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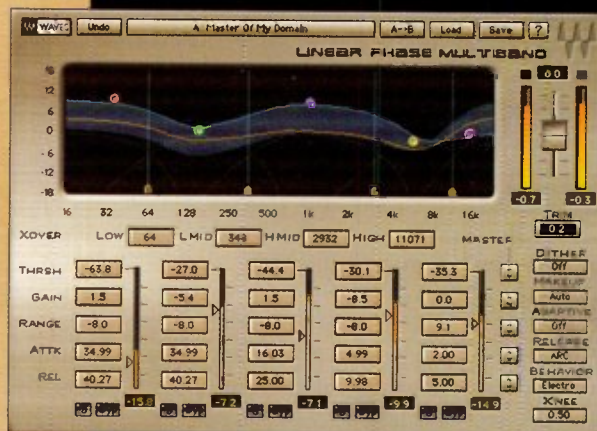
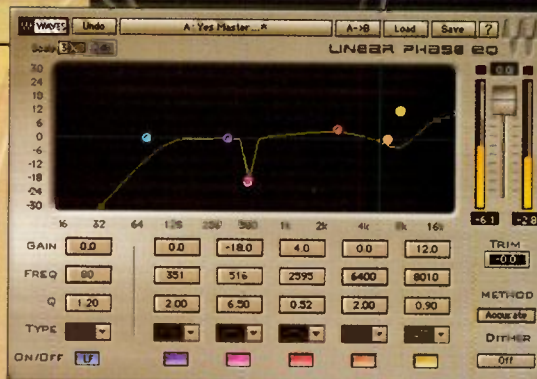
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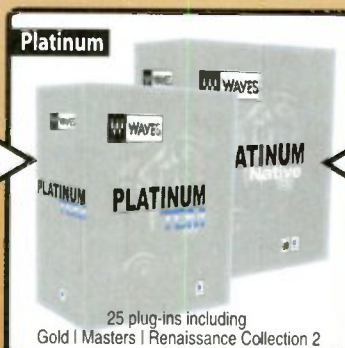
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I Have A Dream

A couple of issues ago, I offered an opportunity for you to send in your ideas for dream products — your visions for the ultimate pieces of gear for your studio. A number of you responded; I'll be running some of my favorites in an upcoming "From The Editor" column. If you haven't gotten around to sending in your idea(s) — no worries — there's still time for you to drop me an email at the address below.

Although I said that I'd hold off on listing my own dream products for now, I'm going back on my word. Why? Because an unexpected dream product smacked me square in the head the other day. Here's the story: Recently I decided to relocate from Manhattan to scenic Nashville — it seems that two years or so is the limit to how long I can stay in one place. Anyway, this move necessitated packing up my studio and preparing it for the moving company. Naturally, the first thing I had to do was to unplug all the gear, carefully coiling and sorting the various cables as I went.

Now, perhaps I'm a bit slow — maybe this is obvious — but has anyone else considered how ridiculous the cabling situation has become in studios? I mean, my rig is of moderate size, and I've got stacks of RCA, RCA to 1/4-inch, 1/4-inch unbalanced, 1/4-inch balanced, XLR, XLR to balanced 1/4-inch, XLR to unbalanced 1/4-inch, USB, FireWire, SCSI, serial, parallel, ADB, Toslink/lightpipe, speaker, DB25 to XLR snakes, DB25 to balanced 1/4-inch snakes, DB25 to RCA snakes, IEC power, MIDI, several types of proprietary interfaces, ribbon, and God knows what other kinds of cables. Am I the only one who thinks this mess of cables is simply stupid?

So my first dream product isn't a spiffy control surface, nor a compact self-contained super-quality studio-in-a-box, nor a huge-capacity high-speed solid-state storage device, but rather, a single standard gear interface system that would carry all the necessary data, control, and audio information — and maybe even AC power — over a single wire that would simply daisy-chain from one piece of gear to another. Yes, I realize that Yamaha's mLAN and Gibson's MaGIC systems are beginning to emerge — I have hopes that one of them will solve this problem. But until a system emerges that all gear manufacturers adopt, my dream will remain just that; an unfulfilled fantasy.

—Mitch Gallagher

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RANT ON!

I have to take a moment and thank you for having the smarts (and guts) to print Roger Nichol's rant, er, column "Resolve This" [January 2002]. I always enjoy Roger's columns anyway, but this one struck a nerve and asked a lot of very good questions — something a column such as his is supposed to do.

As a producer/engineer/independent who is old enough to have worked in both analog and digital formats, I am often faced with the same wrong-headed maniacal requests to crunch, compress, and "make it louder than the next guy's" CD to the point where all the hard work we spend on dynamic range goes out the window — regardless of the sample rate and bit depth. What's the point?

I have heard 5.1 DVDs (compressed), 5.1 DVD-Audio, (non-compressed) SACDs, and CDs in various bit depths and sample rates in blind and not-so-blind testing, and, in the end, I agree with Roger: It's not the tool, but how one uses the tool. Yes, there can be advantages to higher resolution in some cases, but only to a point, and certainly not to the exclusion of the existing CD format and spec.

I'm sure Roger isn't advocating dumping all the cool, shiny new hi-res toys out there, but he makes a great point: Use the tools you've got effectively, and you'll level the playing field anywhere you go, with anyone you work with. I have plenty of recordings done by Roger over the years, and I don't give a damn what he used to record them on at

"USE THE TOOLS YOU'VE GOT EFFECTIVELY, AND YOU'LL LEVEL THE PLAYING FIELD ANYWHERE YOU GO, WITH ANYONE YOU WORK WITH"

—JOE HANNIGAN, PHILADELPHIA, PA

the time. They sound great because of the talent in the studio, and because of his capable hands once the editing and mastering has begun.

Joe Hannigan
Producer

Philadelphia, PA

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SAMPLE RATE CONFUSION

The following statement on page 64 of the February 2002 issue ["Alesis Masterlink Tips"] is incorrect:

"...sample rate conversion from 88.2 to 44.1 causes no sonic artifacts. This is because conversion simply involves taking every other sample, as if the source material was originally recorded at the lower rate."

This is a naive view of sample rate conversion, and one that proliferated many bad-sounding sample rate converters. In fact, any frequencies above the lower of the two Nyquist frequencies (original and new) must be filtered out prior to converting to the new rate. That is, if the source material has any energy above 22.05 kHz, it must be filtered out before conversion. Otherwise, those frequencies will alias into the audio band (actually, only frequencies above 24.1 kHz will alias below 20 kHz — everything between 22.05 and 24.1 will alias to between 20 and 22.05 kHz).

There are other reasons that factor-of-two sample rate converters achieve better quality, but that would require more time to explain. And, in fact, they still introduce artifacts, they are just less audible and less measurable.

Tom Savell
Audio VLSI Architect
E-mu Systems

HEAR, HEAR

Thanks for the important words about hearing protection in your March '02 editorial. I regret I wasn't similarly warned earlier in my music career, and I hope your readers heed your advice however long they've been making and listening to music. They should also be aware that HEAR (Hearing Education &

Awareness for Rockers) is another excellent non-profit source of information on hearing loss and protection, aimed at musicians. You can check them out at www.hearnet.com.

Richard Johnston
via Internet

DAVID BLACKMER REMEMBERED

We are sad to report that David Blackmer, the founder of dbx and Earthworks, passed away on March 21, 2002. Our condolences to the Blackmer family, and the recording industry as a whole.

CORRECTIONS AND CLARIFICATIONS

In the Quantec Yardstick review that appeared in the March 2002 issue, we listed two manufacturers, Marantz and Quantec (distributed by HHB). The Yardstick is solely produced by Quantec. We apologize for any confusion we may have caused.

In the April issue of EQ, the TC-Helicon VoicePrism Plus was described as a "Vocal Processor/Harmonizer." The term "Harmonizer®" is a registered trademark of Eventide Inc., Little Ferry, NJ, and applies only to units manufactured by that company.

TC-Helicon notes that the S/PDIF out from the original VoicePrism becomes a full-time, 24-bit digital out direct from the mic preamp (regardless of other processing in use) with the VoicePrism Plus model. Also, the company would like to clarify that the signal path splits up front into Lead and Harmony Paths, and that each path has its own compressor and two parametric EQs. The original text implied that the signal path split after the compressor and EQs.

UPDATE

The review of G & E Music's Producer's Toolbox sample CDs noted that keys and tempos were not provided for the musically oriented loops. G & E has now posted this information on the Web site at www.producerstoolbox.com.

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MESSIN' AROUND AT THE MESSE

The latest and the hottest from the 2002 Frankfurt Musik Messe trade show

By Craig Anderton

It's huge. It's happening. It's...too much for even an army of journalists to handle. This show report has four sections: Musik Messe highlights, highlights from ProLight+Sound (a show that runs concurrently with the Messe), Product Focus on some specific items of interest, and *Keyboard* magazine's list of ten hot new products.

Did we cover everything there was to cover? No, but still, you'll get a pretty good idea of what's shakin' gear-wise over in the land of the Euro. To get in the mood, stay up for 21 hours straight, light 40 cigarettes in a confined space, and have a beer. Enjoy the show!

