us and the higher the level of creativity."

Recent and upcoming releases from Oasis include Fiona Apple, H-Town, Coolio, Daz Dillinger and Polydor UK's Kele Le Roc.

Dropped in for lunch at Precision Mastering, a daily ritual overseen by hospitable studio manager Caryl McGowan. There I managed to snag chief engineer Stephen Marcussen for a few minutes before he returned to work on the Don Smith-engineered and produced new release by Cracker.

In business since 1979 at the same location, Precision has developed a large roster of clients with credits that include the Rolling Stones' *Bridges to Babylon* and *Voodoo Lounge*, Collective Soul, Tom Petty's Grammy-winning *Wildflowers*, Alice In Chains, Counting Crows, Sade and Beck.

"We're fortunate to have a lot of longtime clients," Marcussen says, "and people seem to be comfortable here. For example, Don Smith and I have been working together for 20 years. We do things a little differently at Precision: For one thing, we break the mastering process up into two different elements—EQ and sequencing. Where at some cutting rooms one person does the whole project, I'm fortunate enough that all I do is EQ tapes. After EQ, Don [Tyler] or Ron [Boustead] typically edit, sequence and space."

Marcussen's suite features a lot of Manley equipment, including Infinity speakers powered by Manley amps and a Manley console. "It's not conventional," is all we could get him to say about his setup. "There's not much to it, but it's very pure, very clean and clear."

Analog vs. digital? "My clients generally are analog people," Marcussen says, "although I see a real interest since the beginning of this year in the bit-split format on DA-88, which I think is great. When you compare it to the sound of DAT, you say, 'What took so long?' Editing may be a problem, but if you can just mix to it, get it as good as you can and then let your cutting room take care

World Radio History

of the rest for you. I think it's going to be great. I hope a lot of mixers look at it and treat it as a real format, because I think it sounds very good."

Marcussen also complained about engineers who don't properly maintain their ½-inch machines, particularly because "a good ½-inch master will almost always beat a DAT's sound," he says. "It's unfortunate, really, that DAT is so convenient, especially for the people at the labels—they get a FedEx of the mix, and it's already a copy, then they may copy it and send that to the cutting room! Here we're striving to make every last little connector perfect and of the highest quality, then we get sent a copy of a copy. People should be running at least two first-generation DATs and should be very clear on what's a master."

Precision just recently switched over to Sonic Solutions editing and storage, having previously held out for magneto-optical AKAI D1000s. "It was time to embrace the 20- or 24-bit word length," Marcussen explains. "Now we've hubbed everything and can access Sonic from all our rooms. Being audio purists, we try to keep everything first-generation, so we do keep projects on disk as long as possible; that means, of course, that we have to have tons of storage."

There are two suites at Precision, Marcussen's and Don Tyler's, which is "equipped similarly to mine" Marcussen says. "Don's a very talented up-and-comer who divides his time between his clients like 4AD and Bong Load

Records and editing and assembling for my clients." There's also a workstation room. A third production room, to be staffed by Boustead, is in the works.

Challenges in mastering lately? "Nobody makes an album from beginning to end anymore," Marcussen says. "You have the consistency of an artist, but he or she is working with four, six, maybe 12 producers, engineers and studios. You have 12 different peoples' idea of what sounds right, and to put all those pieces of a puzzle together is a challenge. Then, of course, you have movie soundtracks, with even more people to please."

Tyler brought up the importance of digital editing and how it's become an expected service of a mastering house by clients. "We restructure songs and fly in parts," he says. "It used to be ten songs and you just had to worry about the timing gap between them. Now its a bit like a second mixdown where you can add parts and make real changes. It's the last step in the creative process, and it can get very extreme if you want—we recently had the Jayhawks satellite in a background part for a section on a John Hiatt record."

Other recent projects in at Precision have included Soul Asylum, Richie Sambora, Matchbox 20, Jerry Cantrell, Elliot Smith, James Iha and Agents of Good Roots, with an upswing also noted in DMM projects for vinyl. ∎

Fax your L.A. news to 818/346-3062 or e-mail to msmdk@aol.com.

Norman Pickering, Fred Seebringer and Gerald Shirley.

The Clubhouse in Germantown added a Studer A827 multitrack deck earlier this year, part of the studio's vintage-niche strategy. The tape machine is linked to what studio manager Daniel Goodwin calls "an incredibly immaculate" Neve 8058. There is also a large collection of equally vintage guitar amps.

The Clubhouse is in its tenth year and is one of the community of studios in upstate New York that fall within the magic "two-hour-drive-from-Manhattan" radius that also includes Bearsville and Dreamland. "It's denser up here in terms of the number of studios than people think," Goodwin says, "but that also means that the competition is immense." Like its neighbors, The Clubhouse relies upon location as a marketing tool: The distance to Manhattan has to be far enough to truly make clients feel as though they've escaped the city, but close enough so that they don't feel isolated. Bucolic surroundings help; the two-room facility is situated on the east bank of the Hudson River and has river views. The main recording room is large and is the focus of the other foundation of marketing the studio—vintage equipment. "To a degree, you can choose your location, but you can definitely choose your niche," Goodwin says. "There's a lot of people who really want to achieve that sound of the classic hit records, and that's what this kind of equipment in a room like this can do."

The facility's second studio is a contrast—a Pro Tools-based studio that counterbalances the vintage-heavy A room. The combination has been enough to pull as much as half of the studio's revenues from New York City, the rest from a populous independent record label and band community in the region. Independent labels, including Bar None and Razor & Tie, have been a mainstay at the studio, as they have for many New York facilities in the past five years. But major-label artists have also found their way to The Clubhouse, including Natalie Merchant and Rusted Root.