MUSIK MESSE HIGHLIGHTS

AARDVARK: Low-latency drivers for Windows XP/2000 are now available for the **Direct Pro** series (Q10, 2496, and LX6), and Mac OS 9.x drivers have been announced. Also, USB Mac and Windows drivers are available for the Direct Mix USB3. www.aardvark-pro.com

ABLETON: Live is now Rewire-compatible, allowing it to run in conjunction with Reason, Sonar, Cubase, Logic, or Digital Performer. It also supports MIDI sync (master or client), fader box compatibility, render-to-disk for file export, reverb, and Mac OS X. Download the free update from www.ableton.com.

ACCESS: The **Virus C** features 32-note polyphony, two filters with 36 dB/octave response, six outs for surround capabilities, two ins, 16 independent arpeggiators, MIDI tempo sync for time-based parameters, 98 effects, and editor/librarian for Windows/Mac OS...The **Virus kc** adds a five-octave, semi-weighted aftertouch keyboard...The compact **Virus Indigo 2** has the Virus C

engine as well as a three-octave keyboard with aftertouch. www.access-music.de

ANALOG SOLUTIONS: The **Vostok** matrix synth is a portable, modular analog synthesizer with matrix-style patching, where inserting pins into the matrix completes the patch connection. Control modules consist of a MIDI-to-CV converter, joystick, and eight-step sequencer. www.analoguesolutions.com

ARTURIA: An upcoming **modular synthesizer** (Mac/PC, stand-alone or VST/DXi/MAS/RTAS) has 12 slots to accommodate oscillators, filters (multi-mode or four-pole lowpass), LFOs or loopable ADSR envelopes, a VCA with envelope, and three built-in effects...**Storm 2.0** enhancements include an online service with news, chat, peer-to-peer file-sharing, tips, and tutorials; the program itself adds a composition wizard, improved sample libraries, support for Windows XP/Mac OS X, and the ability to sync two Storms running on the same computer. www.arturia.com

CLAVIA: The **Nord Electro Rack** is a 19-inch tabletop/rack version of the Nord Electro stage keyboards that also includes a concert grand

piano. A USB port allows for easy loading of new sounds.

www.clavia.se

CREAMWARE: See "Product Focus" sidebar. www.creamware.de

DCS: The **dCS 974 D/D** converter provides real-time conversion of standard sample rates between 11.025 to 192 kHz, word length reduction and extension in the range of eight to 24 bits, noise-shaping, and dithering. It can also convert between standard PCM formats and the Sony DSD (2.822 MHz) format, and vice-versa. www.dcsLtd.co.uk

DSOUND: The **VL2 multichannel valve interface** plug-in, designed to fatten up sounds within your computer, is now available for the TC Works PowerCore system. www.dsound1.com

DSP ARTS: The **Tauron** is a multi-functional sound processing device, based on the Motorola 56K DSP family, whose characteristics depend on the applications you download into the built-in flash memory; it's also possible to write code for your own modules. A typical application, the K2 synthesizer, features 10 voices, eight-part multitimbrality, 24 dB/octave resonant multi-mode filter, etc. www.dsparts.com

EBAND: Making preconfigured computers for music is not a new concept, but Eband offers online servicing (a technician can analyze your computer

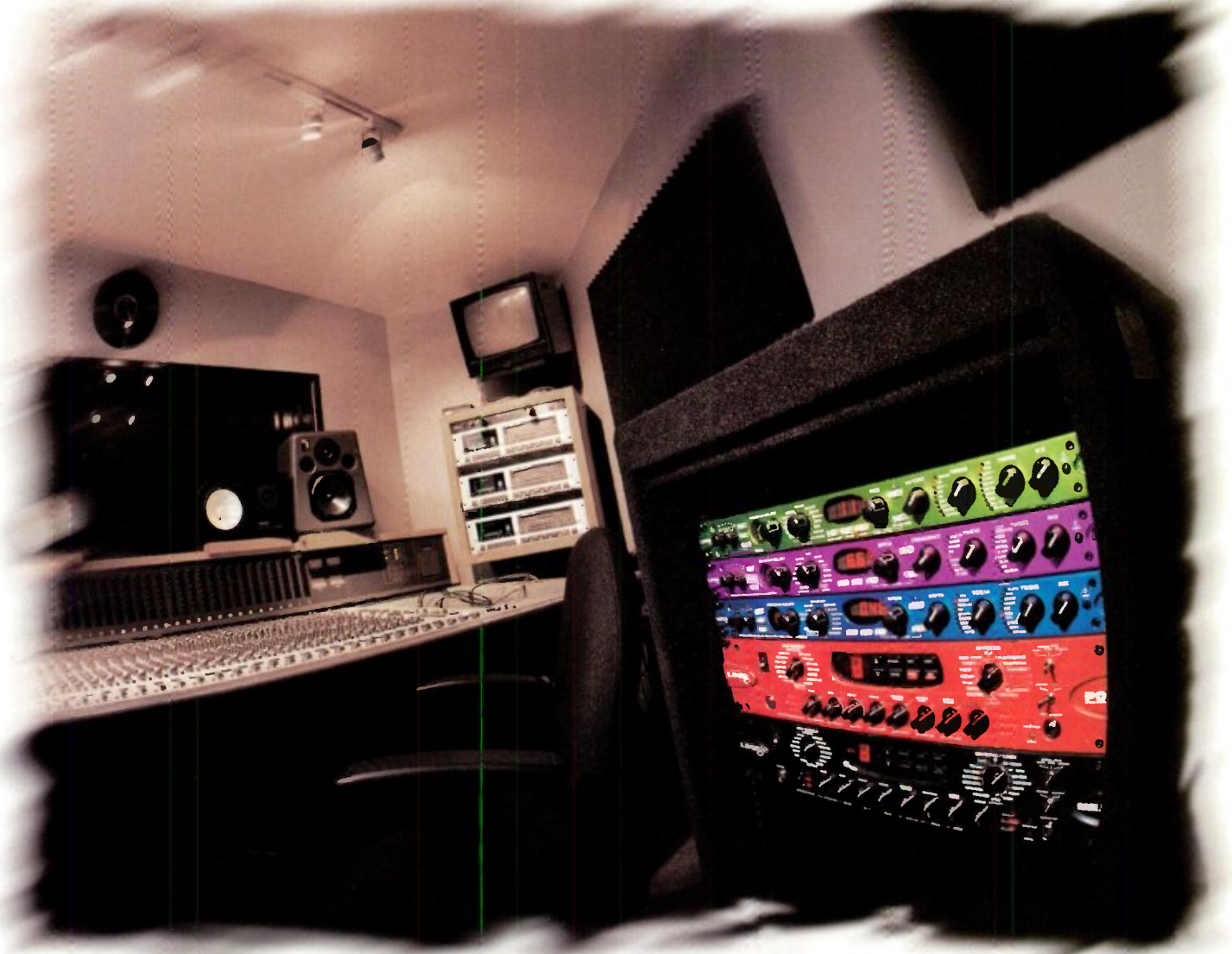


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online), and automatic updates for hardware drivers, sounds, forums, etc. www.e-band.com

EDIROL: The **HyperCanvas** plug-in for Mac/PC, VST/DXi comes with 256 General MIDI 2 sounds, nine drum sets, 16-part multibrality, and 128-voice polyphony. It's optimized for Intel SSE, 3D Now!, and Motorola AltiVec. www.edirol.com

EMAGIC: **Phat Channel** is an extension for the Logic Control system that offers 32 additional V-Pots, which provide direct access to several parameters of a track, audio instrument, or integrated Logic Platinum plug-in...The **EMI 6 2 m** (\$399) is a six-in, two-out audio interface and USB hub (with two additional USB ports) and 24-bit/96 kHz resolution. A built-in headphone amp provides monitoring, and the S/PDIF I/O can be used for MIDI I/O instead...The **EVB3** (\$199) for Logic 5 models the B3 organ, including rotating speaker effects and "aging" parameters. Other integrated effects include distortion, wah, and three-band EQ optimized for organ...**HTDM versions** of the ES2 synth, EVP88 piano, EVB3, and EVD6 will be introduced for Pro ToolsMix and ProToolsHD systems...The **EPIC TDM** bundle (\$699) consists of Logic Platinum's plug-ins, but ported for compatibility with TDM and Pro Tools systems. Plug-ins range from the traditional to processes that fall more into the sound-design category...Emagic will support the latest generation of **Pro ToolsHD** hardware; Logic Platinum Mac will offer sampling rates up to 192 kHz, increased track count and I/O, and support for the new high-resolution audio interfaces and peripheral devices. www.emagic.de

OWAVE: The 3U **Eofix** is an analog effects box with multi-mode filter, 24 dB/octave filter, VCA, waveshaper overdrive, phaser, ring modulator, delay, and reverb; modulation is supplied by two LFOs or an AR

PRO SOUND AT FRANKFURT

The Frankfurt show is actually two shows: the Musik Messe, and Pro Light+Sound. Here are some of the hits from the pro audio world.

ADAMSON: The **Y10** sub-compact (10.5-inch high) three-way line array consists of two Adamson AX 10-inch LF drivers, one Adamson YX 9-inch Kevlar MF driver, and one JBL 2451 HF driver. It claims a defined pattern coverage of 100° at -6 dB, and 90° at -3 dB. www.adamsonproaudio.com

ALTO: New analog signal processors include the **Alto Gate** (four-channel, frequency-selective gate expander), **Alto G** (five-band parametric EQ with high/low cut filters), and **Alto Link** (mixer/splitter that can split to six mono outputs or mix to two outputs)...Alto is now distributed in the U.S. by ART, and in Canada by Yorkville. www.altoproaudio.com

ARX: The **SPL 30** three-way system joins the SPL Self-Powered Speakers series with a 15-inch LF driver with 400W amp, 8-inch MF driver with 200W amp, and 2-inch throat HF driver with 150 watt amp. www.arx.com.au

AUDIANT: The **Aztec** live performance console has frame sizes for 32, 40, and 48 channels. It features analog technology, four-band EQ with parametric mids, two stereo ins, eight mono and two stereo aux busses (with inserts), 12 x VCA subgroups with VCA solo, 12 x 8 matrix with inserts, mute and VCA assignment scene automation, stereo ambience input for in-ear monitoring, and dedicated recorder interfaces for performance archiving and postproduction. www.audient.com

BEYERDYNAMIC: The **Opus 39** is a high-output, dynamic supercardioid vocal mic with all-metal housing. The **Opus 59** dynamic mic, optimized for vocals, features high isolation from unwanted sound...The **MC 930** cardioid condenser mic offers low noise, switchable low-cut filter and pre-attenuation, 140 dB SPL capability, and accepts 11-52V phantom power. www.beyerdynamic.com

BRAUNER: The **Phantom** series large-diaphragm condenser mics, available in cardioid-only and switchable pattern models, are an economical alternative to the Brauner tube mic range. www.dirkbrauner.com

CELESTION: An inverted chassis PA 15-inch driver offers 600-watt power handling and improved heat dissipation by placing the magnet and associated metalworks in front of the cone rather than behind it. www.celestion.com

DAS AUDIO: The **MI** series of entry-level sound reinforcement cabinets include the **MI-115** passive two-way 15-inch loaded enclosure and the **MI-215** passive double 15-inch two-way enclosure. Both feature proprietary DAS loudspeaker components and an internal passive crossover with protection circuitry. www.dasaudio.com

DYNACORD: The basic **Cobra** compact line array system configuration consists of four tops, four subs, and a pre-cabled rack shelf that houses the **DSP244** digital controller and two **L2400** power amps. Tops can be augmented or replaced with the **Cobra Far**, which uses an acoustic waveguide to reduce the vertical emission angle. All speakers are protected against thermal overload. www.dynacord.de

ELECTRO VOICE: The Eliminator series is now the **Eliminator i** series; the "i" stands for improvement, including a crossover section with higher power-handling capacity, new protection circuits, and inclusion of the DL-18MT speaker in the Eliminator i sub. www.electro-voice.com

INTER M: The **MEQ2000** multi-mode digital equalizer encompasses a 31-band graphic EQ, eight-band parametric EQ, low and high-cut filters, and six-band notch filters for feedback suppression. It also features 24/96 analog ins, AES/EBU and S/PDIF digital I/O, remote control via MIDI or RS232, and less than 1 ms latency. www.inter-m.com

MASTER AUDIO DESIGN: The **DP** series of Class H power amps consists of the DP-1000, -2000, -3200, and -5000 which produce 325, 700, 1,150, and 1,750 watts, respectively, into 4 ohms. www.master-audio.com

NEUMANN: The **KK105 S** capsule head is designed to work with the Sennheiser **SKM 5000 N** wireless system. The capsule is based on the KMS 105, -140, and -150 vocal mics. The package includes a carrying case capable of holding the capsule and transmitter. www.neumann.com

PHONIC: The **Powerpod 2280** mixer offers 12 inputs (with parametric mid EQ and inserts), four stereo ins, three aux sends, stereo 10-band graphic EQ, digital delay, and a stereo power amp rated at 400 watts/channel (4 ohms). www.phonic.com

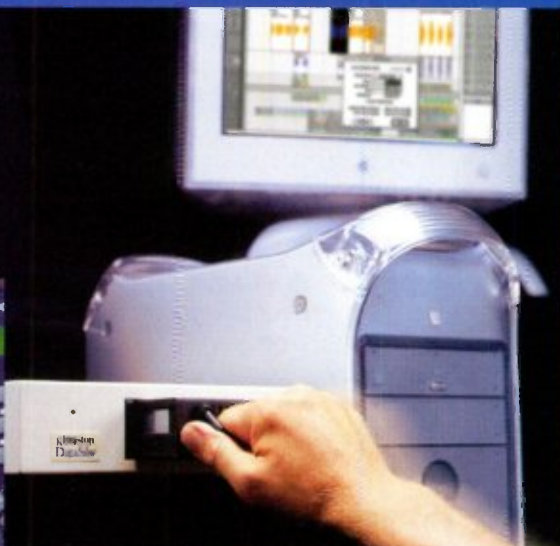
STK: The **VRM-11TD** integrates three 300-watt power amps and three 7-band equalizers. It offers nine mono and two stereo input channels, each with three-band EQ, aux send, and aux send to the internal effects processor. It is one of a line of nine powered mixers from 150 to 900 watts. www.stkpro.com

XTA: The **Series 2** line of digital processors consists of the C2 dual compressor, D2 stereo dynamic EQ, E2 stereo parametric EQ, and G2 dual/stereo gate. All units feature a "one control per function" design philosophy, auto-ranging power supplies, and may be fitted with both transformer-isolated I/O and digital I/O. www.xta.co.uk

YAMAHA: Two 2U power amps, the **PC9500N** (925 watts/channel) and **PC4800N** (475 watts/channel), offer optional networking capability via LAN or CobraNet, dual heat sinks, and dual variable-speed fans. www.yamaha.com

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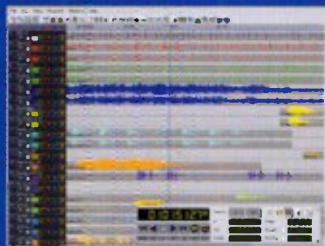


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For all the details on the MX-2424 go to
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envelope...The **Eofilter** is a stereo multi-mode filter with 12/24 dB/octave response, CV input, LFO, and AR envelope triggered by the level of the incoming audio signal...The **Eoring** is a stereo, analog ring modulator with two oscillators, one LFO, and one low-/high-frequency oscillator.

www.eowave.com

FOSTEX: The **D2424LV** records eight

tracks (and 48 virtual tracks) at 96/88.2 kHz sampling rate, or 24 tracks (with 32 virtual tracks) at 44.1/48 kHz, all uncompressed and with 24-bit resolution. A second drive bay allows for a second internal drive, or Fostex DVD-RAM for backup...The **VF80** digital multitracker includes a mixer, onboard effects (reverb, pitch shift, amp simulation, etc.), optional CD-R/RW drive with mastering mode,

and records eight tracks (plus 16 virtual tracks) with uncompressed 16-bit/44.1 kHz resolution...The **DE-10** 24-bit dual multi-effects processor features mic modeling, guitar and bass amp simulations, guitar/mic input with trim, and dual mono (with stereo out) or stereo operation...The **AC2496** is an eight-channel analog to ADAT/S/PDIF converter with 24-bit/96 kHz resolution. Each analog input can

KEYBOARD MAGAZINE'S PICK HITS

With a show this big, you have to rely on friends to find out about everything that's going on. When it comes to keyboards, who better to ask than *Keyboard*'s editorial staff? Here are 10 of their favorites, with some comments [see the June 2002 issue for *Keyboard*'s complete Frankfurt report].

- **PROPELLERHEAD SOFTWARE REASON 2.0.** As if Reason 1.0 wasn't powerful enough...
- **ACCESS VIRUS C.** Keyboard or rack, this has serious sonic mojo.
- **STEINBERG CUBASE SX.** A brand new power sequencer/recorder written from the ground up.
- **VIRSYN TERA.** One of the most intriguing software synths we've seen, fueled by a "spectral synthesis" engine.
- **EMAGIC EVB3 AND EVD6 PLUG-INS.** Virtual versions of the Hammond B3 and Hohner D6 clav, complete with anomalies.
- **KORG KA0SS PAD KP2.** There still isn't anything quite like it.
- **NATIVE INSTRUMENTS REAKTOR 3.3.** The earlier versions were great, but 3.3 raises the stakes.
- **CREAMWARE NOAH.** The keyboard/computer crossover aspect is what got our attention.
- **WALDORF Q2.** Waldorf knows how to make fat sounds, and this baby is the fattest yet.
- **EMAGIC PHAT CHANNEL.** It's loaded with knobs for real-time control over synths and other plug-ins. Tweak on!



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accommodate balanced or unbalanced signals, with four digital output formats available. www.fostex.co.jp

JBL: Designed for dance music and live reinforcement of drums and bass, the **SF22SP** powered subwoofer, part of the SoundFactor line, features dual 12-inch woofers in a bandpass enclosure with internal 300-watt RMS power amp. The SF22SP accepts either a line-level or speaker-level signal. www.jblpro.com

JOMOX: The **Xbase 09 Dr. Walker Limited Edition** is a crossover between the Xbase09 (kick/snare/808-sequencer) and the airbase, as it contains an airbase soundchip with Walker's signature drum and percussion samples. www.jomox.de

KORG: The **KAOSS Pad KP2 dynamic effect/controller** has 100 built-in effects programs, new BPM effect functionality, "pad motion" function to record and reproduce complex finger movements on the touch pad, and MIDI in/out for control from an external sequencer. www.korg.com

MAYAH: The **Flashman** digital MPEG2/MPEG3/PCM portable audio recorder records to Compact Flash cards at 32, 44.1, or 48 kHz. It offers S/PDIF I/O, analog I/O, and up to five hours of recording time. www.mayah.com

MOOG MUSIC: Robert Moog has



FOSTEX VF80

regained the rights to the names **Moog Music** and **Minimoog**. Way to go, Bob!