"There's definitely enough work up here to support most of the studios that have been around here awhile," says Goodwin, who declined to state the studio's rates but agreed they were on a par with mid-level studios in Manhattan. "The thing is, we can offer people equipment that's better than mid-level, as well as the vibe of the area. So we hold our

At Precision: Stephen Marcussen (L) with producer/engineer Don Smith during mastering sessions for the new Cracker release. At rear is engineer Martin Pradler.

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Woody Harrelson and his songwriting partner/co-producer Jerry Joseph tracked songs for their project Children at Play in Studio D (Sausalito, CA). Studio co-owner Joel Jaffe co-produced and engineered, with assistance from Ted Rodden. Standing are (L to R) Rodden, Jaffe and Joseph. Next to Harrelson is studio owner Dan Godfrey.

own outside of the city pretty well."

Firehouse Studios is for sale, according to facility owner Yoram Vazan, though he says he hopes to see it stay part of New York's hip hop community. Starting in Brooklyn in 1989 and later moving to West 28th Street, Firehouse was an early hip hop standard, providing a base for producers such as The RZA, DJ Premier and Easy Mo Bee, and records for artists including Wu-Tang Clan, MC Lyte and Gang Starr.

Vazan, who came to New York from his native Israel in 1981, started the studio with a 16-track analog machine with a small board and built it up over the years into a 24-track facility with a Peavey AMR-2400 console, Westlake BBSM12 monitoring, Pro Tools digital editing and extensive MIDI. Vazan cited the steady proliferation of home studios as putting pressure on the economics of studio operation, and his decision to move his family back to Israel, as reasons for the sale. ∎

New York items? Fax to East Coast editor Dan Daley at 615/646-0102 or e-mail danwriter@aol.com.

lion in consoles alone. Meadows felt optimistic that the studio would come out of the filing intact, but he added that what pushed him to the edge—rate depressions, upgrade costs, the prolifera-

tion of personal studios, less work and record companies tightening budget strings—were systemic problems not limited to his facility. In Nashville, with more studios per square mile than anywhere else, these problems are particularly difficult.

At press time, the situation was quiet, and Masterfonics' finances are being reorganized over the course of what will likely be a year or so. But other studio owners were watching closely and pondering their own next moves.

Meanwhile, upgrades and new rooms keep on coming. This June, Seattle-area independent producer **Trevor Johnson is slated to open Bulldog Recording**, a Hidley-designed one-studio facility that is the first sizable studio to open in the upscale Nashville suburb of Franklin. Bulldog, which is being constructed by longtime Hidley contractor Michael Cronin, is also the first purpose-built 5.1 surround audio studio to come to Nashville. The room, which cost approximately $1.6 million, including the building and equipment, will have four isos and a 96-input Euphonix CS3000. Monitoring is Kinoshita, with the front three speakers soffitted and the rear surrounds in concrete abutments.

Johnson, whose living has come mainly from real estate transactions in recent years, says the studio will be completely for hire, and he is confident that he can make a go of it despite the economic difficulties that Nashville is

Electronic Musician Presents The

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The *1999 Personal Studio Buyer's Guide* will truly be a "must have" resource for first-time studio builders, personal studio owners, recording musicians, and gearheads.

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experiencing. "Franklin is its own vibe," he says, "and I intend to market not only the studio but the entire community as such," indicating that he plans to approach other area studios such as The Castle, Sound Kitchen and Bennett House to assemble a regional studio association. "I can subsidize the studio for a while, but it's going to have to pay for itself at some point, so you can bet I'm going to be aggressively marketing it."

Recording Arts installed new Dynaudio M-3 monitors in its control room. The monitors, bi-amped with Bryston ST amps with Avalon Class A crossovers, are mounted freestanding, and the room was tuned later by Bob Hodas. "There's a trend toward free-standing monitors," says studio owner Carl Tatz, who positioned the room as a mixing facility in Nashville's increasingly specialized studio community. "That's been happening in a lot of California studios, and all the major mastering houses have their monitors freestanding. It just sounds better."

Abtrax has installed an Otari 24-track RADAR hard disk recording system and Otari 96-fader Elite console at its five-year-old single-room facility in Berry Hill, an independent township with its own mayor, town hall and private speed trap operation smack in the middle of Nashville itself. (The township is a mini-Music Row unto itself, and its studio density rivals that of its larger cousin. It's also the center of some of the better personal studios in the area, a fact encouraged by the town's mixed-use zoning regulations.) Abtrax owner Jerry Abbott says a high level of equipment allows him to keep his rates more than adequate at $750 per day, but still affordable for a mid-level to upscale clientele that ranges from publisher projects to Marty Stuart, George Jones and Wynonna. But if there's one single thing that helps put Abtrax over, it's the Texas connection.

"When I came up here about seven years ago, I'd heard that 70 percent of everything that goes on in Nashville is done by Texans," says Abbott with a laugh. "Well, at least that much of the business is done based on personal relationships, too. I'd spent the better part of 45 years living in Texas, so when you see that the studio's client list includes Delbert McClinton, Gary Nicholson, Lee Roy Parnell and other Texans, you can see that they're right about that. It's good to be a Texan in Nashville." ∎

Send Nashville news to Dan Daley at danwriter@aol.com or fax 615/646-0102.

cy…African pop sensation **Rigo Star** mixed his new Ima Records album at San Francisco's **Coast Recorders** with engineer Tom File and assistant Zac Allentuck…**William Rieflin** of Ministry recorded a solo LP with musicians including Robert Fripp and Trey Gunn at Soundhouse Recording, Seattle. Scrane and Carmen Rizzo engineered…The Cherries recorded their Badman Recording debut, *Crotchrocket*, at the label's studio in San Francisco…Bay Area contemporary soul combo **Tom, Dick & Harry** recorded their eponymous Tripek Records release at **Music Annex** (Menlo Park, CA) with producer Allyn Rosenberg, engineer Tom Size and assistant Matt Campagna…

SOUTHERN CALIFORNIA

Saxophone legend **John Klemmer** completed a new project for Chicago Records at **Goodnight L.A. Studios** in Van Nuys with the production team of Peter Love and Dave Donnelly…Warner Bros. artists **M.A.D. Kutz** remixed songs in **Ameraycan Studio A** (L.A.) with producer Rodney Terry, engineer Michael "Jazz" Nally and assistant Brandon Abeln…The **Foo Fighters** mixed a new song for *The X-Files* movie soundtrack at **Scream Studios** in Studio City. Bandleader Dave Grohl produced and Adam Casper engineered, assisted by Douglas Trantow…At **Skip Saylor Recording** (L.A.), **Twist Top** mixed their Capitol debut with producer Rick Neigher, engineer Neal Avron and

assistant Ian Blanch…Producer/engineer Clif Norrell overdubbed and mixed for Outpost artists **Home Grown** at Louie's Clubhouse in Hollywood. Victor Janacua assisted…**Kitaro** put the final touches on a new Domo Records release at **Mad Hatter Studios** (L.A.), with engineer Peter R. Kelsey…

NORTHEAST

At the **Music Lab** (Hollis Hills, NY), engineers Matt Piso and Vito DeLaura remixed **Celine Dion's** "My Heart Will Go On" for Sony/550 Music. Programming was handled by Lou Gimenez and Mark Schaffel…**53 Days** wrapped up work on their second independent release at **Audio Magic** in Buffalo, NY. Tom Robinson engineered, with Dan Calabrese assisting…**David Morales** has been camped out at **Mystic Recording Studios** (Staten Island, NY) tracking and mixing for artists including the Spice Girls, Mariah Carey and P.M. Dawn…Sony/Mushroom recording artist **Suze DeMarchi** (lead singer of Australian group Baby Animals) spent six weeks working on a new solo project at **Longview Farm Studio** in North Brookfield, MA, with producers Nuno Bettencourt and Anthony J. Resta. Carl Nappa engineered, and Jesse Henderson assisted…**Patti Scialfa** tracked and overdubbed for Sony at New York City's **Sear Sound** with producers T-Bone Burnett and Craig Street, engineer Roger Moutenot and assistant Tom Schick…**D.J. Spooky** tracked and mixed for Outpost with engineer Dan Yashiv on the

SSL 4000 G Plus at **M.A.W. Studios** (New York City)…**Spooky Ruben** recorded for TVT Records at **Water Music** in Hoboken, NJ, with producer/engineer Steve Lyon and assistant Todd Parker…**Stiff Johnson** and Mike Klein co-produced a new record for funksters **Moon Boot Lovers** at **Tongue & Groove Studios** (Philadelphia)…Gee Street artists **Olu** overdubbed and mixed in the Neve room at **East Side Sound** (New York City) with engineer Ed Tuton and assistant Fran Cathcart…

SOUTHEAST

At **Tree Sound Studios** (Atlanta), Sony Music artists **Color Me Badd** mixed the song "Kissing You" with production crew Noontime and engineer Neal Pogue. A&M recording artists **Cold** tracked and mixed the single "Look" with producer/engineer Pete Thornton and assistant Shawn Grove…**Classic Recording** (Franklin, TN) had producer Garry Jones in working on vocal sessions with gospel group **Brian Free & Assurance**, with engineer/studio owner George Cumbee at the board…Medium Cool/Restless artists **Perfect**, featuring former Replacement Tommy Stinson, recorded and mixed in Studio A at **Ardent Studios** (Memphis, TN) with producer Jim Dickinson and engineer Bob Krusan…**George Massenburg** stopped in at **Ocean Way Nashville** to engineer a 40-piece string session for EMI artists **The Rankins**. Massenburg is co-producer on the project, with David Campbell. Also in the studio was **Vince Gill**, tracking for MCA Nashville with producer Tony Brown and engineer Steve Marcantonio…**Shanice Wilson** tracked vocals for her upcoming LaFace release at Atlanta's **Patchwerk Studio**. Carl-So-Lowe produced and Mike Wilson engineered…**Sweet Honey in the Rock** recorded for their 25th anniversary project with producer Ysaye Barnwell and engineer Jim Robeson at **Bias Recording** (Springfield, VA)…At Nashville's **Emerald Sound**, Paul

Live Oak Recording (Berkeley, Calif.) owner Priscilla Gardiner is seated at the studio's newly installed 64-input Otari Elite console. In its 14 years in business, the facility has hosted sessions for artists ranging from poet Maya Angelou to musicians including Boyz II Men, En Vogue and Mazzy Star.

Situated on seven acres of land in Central Point, Ore., A Wing & a Prayer Productions is now in its second year of operation. The 1,500-square-foot recording/mixing studio is equipped with a 48-input SSL 6056 E/G with Total Recall, Genelec 1031A and Auratone monitors, 48 tracks of ADAT and an Otari MTR-90II 24-track. Owner/engineer Ron Davis is a 20-year industry veteran whose recent accomplishments include the 1996 S.F. Bay Area Jazz Album of the Year, Dave Ellis' Raven.

DSP's Postation P

surface worth checking out. At the show, Margarita Mix announced the purchase of five systems for its expansion into Santa Monica (scheduled for completion by January). The five-suite facility will serve as a flagship for DSP and as a beta site for its networking system, which will link suites via Fibre Channel and Ethernet links.

Manufacturers of hard disk recording systems are going high-res. AMS Neve's new 24-bit AudioFile 98 features waveform displays, multilevel undo, strip silence, OMFI import and 4.3- and 9.1GB drive support. AMS Neve also introduced a new offline Media Toolbox to improve workflow and cut turnaround time; tools include offline archiving, restore and backup; OMFI 2.0 import, AIFF and .WAV conversion; and cue sheet management. Otari (www.otari.com) introduced RADAR II, the 24-bit next generation of its stand-alone hard disk recorder. (For more on RADAR II, see the Technology Spotlight on page 130.)