NATIVE INSTRUMENTS: **Spektral Delay 1.5** adds a rewritten audio engine, MIDI learn feature, a performance mode where the computer's keyboard can trigger samples and

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switch presets, and several other enhancements...**Reaktor 3.3** includes several new modules such as a grain cloud delay, FIR-filter, clock shuffler, and FM7 oscillator. It also offers reworked sample management and an integrated browser. www.native-instruments.de

NOVATION: The **K-Station** is a two-octave polyphonic synth with touch-sensitive keys, 12 or 24 dB/octave filters, lots of knobs for real-time control, 12-band vocoder, audio input, and arpeggiator...**V2.0** software for the **Supernova II** keyboard and rack

is a bundle dedicated to computer-based recording that offers 24 tracks of 24-bit/96 kHz recording and MIDI sequencing with hardware-based control...The **MC-09 Phrase Lab** combines a four-part audio phrase looper (that can slice loops for easy tempo stretching), DSP monosynth to create lead, bass and rhythm sounds, a vintage step sequencer, onboard effects with four algorithms, optional SmartMedia storage, and easy real-time control. www.rolandus.com

SERATO: **Scratch**, an RTAS plug-in for Pro Tools 4.x, 5.x, HD, and Pro Tools Free, provides DJ-style digital scratching, controllable by either turntable or mouse. A special vinyl record included with Scratch contains a control signal that allows your computer to track the record motion, simulating the same movement within a digital sample. www.serato.com

SM PRO AUDIO: The Mac OS X/Windows-compatible **XPUSB1** converts audio sent into it via USB into an optical S/PDIF output suitable for feeding DAT and MiniDisc, as well as an analog out for feeding standard consumer stereo products...Plugging directly into sound card inputs, the **XP201 phono/mic preamp** has RIAA-equalized turntable and line inputs to facilitate the transfer of CDs and cassettes to PCs, and also provides a high-gain mic preamp and headphone amp. The unit comes bundled with Diamond Cut 32 vinyl restoration software. www.smproaudio.com

SOUNDART: A free **Software Development Kit** for the **Chameleon** synthesizer (based on the Motorola 56303 hardware DSP) is now available at the company's Web site. Chameleon uses a microcontroller and digital signal processor to implement

various types of synthesis. www.soundart-hot.com

SPL: The **PQ** for mastering is a parametric, two-channel, five-band equalizer with a dynamic range of 150 dB. All potentiometers are motorized, and linked with all the switches in a digital control panel that offers recall/reset capability. Also see the product focus on the MMC 1 mastering console. www.soundperformancelab.com

STEINBERG: See the First Look on Cubase SX, and the Product Focus on the Virtual Guitarist VST instrument. www.steinberg.net

TC ELECTRONIC: The **M300** multi-effects/reverb processor features 24-bit stereo operation with S/PDIF input that switches to analog if it doesn't recognize the incoming bit stream. Delay times sync to MIDI clock, tap tempo, or footswitch presses. It offers 15 reverb and room simulation algorithms, and has knobs so that five parameters can be accessed at any time. www.tcelectronic.com

TC WORKS: **Spark V2.5** (\$399, update free to Spark 2.0 users; XL version with TC Native Bundle, \$699) includes Mac OS X compatibility, a new scrub tool, streamlined waveform overview and zoom handling, multi-processing support, and extended QuickTime features...**PowerCore V1.6** (\$1,299, update free) now includes **TC Powercore 01**, a mono synthesizer, **PowerCore Control**, a control panel for viewing detailed information about all PowerCore boards, and more than 50 bonus Mega-Reverb Presets exclusively for Logic. www.tcworks.de

TERRATEC: The Windows/Mac OS9/X-compatible **MIDI Master USB**



offers tempo synchronization of all effects, double the number of presets, and adds 1,000 new presets. www.novationmusic.com

OKTAVA: Using a double ribbon filament, the **ML52** ribbon mic features the characteristic figure-eight pickup pattern associated with ribbon mics. www.oktava.net

PROSONIQ: An update to **V2.5** of the Mac **sonicWorx** studio (a complete audio editing system) is now available, as is an update to **V2.5** of the **Powerbundle** with studio and sound design programs. www.prosoniq.com

ROLAND: The **Studio Package Pro**



ROLAND STUDIO PACKAGE PRO

features 49 full-size, touch-sensitive keys, mod wheel, control slider, ten preset memories, and can derive power from the USB port or an external power supply...The **EWS MIC 8** features eight mic/line input preamps, two XLR mic inputs (override two line ins), and eight outputs. All converters are 24/96; the unit was designed in conjunction with SPL and based on the ChannelOne/GoldMike series. There's an integrated ADAT lightpipe interface; up to eight ADAT and analog channels can be mixed. www.terratec.net

TIDAL MUSIC: Quad is a four-channel multimode filter, each with its own envelope follower and waveshaper that adds overdrive and frequency modulation effects. There are also two dual-channel LFOs and



a phono-to-line adapter for DJs. www.tidalmusic.com

ULTRASONE: The HFI-15G headphones are lightweight (around 3 ounces), designed for extremely low magnetic emissions, and produce a spatial, wide sound by interacting with the ear in a way that promotes greater spatiality. www.ultrasone.de

VIRSYN: The Mac/Windows Tera is a standalone/VST integrated virtual synthesizer workstation that includes 16 modular synths (offering analog, FM, waveshaping, or physical modeling), a combined pattern/step sequencer, arpeggiator, and a mixing console with effects rack (chorus/phaser/flanger, distortion, echo/delay, and reverb) that contains up to 48 effects. www.virsyn.de

WALDORF: The Q+ analog filter synthesizer has 16 discrete 24 dB/octave analog filters with self-oscillation, 32 notes, five-octave keyboard with aftertouch, integrated effects, step sequencer, vocoder, stereo audio input, and a S/PDIF digital out...The Micro Q Omega keyboard has up to

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WAVE IDEA: The **Bitstream Pro** is a universal hardware MIDI controller with 32 potentiometers, eight sliders, eight On/Off buttons, snapshot scene memory, multiple programmable features (such as crossfading, min/max control values, and MIDI delays), built-in programmable LFO, MIDI thru/merge, and Windows configuration software. www.waveidea.com

WAVES: The **Version 3.HD** pre-release upgrade allows all Waves TDM processors to support Digidesign's new Pro ToolsHD hardware. The upgrade is free to customers who purchased TDM products since 1/1/02, and \$400 to others; those who purchase new TDM plug-ins get the upgrade for free. www.waves.com

WIZOO: **Urban Atmospheres** (under \$1,000) is a set of six DVDs with 5.1 environments from various locations, including subways, airports, department stores, casinos, etc. Produced using the SPL Atmos system, this library will be available in Nuendo and Pro Tools/AIFF formats...

WizooSounds.com is an online service that offers three quality levels that determine downloading size and time. Sounds may be bought in packages for specific styles, samplers, or instruments; custom sound compilations can also be burned on CD and sent to customers. www.wizoo.com

YAMAHA: See the First Look in this issue on the 02R96, as well as the Product Focus on their **Open Plug-In Technology** standard. www.yamaha.com

PRODUCT FOCUS

A lot of products got a buzz at Frankfurt. We don't have space to do detailed treatments on each, but here are five of the types of products that had people talking in the aisles.

STEINBERG: **Virtual Guitarist** is a VST instrument that's tough to describe, but, basically, it creates convincing rhythm guitar parts (electric or acoustic) in a variety of styles, from country to metal. It's based on "slicing" technology, where various guitar licks and plucks are broken down into individual elements, then recombined into parts. Because the program can control individual slices, it's possible to add shuffle, define tight/loose timing, create syncopated rhythms, and so on.

All of this is transparent — you don't have to rearrange individual slices or anything, you just describe what kind of style you want (there are 20 virtual players offering different guitars), and tweak various controls for sound or phrasing. Available sounds are Spanish, steel string, resonator, clean Strat, wah, power chords, and "ultra metal". Fret noise gets added intelligently for an even more realistic effect. Variations can be added with keyboard, mod wheel, aftertouch, and velocity.

The Virtual Guitarist package consists of three CDs with over 2 GB of samples, and lists for \$249. www.steinberg.net

CREAMWARE: The **Noah** hardware synthesizer uses DSP and a plug-in, software-based architecture to provide multiple forms of synthesis. Current synthesis implementations include subtractive (minimax module), FM, vector (like the Prophet VS), and wavetable; expansion for sampling and PCM sound is available as an option. Furthermore, there is physical modeling of guitar, bass, and drawbar organ, an analog drum synthesizer, and 22-band vocoder with integrated synthesizer.