Akai's (www.akai.com) DD8 digital audio dubber Version 2.0 offers 24-bit, 96kHz audio, plus bidirectional conversion capability with any OMF-compatible DAW. Existing DD8s can be up-

TOP 10 COOL GIFT ITEMS FROM NAB

Beyer M 8000

NAB had plenty of megabuck whizbangs, but here are our Top 10 affordable, must-have products, listed alphabetically:

Beyerdynamic's (www.beyerdynamic.de) M 8000 is a modern TG-X Series dynamic capsule housed in a beautifully crafted, brass suspension cradle for that vintage 1930s/'40s look. Retail: around $400.

Gefen Systems' (www.gefen.com) M&E Pro Intranet software with Gefen's sound effects database combine to allow searching and auditioning of thousands of sound effects online from several libraries. Once you find the right sound, simply enter your credit card number and download the sound you need—from a PC or Mac.

JLCooper Electronics' (www.jlcooper.com) new MCS Panner was designed for its MCS-3400/3800 Media Command Stations, but this compact, three-axis joystick panner with backlit LCD, eight user-defined keys and MIDI output worked perfectly with Panasonic's WR-DA7 digital console. Should be no sweat to adapt to other mixers or DAWs as well.

Musicam's (www.musicamusa.com) Mynah™ ($800) is the world's first software-only audio codec—add this Windows 95/NT application to your Pentium PC, ISDN terminal adapter and ISDN line and send broadcast-quality stereo audio in real time to hardware codecs or as files to PCX card-based systems.

OneMusic's LiquidTrax music library (www.firstcom.com) provides basic versions of themes (in nearly 20 categories, from Americana to world music), along with stereo submixes that load into an 8-channel workstation for creating custom mixes that fit *your* project.

Schoeps (www.posthorn.com) LC 60U and LC 120U are highpass filters in double-ended XLR barrel connectors for in-line insertion on field recording mics. The units have either 60- or 120Hz, -18dB/octave Butterworth filters, but best of all, they will pass phantom power!

Switchcraft's (www.switchcraft.com) TTP96FA is a 96-point TT patchbay built into a 1U rack tray that slides out to provide front (!) access to the IDC terminations. Somebody should have thought of this years ago!

THAT Corp.'s (www.thatcorp.com) 2002 high-tech VCA module is pin-compatible with the dbx 202 VCA used in various SSL, Sony, Neve, Harrison and MCI consoles. Specs include a 130dB dynamic range; 100kHz (±0.1 dB) frequency response; and 0.004% distortion.

TMH Corp. (www.tmhlabs.com) showed Tomlinson Holman's Test & Measurement CDs, a four-disc set for checking analog and digital sound system performance (stereo/surround monitoring setup, acoustical tests, electroacoustic procedures for speaker evaluations and more), either by ear or using simple gear such as a sound level meter.

Whirlwind's (www.whirlwindusa.com) pocket Qbox combines a 440Hz generator with headphone out, internal speaker and mic, LEDs for checking phantom or intercom power, and ¼-inch and male/female XLR connectors for receiving/sending mic or line-level signals at -20/-50/+4 dB. Retail: $169. ■

Akai's S6000 and S5000 samplers

graded to 24 bit/96 kHz via a DD8 Version 2.0 CPU upgrade kit. Akai also introduced two hip samplers, the S5000 ($1,995) and S6000 ($2,995). The rackmount units feature a 64-voice system (upgradable to 128 voices), using DOS disk format and .WAV files as native sample format—PC .WAV files, including Web-downloadable files, can be loaded directly for instant playback. The S5000 has eight analog outs plus stereo master analog out; the S6000 has 16 outs plus stereo master. The S6000 also features balanced stereo ins and a removable front panel that doubles as a remote control.

With more than 1,400 exhibitors, there were many more exciting debuts at NAB, and we'll be showcasing these products in the upcoming months. Meanwhile, NAB returns to Las Vegas from April 17-22, 1999. See you there! ■

Brandt overdubbed and mixed for Warner Bros. with producer Josh Leo and assistants Ben Fowler and Allen Ditto...Buddy Guy mixed for Jive with producer/engineer David Z and assistant Todd Gunnerson at The Sound Kitchen in Franklin, TN...Producer Brendan O'Brien worked on Gordon's new 57/Epic Records release at Southern Tracks Recording (Atlanta). Nick Didia engineered, assisted by Ryan Williams...Rhonda Gunn tracked for her second Damascus Road release at The Bennett House (Franklin, TN) with producer Billy Smiley...Eric Knight recorded his self-produced new 28 Records album, *Near Life Experience*, at Criteria Recording in Miami with co-producer/engineer Keith Rose...At The Castle (Nashville), Stir tracked for Capitol with producer Justin Niebank and engineer Jim Demain, and Terri Clark mixed for Mercury Nashville with producer Keith Stegall, engineer John Kelton and assistant Paula Montondo...Country rockers Atlanta overdubbed for a self-produced upcoming live record at Entertainment International Studios (Atlanta) with co-producer Darryl Harvey and engineer Jan Nerud...

STUDIO NEWS

Tiki Recording (Glen Cove, NY) recently redesigned and expanded its studios B and C. Studio B is equipped with a Trident TSM console, with 64 channels of Megamix automation, and 32 tracks of DA-88...Redwood Digital (Woodside, Calif.) took delivery of its third Genex GX-8000 MO disk recorder from Trew Audio, Nashville...Time Warp Studios (New York City) recently added Audiomate moving fader automation to its 52-channel DDA DMR-12 console...Also adding 24 channels of Audiomate was Rax Trax in Chicago, to its Neotek Elite...Nashville studio JamSync installed a Studio Technologies Model 58/59 system controller and remote for their new surround monitor system. ■

Bonnie Raitt recorded for her new Capitol release, Fundamental, at L.A. studio Sound Factory with producers Tchad Blake (L) and Mitchell Froom. Blake engineered the sessions.