The effects section has more than thirty 32-bit algorithms, including reverb, modulation, and dynamic effects. A programmable step sequencer and arpeggiator are optimized for live performance applications.

Noah doesn't require a computer, but communicates with external sequencers over its USB interface. Noah instruments can be treated in the computer like plug-ins; Noah configurations can be created on-screen, and uploaded into the synthesizer.

Noah is available in both rack and keyboard versions. The keyboard offers two 2x40 indicator displays (the rack has only one), and 16 controls/push buttons (the rack has four). Both versions have stereo ins and outs, eight individual outs in ADAT format, MIDI in/out/thru, USB, and a slot for Compact Flash data storage. Expected price is under \$2,000. www.creamware.de

SPL: The **MMC 1 multichannel mastering console**, intended to be the mastering studio's "traffic director," provides speaker management, source connectivity, audio metering, track assignment, master and monitor level setting, and automated insert routing of external processors.

The analog-based design assumes an external D/A converter is connected to the MMC 1, and also that the studio will prefer to use high-quality analog processors; as monitors and power amplifiers are mostly analog designs, having analog outputs makes sense as well. This approach minimizes the number of conversions.

The MMC 1 uses SPL's Supra operation amplifiers, which operate off of $\pm 60V$ rails. The op amps feature a signal-to-noise ratio of 116 dB with headroom of 34 dB. The total dynamic range is 150 dB, with a frequency bandwidth up to 200 kHz. With these basic specs, the MMC 1 meets or exceeds the requirements of today's PCM digital formats up to 24-bit and 192 kHz sampling rate, as well as DSD digital formats with 1-bit and 256 fs. SPL believes that digital technology will not improve sufficiently on these specs in the near future, giving the MMC 1 significant staying power.

The Insert section accommodates up to eight 8-channel processors; there are also sections for monitor and speaker management (which includes multiple channel selection options for surround), and eight large-size VU meters. www.soundperformancelab.com

MEYER SOUND: The **M1D ultra-compact curvilinear array loudspeaker** is designed for PA applications in small venues, as well as single-cabinet applications that require tight vertical pattern control (such as under-balcony fill systems). The **M2D compact curvilinear array loudspeaker** is designed for mid-sized venues that require tight vertical pattern control with long throw.

The self-powered, bi-amplified M1D and M2D incorporate a complex crossover design. At the lowest frequencies, both cone drivers combine; in the mid frequencies, the crossover feeds only one of the two drivers. This technique eliminates interference between the drivers that would otherwise occur at shorter wavelengths.

The M1D comprises two 5-inch cone drivers and three new high-power neodymium high-frequency dome drivers feeding a horn with a 100° constant-directivity pattern. These are housed in a 22.9 W x 7 H x 8.5 D (inches) vented trapezoidal enclosure and weigh approximately 40 lbs.

The M2D uses Meyer Sound's REM (Ribbon Emulation Manifold) to couple a single Meyer Sound MS-2010L compression driver with a 1.5-inch exit to a new horn with 90° constant-directivity horizontal coverage. Its mid-low section comprises two new 10-inch cone drivers with lightweight neodymium magnet assemblies, housed in a vented 39 W x 12.1 H x 17.5 D (inches) trapezoidal enclosure.

Both the M1D and M2D incorporate a MOSFET power amp module with 350 watts/channel burst capability (225 watts for low frequencies and 125 watts for highs), and accommodates mains voltages from 80-260 VAC (50/60 Hz). www.meyersound.com

YAMAHA: **Open Plug-In Technology** for Windows computers is a plug-in format that integrates MIDI hardware devices with librarians, editors, MIDI effects processors, and control panels within host programs such as MIDI sequencers. For example, Sonar 2.0 will come with an editor panel for controlling functions of the Yamaha Motif synthesizer. Software Development Kits are available (without royalty) under license from Yamaha.

Confused? Think of it this way. Software synths have a cool-looking interface, right? Now you can have a single, universal interface for external hardware boxes that show up within programs just like a soft synth.

The OPT format is based on Microsoft's Component Object Model interface structure for compatibility with Windows 9x/ME/2000/XP. Upon invoking an OPT, the host application releases its sequencing features to the MIDI plug-in to offer access to MIDI ports, track/event data, timing information, etc. Basically, Yamaha is promoting the idea that the user interface for hardware designs should look the same within different audio sequencer applications; also, OPT also makes it unnecessary to switch to another program from within the sequencer. www.yamaha.com

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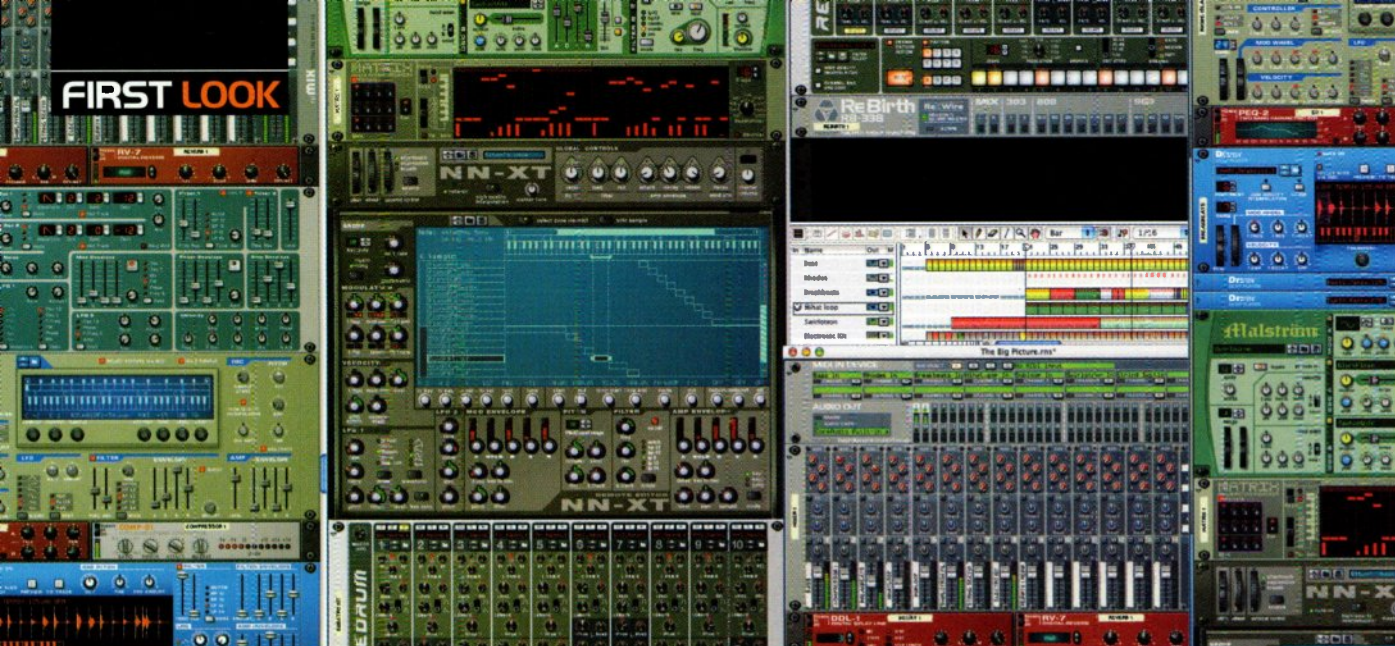
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By Craig Anderton

Propellerhead Reason 2.0

When Reason was introduced, it defined the "virtual studio" concept by integrating a drum machine, analog synthesizer, REX file player, sample playback module, step sequencer, mixer, and several effects into a "virtual rack." Not only was there a full-function sequencer, but the program was coded so efficiently it was easy to load up multiple instances of instruments and create complex compositions.

Now Reason 2.0 is here. Along with Windows XP and Mac OS X support, it adds two entirely new instruments and tweaks the sequencer.

The Malström Grainable Synthesizer uses samples that have been preprocessed into a set of periodic waveforms. This set, called a graintable, can be treated like a regular wavetable — sweep through it, play a section repeatedly, jump to different sections, and so on. It's also possible to resample the grains to shift the graintable formant without changing pitch, or "move" through the grains with real-

time controllers (velocity, pressure, etc.).

Malström's two filters each offer five modes: 12 dB/octave lowpass, bandpass, subtractive and additive comb-filters, and an AM mode (where the filter module provides a carrier wave that's modulated by the filter inputs). A shared filter envelope can control either or both of the filter sections simultaneously.

The second filter includes a shaper that alters the signal through saturation, clipping, bit reduction, or shaping the signal with a sine wave or noise.

There are also two multi-waveform modulator/LFOs with tempo sync (the LFOs in existing Reason modules now incorporate tempo sync as well). The LFOs include a one-shot mode to generate attacks or envelopes, and can even modulate each other. Furthermore, Malström has more control options, inputs, and outputs than any other Reason module, and the two filters and shaper section can accept external audio from other Reason devices.

The NN-XT goes much deeper than the NN-19 (which is still included with Reason 2.0). Despite the greater power, the NN-XT remains very easy to use thanks to automatic pitch detection that maps samples intelligently across the keyboard, and graphically intensive zone editing to implement features such as velocity switching and crossfading.

For processing a selected zone (or zones), there are several synthesis options: a filter with six different modes, two LFOs, two envelopes, microtuning capabilities, and routing to any of the 16 audio outputs.

The NN-XT is currently compatible with Sound Font 2 libraries, and an Akai import utility is in the works. Meanwhile, Reason 2.0 ships with the Orkester orchestral library, created exclusively for the NN-XT and featuring sounds that span the range from single woodwinds to complete string sections.

The main sequencer can be removed from the rack and resized, or even floated to a second monitor. It also includes new tools such as Zoom, Line, and Eraser for more straightforward editing.

PROPELLERHEAD REASON 2.0

WHAT IS IT? Complete virtual studio for Windows or Mac, with sound generation, playback, processing, and sequencing.

WHO NEEDS IT? Anyone who wants a great-sounding suite of instruments to create complete compositions, or to flesh out arrangements in ReWire-compatible sequencing/digital audio recording programs.

WHY IS IT A BIG DEAL? Reason was already an award-winning program, but the two new modules are downright exciting.

SHIPPING: Q2, 2002

PRICE: \$399 (Reason 1.0 upgrade, \$89)

CONTACT: For more information contact Midiman (Reason's U.S. dist.) at 626-445-2842 or visit www.propellerheads.se.



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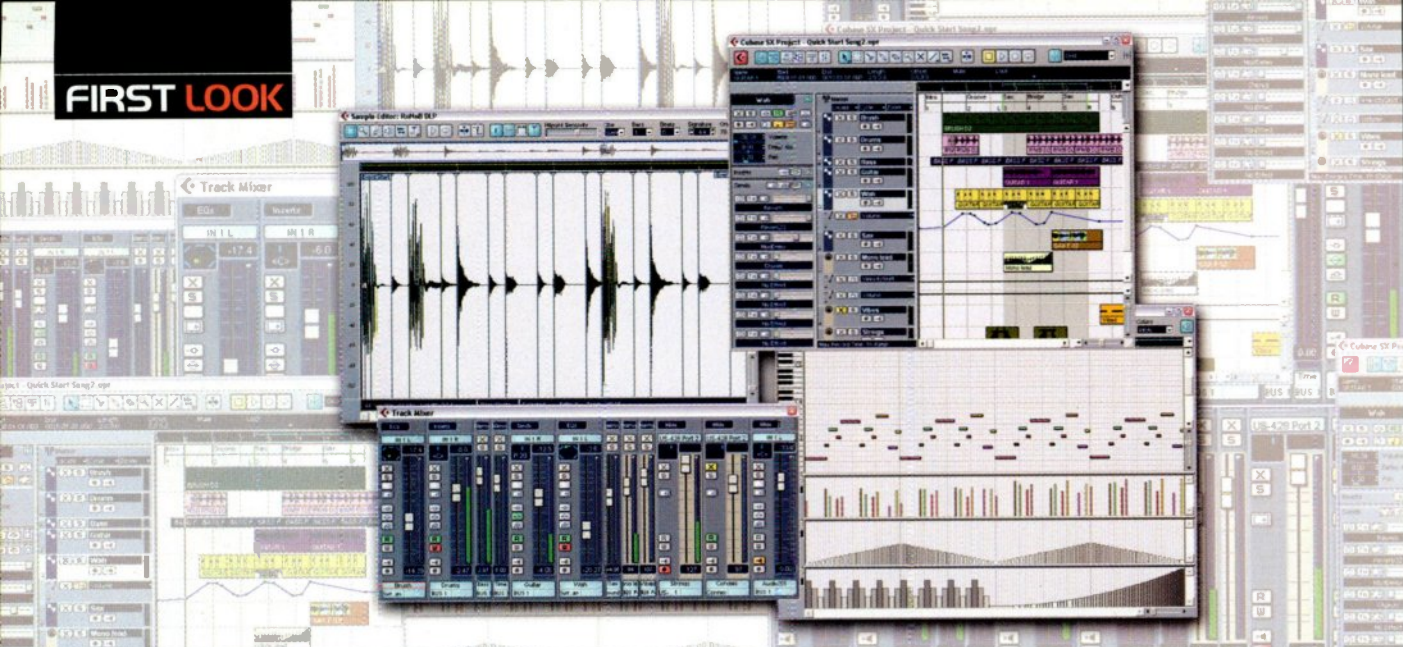
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By Craig Anderton

Steinberg Cubase SX 1.0

Since the days of the Atari, Cubase has dominated a significant portion of the sequencing market. But it's been showing its age, which makes the introduction of Cubase SX all the more welcome. Its relationship to the "old" Cubase is in name only; the program is a major redesign. SX is definitely not "Cubase 6.0"; rather, it's the start of a new generation.

The Cubase audio engine has been revamped with Nuendo code, which is more efficient, has superior editing options, and allows up to 200 tracks. Cubase SX also features unlimited audio and MIDI undo/redo, along with an offline edit history list, to replace Cubase VST's single-level undo. You can even modify or replace effects already rendered into audio files and plug-ins.

SX supports 24/96, 5.1 surround, and a video track with thumbnail preview. If this sounds a lot like Nuendo, well, it is. But, according to a company spokesperson,

Nuendo will be heading down its own separate path.

System requirements for PC are Windows 2000 or XP, Pentium III/500 MHz (1 GHz recommended), and ASIO 2 or MME-compatible sound hardware. The Mac version requires OS X, G3 350 MHz (G4 recommended), and ASIO 2 or OS X-compatible audio devices. Both versions need at least

256 MB RAM, and a USB port for the dongle.

The automation user interface is a major improvement. Cubase VST used to stash automation data in a cryptic, semi-editable track; now there's sample-accurate, vector-based automation with automation tracks for every audio track, group track, and plug-in.

There are other, more subtle changes. A Project Overview panel simplifies navigating to a specific part of a tune for editing, and there are savable screen sets, user-definable keyboard shortcuts, and macro functions. For hands-on fans, SX also complements Steinberg's "Houston" controller.

Cubase SX ships with several processors, including the SPL De-Esser, Vocoder, Reverb, and the Quadrafuzz, which is modeled after my multi-band distortion processor. (No, I don't get any royalties for this, but I'm pleased to see it in there.) It also includes a hefty set of virtual instruments.

Cubase SX lacks "Acid-style" time stretching, but does include slice-based stretching (like ReCycle), as well as traditional audio time-stretching using Prosoniq's algorithms. SX's automatic tempo-matching functions are far more friendly than Cubase VST's.

For MIDI, there's multi-lane controller editing and support for both Steinberg and Cakewalk MIDI plug-ins. Score functions include 32 staves per page, scalable page view and printing, guitar tablature, and automatic layout options.

Other features include ReWire 2 support, spectrum analysis, audio CD ripping, scrubbing, non-destructive/editable crossfades, Apogee UV22HR dithering, Steinberg's VST System Link for "parallel processing" with multiple computers (see First Look, March 2002), and a new "effects rack" paradigm for VST processors. ■

STEINBERG CUBASE SX 1.0

WHAT IS IT? Digital audio + MIDI multitrack sequencer with numerous virtual instruments/processors and ReCycle-style time-stretching.

WHO NEEDS IT? Any Cubase fan who wants to take the program to the next level.

WHY IS IT A BIG DEAL? Cubase VST has been immensely popular, but was showing its age. Cubase SX is a complete reworking that presents a more streamlined and complete music-making experience.

SHIPPING: End of Q2, 2002

PRICE: \$799; update from Cubase VST/32, \$149; Cubase VST Score, \$199; Cubase VST, \$299.

CONTACT: For more information, contact Steinberg at 818-678-5138 or visit www.steinberg.net.

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By Mitch Gallagher

Audio-Technica AT4040

For most recordings, everything starts with the microphone. No matter what style of music you're working with or where you're doing your recordings, if you don't have great sounding mics, there's simply no way you're going to get a truly great sounding recording (from a purely sonic standpoint). Unfortunately, great sounding mics can often cost a great deal of money — this can be especially true with large-diaphragm “studio” microphones. While there are many bargain-priced models on the market these days, the performance of those mics may not necessarily be up to the rigorous demands that a recording professional will make on his or her equipment.

Enter Audio-Technica's 40 Series microphones. Over the past few years, the 40 Series has brought high sound quality to a new, lower price point with models such as the AT4033 and AT4050. The AT4040, announced at the recent Frankfurt Musik Messe and Las Vegas NAB tradeshows, carries on this tradition. The new mic fea-

tures a completely new element and, according to the manufacturer, is intended to provide “smooth, natural sonic characteristics with a wide dynamic range and the ability to handle extremely high SPLs.”

The AT4040 is a large-diaphragm single-pattern true condenser microphone

that uses surface-mount electronics and transformerless circuitry. The mic's aged two-micron-thick vapor-deposited gold diaphragm is designed to capture even hard-to-mic sources without sacrificing high-frequency detail. The mic features a tailored frequency response from 20 to 20,000 Hz, and a 133 dB dynamic range. It can handle a maximum sound pressure level of up to 145 dB at 1 kHz with 1% THD (155 dB with its integral 10 dB pad). A switchable 80 Hz, 12-dB/octave highpass filter provides control over low-frequency response. The microphone's transformerless circuitry is said to virtually eliminate low-frequency distortion and to be fast enough to accurately deliver high-speed transients. The AT4040 is a true condenser microphone (meaning that its capsule is externally polarized), and so requires 48-volt phantom power in order to operate.