World Radio History

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Located 35 minutes east of NYC, Lobo Recording is the place to achieve your creative goals. Recent acquisitions include an SSL 9096J, Neve VR 72, Studer D827 and Yamaha C7 Grand Piano. Other equipment includes Amek Angela IIs, Studer A827s, A80s, ADAT XTs 64 tracks and an extensive list of microphones and outboard gear. Please call for more info.

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California-based Tom Parham Audio has opened a new location in Las Vegas, offering state-of-the-art CD mastering and digital bin cassette duplication. The new mastering rooms include Sonic Solutions w/NoNoise, Apogee AD 8000 w/UV22 24-bit converters, Manley variable MU compressor and Electo Optical leveling amplifier, Focusrite Blue 315 mastering EQ, Drawmer 1961 Tube EQ, TC Finalizer, Z-Sys and complete Pro Tools 24 system for 32-track recording.

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These comfortable closed headphones are designed for professionals who require full bass response to compliment accurate high and mid-range reproduction

FEATURES-
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Pro Headphones

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MIXING BOARDS

Panasonic. RAMSA

Stop dreaming about your digital future, it's here! The Panasonic/Ramsa WR-DA7 digital mixer features 32-bit internal processing combined with 24-bit A/D and D/A converters as well as moving faders, instant recall, surround sound capabilities, and much more. Best of all, it's easy to use, and it's available NOW!

FEATURES-
• 32 Inputs/6 AUX send/returns
• 24-bit converters
• Large backlit LCD screen displays EQ, bus and aux assignments, and dynamic/delay settings.
• 4-band parametric EQ
• Choice of Gate/Compressor/Limiter or Expander on each channel
• 5.1 channel surround sound in three modes on the bus outputs
• Output MMC
• Optional MIDI joystick

MACKIE
8 Bus Series Mixing Consoles

Since its introduction, Mackie Designs' 8•Bus Series consoles have proven that excellent sonic quality, practical features and extreme durability can be affordable. All 3 versions offer extensive monitoring, 4-band EQ, accurate, logarithmic taper faders, and expansive headroom. The 24x8 and 32x8 can be expanded using Mackie's 24•E Expander console which consists of 24 input channels and tape returns and may be daisy chained to provide 128 or more total input channels.

FEATURES-
• Each channel includes Mackie's well-known Mic preamp and a -10/+4 switchable tape return
• 8-assignable submasters and a L/R mix master
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• Extensive routing capabilities
• Available in 16 24 & 32 channels
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MS1202VLZ
12-Channel Compact Mic/Line Mixer
• Gain control, pan, 3 band EQ. and 2 Aux sends.
• 4 mono, 4 stereo channels (12 inputs total).
• Great for **extra inputs** on the fly.
• Phantom power.

MS1402VLZ
14-Channel Compact Mic/Line Mixer
• Mic preamps w/Trim control (channels 1-6).
• 60mm "long" faders.
• Mute switch routes to alt 3&4 bus.
• Low-cut filter. • Phantom power.

CR1604VLZ
16 x 4 x 2
Mic/Line Mixer
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• Large 10-segment LED meter.
• Lowest noise/Highest headroom.
• 16 studio grade mic pres.
• 3 different setup positions.
• Low-cut filter. • Phantom power.

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SPIRIT
LX7 Professional Mixing Console

The LX7 was designed by Soundcraft co-founder Graham Blythe. Built in the UK, it uses surface mount technology to ensure accurate, consistent insertion of all components into LX7's PCBs. Roadworthy construction and 25 years of audio console experience put this newest addition to the Spirit line at the top of the heap

FEATURES-
• 24 Ultramic preamps
• 100mm ALPS faders
• 7 bus outputs
• Comprehensive 4-band EQ includes 2 swept mids and 15dB of boost or cut
• Separate stereo input section
• Use in FOH applications as well as studio recording
• Internal power supply

MONITORS

MACKIE
HR824

These new close-field monitors from Mackie have made a big stir. They sound great, they're affordable. they're internally bi-amped. "What's the catch?" Let us know if you find one.

FEATURES-
• 150W Bass amp, 100W Treble amp
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SPIRIT
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Ad Index & Advertiser

—FROM PAGE 20, NOW I KNOW MY LCDs

work to warrant a good video projection system for our studios, while others of us simply feel that we need a nice, big, theater-quality image to go along with our nice, big, theater-quality surround sound systems at home. But we don't need and often can't use these monsters. So what's up for the rest of us? What alternate technologies are out there, and what is coming?

For at least the last year-and-a-half, I have been diligently attempting to write the definitive column on a real contender—the LCD projector. Well, this isn't it—and this is your official notice that it will never happen. LCD projector technology is such a moving target that the beginning of each sentence I write is obsolete by the time I get to its end.

THE CLIFF'S NOTES OF LCD PROJECTOR HISTORY

In the beginning they were dim. Real dim. To use one, you had to first wait until the darkest hour of night, then close all your windows and nail blankets over them (to assure no starlight could enter), and wait in the dark with your eyes closed for an hour while they acclimated. Then you would make the picture as small as possible for the brightest image (inverse square law, you know). And last, but certainly not least, you had to smoke all the ganja you had so that the weak, pasty colors would look brighter and more intense.

Now, those of you with good scientific backgrounds have probably already figured out the great weakness in this system—it's obvious. About half an hour or so into the movie, the ganja would be full on and the munchies would strike. You would then be forced to get up and feel your way into the kitchen for a turkey and a chocolate cake. You would open the refrigerator, and the little light would blind you. So 15 minutes to get the food, 20 minutes of sitting there in front of the screen waiting to be able to see it again, and then another 30 minutes cleaning the mess you made attempting to eat turkey and chocolate cake by feel in the dark while you waited. Over one hour blown. The movie's toast. THC and LCDs. Another case of what seems like a good idea turning out to be bad.