The AT4040's nickel-plated brass element baffle is precision machined for enhanced stability and sensitivity. The housing is a symmetrical design that is intended to minimize internal reflections by providing an open acoustical environment.

As a manufacturer, Audio-Technica has always maintained stringent quality control standards. The company individually tests each 40 Series microphone before it is shipped in order to ensure the best performance characteristics and the most consistent performance from model to model.

The AT4040 is shipped in a protective case and comes with a dust cover and Audio-Technica's heavy-duty AT8449 shock mount. ■

AUDIO-TECHNICA AT4040

WHAT IS IT? Large-diaphragm cardioid true condenser microphone.

WHO NEEDS IT? Recording artists, engineers, and producers who need great sound quality at a reasonable price.

WHY IS IT A BIG DEAL? With the introduction of the AT4040, Audio-Technica continues their tradition of providing high-quality professional studio microphones at ever more affordable prices.

SHIPPING: May, 2002

PRICE: \$495

CONTACT: For more information, contact Audio-Technica at 330-686-2600 or visit www.audio-technica.com.

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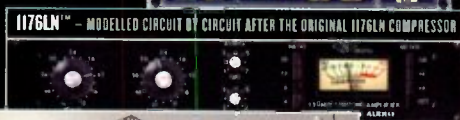
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World Radio History





By Steve La Cerra

Yamaha 02R96 Digital Mixing Console

Hot on the heels of their new DM2000 digital production console, Yamaha has announced the 02R96 digital mixing console. Packing five times the processing power of the original 02R into a chassis with the same footprint, the 02R96 runs 56 channels with 24-bit, 96 kHz resolution. Onboard A/D and D/A converters operate at 24/96, while internal processing and four simultaneous effect engines operate at 32-bit, 96 kHz.

Every 02R96 channel features independent compression and gating, four-band parametric EQ, and up to 453 milliseconds of delay. Twenty-four 100-millimeter faders can be switched in layers to control the 56 channels. A channel strip can control any input, output, insert, or effect. The direct out function routes any channel to any analog or digital output; input channels or effects may also be assigned to eight aux busses.

Rear-panel analog I/O includes balanced XLR mic and TRS line inputs to channels 1 through 16 with switched TRS inserts — keeping the signal path as pure as possible. TRS line inputs for channels 17 through 24 may be used as mono channels or as linked stereo pairs.

Stereo outputs include studio and control room monitors, balanced XLR stereo bus outs, and eight balanced "omni" outputs, which can source their signal from any output bus. Digital I/O includes AES/EBU and S/PDIF stereo bus out and two-track returns. Internal sample rate conversion

allows a digital input to be monitored or routed to an input channel without need for synchronization to the system clock. Four slots accommodate Mini-YGDAI cards, enabling the 02R96 to interface with ADAT, TDIF, and AES/EBU digital equipment, or additional balanced analog I/O. The slots are also compatible with cards from Apogee and Waves.

Display Access keys allow channel settings, digital I/O, routing, or utilities to be shown on the 02R96's LCD panel. Dedicated buttons address channel parameters, including EQ, pan, and aux send levels, while numeric displays for each EQ band show frequency and cut/boost values directly below the encoders. Fader Mode keys switch the 02R96's channel faders between fader or aux send control, while Encoder Mode keys set the rotary encoders to pan, send level, and other functions. A group of effects/plugin keys instantly bring parameters for any of the four effect engines to the display.

Extensive surround capabilities are built into the 02R96, including a 128x128-step joystick, surround position display, and a divergence parameter for adjustment of the hard/phantom center ratio for each channel. Individual speakers may be muted, attenuated, or delayed to the mix position. The 02R96's effect processors feature several algorithms specifically written for surround applications.

Onboard automation provides scene store/recall, as well as real-time automation of all parameters with 1/4-frame accuracy. Yamaha's Studio Manager software for Macintosh and Windows is supplied with the 02R96 for complete on- or offline access to all console parameters.

Additional features of the 02R96 include

► continued on page 126

YAMAHA 02R96

WHAT IS IT? The long-awaited successor to Yamaha's popular 02R digital mixer.

WHO NEEDS IT? Audio and video production studios.

WHY IS IT A BIG DEAL? The 02R96 packs five times the processing power of the 02R, and runs 56 channels at 24-bit/96 kHz resolution.

SHIPPING: July, 2002

PRICE: TBA

CONTACT: For more information contact Yamaha Corporation of America at 714-522-9011 or visit www.yamaha.com/proaudio.

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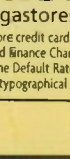
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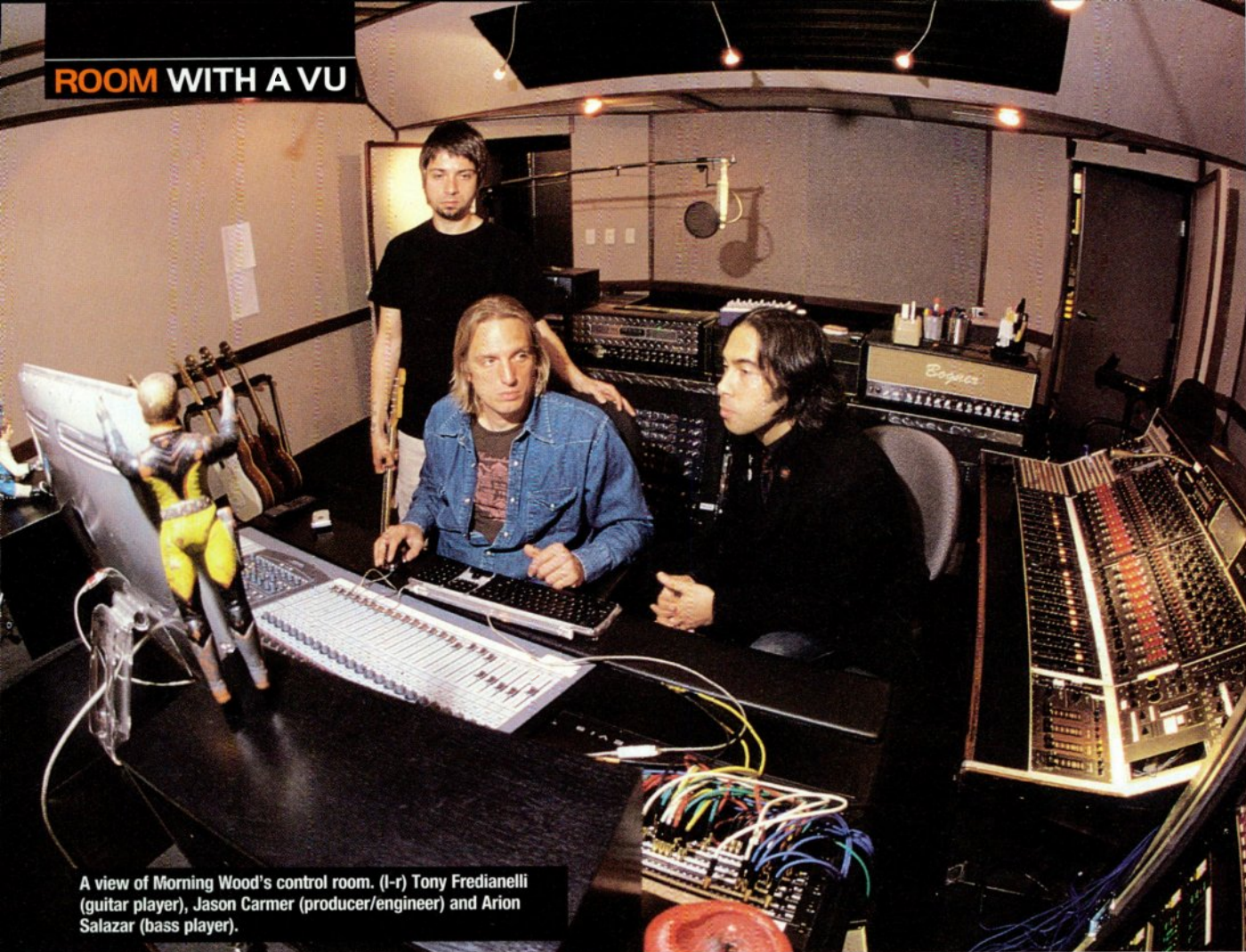
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A view of Morning Wood's control room. (l-r) Tony Fredianelli (guitar player), Jason Carmer (producer/engineer) and Arion Salazar (bass player).

PHOTOS BY JOHN POPPLEWELL

By Kathleen Murphy

Creative Synergy

Third Eye Blind builds a studio of their own

STUDIO NAME: Morning Wood
LOCATION: San Francisco, CA

KEY CREW: Morning Wood partners are Jason Carmer (Third Eye Blind producer/first engineer) and Third Eye Blind's Stephen Jenkins, Arion Salazar, and Brad Hargreaves. Sean Beresford is studio manager/second engineer.