So on with the technical history. LCD projectors use three transmissive LCD panels (the looking glasses); one each R, G and B. Colors are separated with dichroic prisms and mirrors, and then re-assembled for the final image to be projected from a single lens. This means there can be no misconvergence unless it's broken, and the image may be zoomed at will.

There are, however, problems with this technology as well. Early LCD panels had lousy contrast ratios (20:50:1), and as pointed out above, early light sources sucked. This one-two punch is what caused the ganja-factor.

> **Many of us do enough film or TV work to warrant a good video projection system for our studios, while others simply feel that we need a nice, big, theater-quality image to go with our nice, big, theater-quality surround sound systems.**

But there's more. These panels tried to display a video image using around 20 pixels, as it was very hard to get acceptable production yields as the number of pixels in a panel was increased. Panels with higher pixel counts (higher resolution) also had more electrode traces. This in turn meant even dimmer displays, and ghosting due to higher drive resistances. Manufacturers knew that they needed more pixels (at *least* NTSC's 640x480), but it took *years* to get there!

These early LCD systems had very visible pixels and colors that looked like hand-tinted photos from the old wild West. You can tell a machine of this era as its panels measured about 3.5 inches diagonally. I have reviewed this technology in past columns if you are curious (green).

Later, both LCD panel resolution and light source technology improved (real 640x480 appeared, and light output went from 100 ANSI lumens to 250), and things got better—and stayed there

for years. Then, only recently, new higher-contrast amorphous polysilicon LCD panels emerged. They have contrast ratios in the area of 100:1, much less ghosting and better color uniformity, and are amazingly small—in the area of ¾-inch! This makes it much easier to build an accurate projector without hot spots. And so they did.

This technology represents the current state-of-the-art, and it was this that I had intended to review. But dramatic changes in marketing approaches from the big players have blurred comparisons and confused performance issues beyond anything imaginable.

I COULDA BEEN A CONTENDER

When it comes down to quality and features for under $10k (don't panic—some of these systems are *way* under $10k), Sharp and Sony have interesting offerings that seemed superior to

> **LCD projector technology is such a moving target that the beginning of each sentence I write is obsolete by the time I get to its end.**

most. So for me it all came down to a shoot-out between Sony and Sharp for the last few months around here—with complicated and confusing results. A sort of micro-synopsis follows:

This year, Sharp has moved their pro systems away from video projection toward data/computer projection. They make some stunning machines—small, light and bright—but this year's new models are actually weaker than last year's when it comes to video features. They are, however, the clear winners when you want to project anything from 640x480 to 1024x768 data. This is a big shock to me, as last year's machines (even then touted as a data projector capable of showing video) produced impressive, smooth, warm, uniform, pixel-free, naturally tinted video.

Sony has a real 16:9 dedicated high-res video projector that will happily fill your wall with a real movie—but it is very soft and not the brightest kid on the block (even though both these systems have the same brightness number).

Sony also has data projectors, but I chose their video unit as this is what I was really searching for. Sharp has many other models, with more features and even higher res, but the model I played with was their recommendation. I finally ended up with four pages of complicated comparisons—and a complicated final recommendation.

BUT...

As I was sorting all this out, two newer technologies have appeared. A few years ago TI decided that the right way to slam an image onto a wall was to develop a chip with thousands of little micro-mirrors on its surface. They physically spin on little wire hinges when addressed! Does it work? Yes. Is it totally insane? Well, yes—but it does work, and since the mirrors almost touch one another, pixel boundaries all but disappear.

But current projectors use multiple chips in order to get crazed brightness levels, and they are very, very expensive. And because they are physically moving parts, they make me a bit nervous, though I admit that so far they seem pretty reliable.

AND...

Recently another technology has emerged—*reflective LCD*. This is a very simple and promising concept. Instead of shoving the light *through* the LCD panel, which places severe limits on both brightness and contrast ratio, the light is bounced off the panels. If properly implemented, contrast ratios can more than double theoretically, and brightness can be, well—essentially unlimited. This technology holds great promise for the future of precise, bright LCD projectors. I will definitely grab the first one I can to check it out.

SO...

If you want an LCD projector for under $10k right now, look at Sony for video and Sharp for data. But don't just look *for* them, look *at* them—only you can decide if the look and character are right for your application. If you can wait, maybe you should. The new reflective technology looks very promising. ∎

SSC now sees pixels even when his eyes are closed. Tracers in the '60s, pixels in the '90s. Whatcha gonna do?

—FROM PAGE 28, BACK TO THE WEB

jokes and horror stories contributed by readers, and we've brought these over to mixmag.com. We're assembling online what we hope will be the most comprehensive database on the Internet of industry jokes—not only about the audio business (Q: How many record producers does it take to change a light bulb? A: I don't know, what do you think?) but music, television, and computers, too—as well as a large archive of humorous articles and parodies, such as the priceless Rane PI 14 *Pseudoacoustic Infector*, which can add "varying degrees of this or that" to any audio signal, assuming you can figure out how to turn it on.

Everyone in this business has stories about the session/client/singer/producer/venue from Hell, and we're collecting these. No names, please (except yours), but if you have a favorite story about the worst gig you've ever done, we want to know about it. Reading this section is guaranteed to make you feel better about whatever kind of horrible session you've just finished.

And there will be other resources: We're collecting and publishing Web links to manufacturers, industry organizations, schools and other sites of interest to the people who read *Mix*, as well as to the Spanish edition of *Mix*, our sister publication *Electronic Musician*, and to the many and varied magazines in our Intertec corporate family. Plus we're working on ways to make the *Mix Master Directory* and the *Recording Industry Sourcebook* available online, with search engines for these huge databases so that you can zero in on facilities, manufacturers, services, freelancers or whatever you're looking for in a flash.

The Web site, like the dead-tree version of *Mix*, is supported by advertising, with a small amount of real estate devoted to ads, which rotate periodically so you don't always see the same ones. A print ad can provide a reader service number that you blacken on a postcard and then wait for a written response from the advertiser, or an 800 number that you call and then wade through a labyrinthine voice-messaging system. On Mix Online, clicking on an ad takes you straight to the advertiser's Web site (assuming they have one). This means you can check out their message quickly and at your convenience, and when you're ready to come back to us, just click on your Back button.

We do ask for something in return for making all of this information available to you: We want to know who you are. Not so we can sell your name to junk mailers and telephone hucksters, but so we can tell who's visiting us on the site, and what part of the industry they represent. Let's be honest: The more we know about you, and what you do and what you need, the more we can tell our advertisers about our readership. This makes us more valuable to them, which in turn gives us more resources (i.e., money) to make the site more valuable to you.

So to use some of our resources, or to participate in our discussion groups, we're asking you to sign up as a member of Mix Online: fill out a simple form right on the site, and you'll get a password that will let you dive right into the archives, the forums and everything else. We can plant a "cookie" on your computer that will automatically remember your password so you don't have to; if you're philosophically opposed to cookies (even though this one has no other purpose at all), you can tell us not to plant one and you'll have to type in your password every time you visit. No salesman will call, no credit card number will be recorded, and there's no age requirement!

And we ask for something else: your feedback. You can e-mail me or the other editors (the addresses are on the site), or fill out the questionnaire you'll find there. Tell us what you like, and don't like, about Mix Online. What's terrific, what's boring, what's obnoxious, what's missing. How we can help you get access to and use the information you need as an audio professional. As with any publication, it's the readers who will make Mix Online successful, and because the feedback loop on a Web site is so fast, we can respond to your needs quickly and effectively.

For those of you who have become Signal2Noise fans, I'm going to keep that site going, as the loose, informal, free-for-all it's become. It's gotten to be too much fun to just let it go away. But the serious information, and the serious communication that our industry needs, can be found on www.mixmag.com. I urge you to come see us, bookmark us and come back again as we grow. I'm pretty excited, and you should be too. ■

At presstime, we've secured a new domain name, mixonline.com. For the time being, both domain names are active.

imity to each other, sums and differences at different frequencies can occur, producing intermodulation distortion, or simply "intermods." Introducing a fourth system creates the need for still more calculations because of another complex interaction known as a triple beat. A triple beat occurs when the frequencies of three transmitters combine to land on the frequency of the fourth system.

Adding systems or any RF emission in the environment (TV stations, two-way radios, etc.) results in an exponential increase in the number of calculations. The only practical way of determining if multiple systems will

Porporino, a freelance engineer who works extensively in the highly RF-saturated New York metro area, notes that he has sent his systems back to manufacturers for customization of their transmission frequencies. "That service usually only applies to very expensive systems, though," he adds.

One thing becomes clear when talking about wireless with veterans of the technology: There are a lot of freelancers out there, even among major television networks. Larry Kaltenbach has worked for over a decade on magazine shows, including "Inside Edition," "Hard Copy" and "Lifestyles of the Rich and Famous," as well as the "numbers" shows: "20/20," "60 Minutes" and "48 Hours." He was also working for a major network on site in Oklahoma City after the 1995 bombing of the Federal building.

"The reality of wireless is that frequency coordination is often a myth," says Kaltenbach. "The time pressures are too great, [municipal] coordination agencies either don't exist or don't make themselves easily available, there are budgetary constraints that limit equipment choices, and producers are rushed to get the work done. That's particularly the case in ENG [electronic news gathering] and magazine shows, but it applies and affects wireless operations in other applications, including serial television location work, Broadway shows and live concert performances."

Since video crews are also often freelance, Kaltenbach strongly suggests making every attempt to coordinate with them as far ahead as possible. This is easier when working consistently in a single region or city. Kaltenbach notes that Lectrosonics wireless systems and Tram capsules have become a de facto standard in New York City. "But there's a trade-off even in that respect," he says. "Lectrosonics don't allow you to change frequencies, but they're incredibly rugged and reliable."

When traveling to another city, the reality is, anything goes, says Kaltenbach. "In Oklahoma City, there were dozens of crews there from news and, later, magazine shows, and no one was discussing which frequency they were using," he says. "There just isn't time."

Broadway shows are not that much different from ENG, despite their fixed locations. "We're up to about 48 channels of Sennheiser SK50/1046 wireless on [the Paul Simon musical] *Capeman*, so sometimes it looks like a news event," laughs Dominick Sack, director of operations at Sound Associates in New York. Sound Associates has also done theater sound for *Beauty & The Beast* and other Broadway hits. Sack says he limits his wireless systems to those from Sennheiser and Sony. He says he prefers the Sennheisers on large multichannel shows, because of the company's early implementation of narrow-band filtering, which diminishes crosstalk between channels. "The number of wireless channels you can use in a single space is limited by frequency response, bandwidth and the RF requirements of the system," he explains. "Before narrow-band filtering, we were pretty limited as to the number of channels we could put into a show, and that affected a number of aspects of the entire production. The way wireless has changed has in turn changed how Broadway thinks."

Sack also notes that wireless mics don't respond to equalization techniques quite the same as wired ones. "Hard-wired mics are usually cardioid, while lavalier mics have to be omni," he explains. "The off-axis response is not the same, so you have to EQ in a slightly different way, filtering because the pickup area of the omni mic is wider, and it's also harder to get sufficient gain before feedback." ∎

operate "intermod free" is to use a computer program that takes all these interactions into consideration.

In the past five years, frequency-synthesized (frequency-agile) systems have become very popular. These are wireless systems that may be tuned to a number of frequencies within a specific bandwidth. Frequency-agile systems are not able to tune across the entire band but are only tunable over a relatively narrow range, typically 20 to 30 MHz. The need for frequency coordination remains even after the tunable bandwidth has been selected. Nevertheless, synthesized systems definitely have their place, especially for those who travel. Multiple systems will still require some form of frequency coordination to select the frequency that should be used for a given city. At least one manufacturer has designed a microprocessor-controlled receiver that can search throughout the bandwidth of the receiver, detecting RF emissions within the bandwidth and alerting the user to interference before using it.

It's clear that using multiple systems, especially in major urban areas that have high concentrations of RF, requires thorough coordination and frequency analysis. When doing frequency coordination, there are many judgment calls that must be made, and the more knowledgeable the coordinator is about the systems being used and the technical aspects, the more successful the outcome will be. As mentioned before, all of the above calculations must take into consideration any RF emission in the environment that is of sufficient signal strength to get into the receiver. Higher-quality systems are designed with filters and circuits that have tighter tolerance that allow them to operate in more hostile RF environments. A wise choice would be high-quality systems acquired from a supplier that has a track record doing frequency coordination. Advanced technology has greatly improved wireless microphones over the years, and now we must take the time to choose the right systems and select the best frequencies on which to operate. ∎

Bill Sien is vice president of Systems Wireless Ltd., a firm in Herndon, Va., that specializes in selling, renting, servicing and computer-coordinating multiple wireless systems. Sien has 20 years of experience in providing professional wireless facilities for broadcasters, theme parks, theaters and sporting events.

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■ STARTS ON PAGE 238 ■

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ALESIS ADAT

FINDING THE "HIDDEN" FUNCTIONS

The original Alesis ADAT had only 12 specialized function buttons on its front panel, yet the machine is capable of numerous other "hidden" functions, accessible only by pressing various combinations of existing keys. Designed especially for the original ADAT, many of these also work with other ADAT-compatibles (Fostex, Panasonic and Studer machines), as well as the ADAT XT, XT20, LX20 and M20 models.

Take advantage of advanced functions hidden within the ADAT's simple user interface.

DISPLAY SOFTWARE VERSION

Pressing Set Locate and Fast Forward displays an ADAT's software version. Insiders know this is a tribute to the development team from a company named Fast Forward Designs, who wrote most of ADAT's operational software, so it's appropriate that one of the keys used to determine the software version is Fast Forward.

HOW OLD IS MY ADAT?

Access the ADAT's built-in "odometer": If you are unsure of the number of hours on your ADAT (or if you're looking to buy a used one), press the Set Locate and Stop buttons simultaneously to display the total number of hours the head drum was engaged to tape.

CHANGE CROSSFADE TIMES

The BRC remote controller provides a means of choosing from four crossfade times (10.67, 21.33, 32 and 42.67 ms), yet the original ADAT does not have a dedicated switch for this function. Nonetheless, non-BRC ADAT users can make a choice as well; press the Set Locate and Record buttons simultaneously, and the display will read "FAd1," which means the 10.67 ms setting is selected. Pressing the two buttons a second time brings up "FAd2," meaning 21.33 ms, and so on for the 32 ms and 42.67 ms crossfade times. The unit defaults to the comparatively short 10.67 ms setting, which is best for most applications; however, the longer crossfades are particularly useful on sustained notes and guitar, vocal and reverberant instrumental tracks. This is one of the ADAT's most powerful—yet underused—features.

MASTER EJECT MODE

Press Eject on your master deck to eject the tapes from the master and all slaves simultaneously. If you only need to eject the master tape without ejecting all the slaves, press Set Locate and Eject. This is highly useful if you've got a BIG system with LOTS of transports.

RECORD TAB OVERRIDE

Hate using sticky masking tape to cover a missing record tab when you want to re-use a tape? Override the record tab feature by pressing Set Locate and Record 2 to toggle between the "PrOn" (Protect Tab On) mode and the "PrOF" (Protect Tab Off). Requires Version 4.03 Software and above.

LONGER RECORDING TIMES

As a way of getting around the 40-minute, 44-second record time limitation of ST-120 ("120 minute") tapes, original ADATs could extend their running time to more

....

than 60 minutes by using 180-minute video tapes. By pressing Set Locate and Format, two things could happen, depending on your software version. On earlier ADATs, pressing these toggles the machine between "Std" and T-160 mode. On later ADATs, pressing these toggles the ADAT between "t60" (t60 format for ST-60 cassettes), "t120" (the default setting for ST-120 cassettes), "t160" (for ST-160 tapes) and "t180" (ST-180 tapes). The ADAT automatically reverts back to the t120 mode whenever a tape of any length is ejected.

THE HIGHER FIDELITY ADAT

To really squeeze the most out of your ADAT, bump the pitch shift up to its maximum +100 cents value when you record. This raises the sampling rate by 6%, adding about 1,400 Hz to the upper frequency response, while reducing your running time by 6%. This is not recommended to anyone planning to transfer tracks in/out of the deck using a workstation or digital console, but when working on a high quality analog console, the difference is audible.

ADAT, HEAL THYSELF

The "User Soft Reset" is the famed ADAT re-initializing procedure. Hold down the Record and Play keys while powering up, to (as Alesis puts it) "initialize memory to a known state without resetting Drum Head time." As for me, I try this procedure first, whenever any of my ADATs gives me odd software displays. About 90% of the time this is all you need to do, and your ADAT will be just fine afterward. ∎

George Petersen is the author of the revised second edition of Modular Digital Multitracks: The Power User's Guide, available in fine bookstores everywhere.

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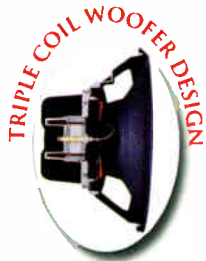
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LSR28P

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