CREDITS: Producer/engineer Jason Carmer has worked with Third Eye Blind since 1998. He engineered and produced the band's 1999 sophomore release *Blue*. He has also worked with such artists as Run-DMC, Merle Haggard, Los Amigos Invisibles, Live, Black Lab, Mark Eitzel, and Deep Blue Something. Third Eye Blind is Arion Salazar (bass/songwriter/producer), Brad Hargreaves (drummer), Stephen Jenkins (vocalist/songwriter/producer), and Tony Fredianelli (guitarist). The Bay Area quartet has released three albums on Elektra Records — *Third Eye Blind*, and *Blue* [with former guitarist Kevin Cadogan], and, most recently, *Crystal Baller*.

MIXING CONSOLE: Sony DMX-R100, vintage Helios

MONITORS: Pelonis Signature Series A-215 mains, Yamaha NS-10s, Dynaudio BM15a [5.1]

AMPLIFIERS: Pelonis Signatures, Hafler Trans-Nova

RECORDERS: Ampex MM1200 with custom 11-track head stack as well as 24-track head stack

OUTBOARD: Decca compressor [2], Empirical Labs Distressors [4], Universal Audio 1176 [2], LA2A; Lang PEQ2 EQs [2], Pultec EQP-1A [2]

EFFECTS: Sony DRE-S777, AMS RMX 16

MICROPHONES: Telefunken Elam 251, Neumann U 67 [2]

MIC PREAMPS: Neve 1073 [4], 1081 [4], Helios Island modules (originally from Island studios in London circa 1970) [4], Telefunken V-76 [2], Audix [2], Calrec [2]

KEYBOARDS/SAMPLERS/MIDI MODULES: Digidesign Soft Sample Cell, Native Instruments Reaktor

COMPUTER: Mac G4

DAW: Digidesign Pro Tools with Apogee AD8000 MkII SE [4], PSX100 [2]

SYNCHRONIZATION: Lynx

STUDIO NOTES: "This studio used to be a jingle production facility. Stephen Jenkins actually recorded here in the late-'80s on the day of the San Francisco earthquake," reports Jason Carmer. "He and I discussed getting our own studio for years, and then one day last summer he was riding his motorcycle around town and saw that this place was for sale. For *Blue*, we were in a studio for nearly eight months, paying thousands of dollars a day, and we always felt the pressure of the clock. We figured if we built our own space, we could have flexible hours, which would be more conducive to the creative process. So, we bought the studio and hired Chris Pelonis to redesign the 3,000 sq. ft. facility. He completely rebuilt our control room and modified the live room. We also have two small rooms off of the live room where we can roll in workstations if needed, and a Pro Tools editing room with an isolation booth for vocals, etc.

"The studio is somewhat space-challenged. Our live room is on the cozy side and rather neutral. However, we found the room attractive and cool *because* of its size. Third Eye Blind really wanted to work and play together as a group as opposed

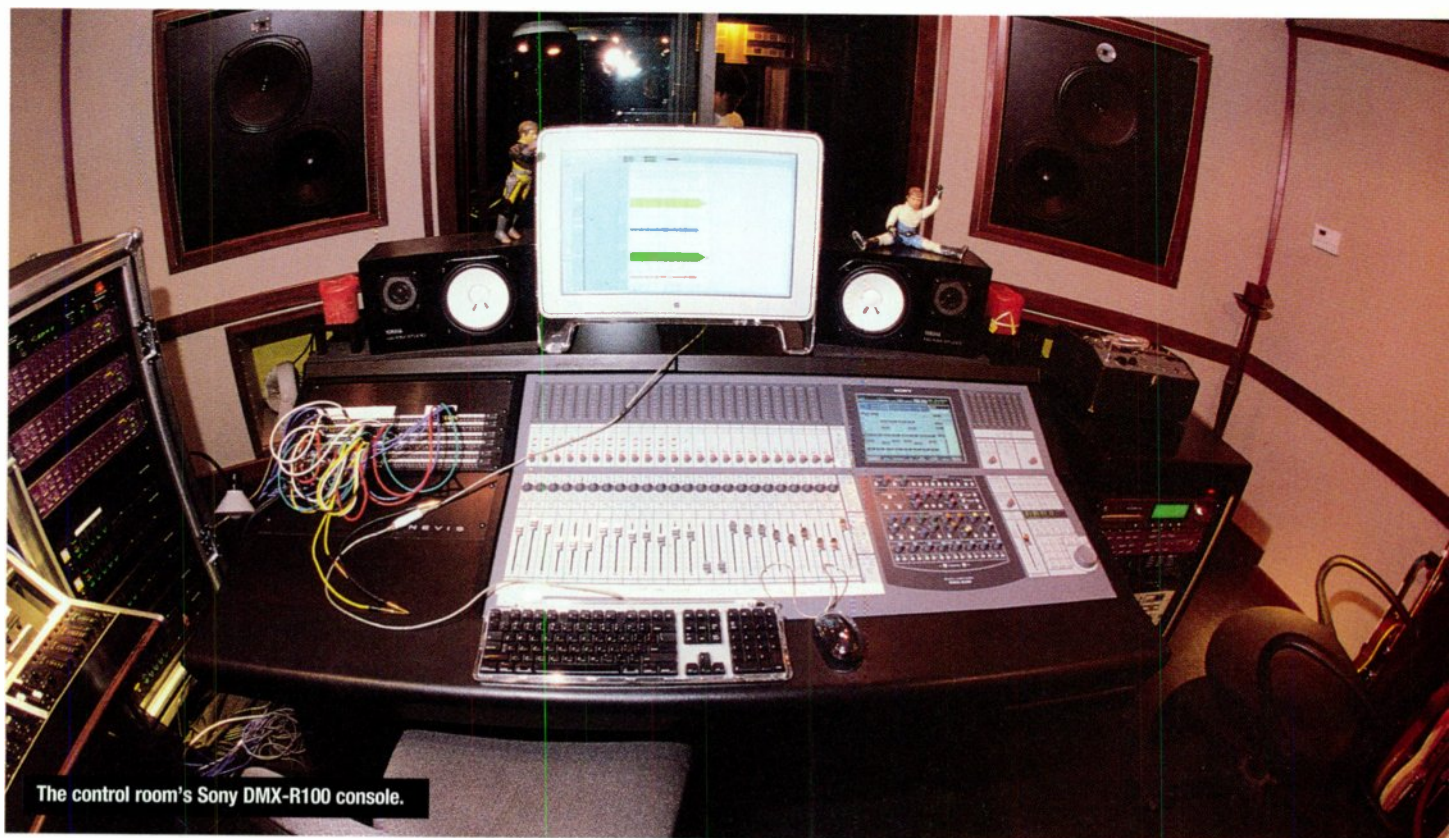
to a bunch of individuals who overdub everything. Production-wise, I agreed. When I worked with Merle Haggard, his engineer Lou Bradley told me that the best way he ever found to record a group is to get everyone together in a room and have them play off of each others' dynamics. It's so simple that it's kind of profound. People play together and music becomes something that is together. It's cohesive and real versus some kind of construct that has been created. I think the human ear hears the difference. When we had the opportunity to look at this studio, we were like, 'Yeah, it's small, but the room sounds really good.' The studio went online in the beginning of the year, and we immediately started work on the new album, which was just released.

"The studio is definitely open for outside business. We'd like to give local musicians a break. We want to appeal to artists, engineers, and producers who are ready for something new. Making a really good sounding tape is an expensive thing, and this is an affordable place for people to get something going in the music business."

EQUIPMENT NOTES: Carmer continues: "Collectively, Stephen and I own a

bunch of equipment — a lot of vintage preamps and extraneous outboard gear. I'm really into esoteric weird old gear. The idea behind the studio was to blend the best of the old with the best of the new. We considered getting a large console, but we wanted to move into the future so we purchased Sony's fully automated DMX-R100 digital mixer, which sounds great. Having 48 channels at the flip of a button and all your controls laid out on one universal channel strip is incredible. It makes so much more sense to remain in the sweet spot and just adjust the faders. I hate having to move like nine feet away because your perspective changes when you are out of the speaker throw.

"We also have a Helios console originally from the Rolling Stones' remote truck and MusicLand Studios in Munich, Germany, which is where Led Zeppelin recorded some of their classic albums. It sounds fantastic. We insert all of the EQs of the Helios into the Sony and use them in tandem. We also have a custom two-inch 11-track tape machine that gives super width on the tape. We take all of this classic gear, throw it in, mix it up on the R100, and



The control room's Sony DMX-R100 console.

that's our sound. The far-field monitors were custom designed by Chris. His speakers are super accurate — there's no bass build-up in the room. They are totally phase aligned. The mains are his, and then we have Yamaha NS-10s for the norm, and Dynaudio for the nearfields and 5.1."

FAVORITE EQUIPMENT: Carmer states: "To simulate a live room, I use two room mics to create a 'distance' sound, run it through a Sony DRE-S777 digital reverb, and then take the output and mix it into every mic on the drum kit. I've experimented with a number of reverb spaces in the S777 software series, but I lean toward Ocean Way Studio. Bill Putnam built some terrific rooms, and that's one of the best. I've worked with lots of digital reverbs, and they all have pluses and minuses, but the S777 is the first reverb-in-a-box that truly sounds like a real natural reverb. I absolutely love it. I'm so excited that I can't hear the algorithms. With other reverbs, you can basically hear how they've designed three or four main algorithms and then the rest of the 50 different reverbs are mutations or permutations of those. With the S777 you hear completely different

sonic environments, each with their distinct natural beauty and rawness. The band loves the S777. I put it on Stephen's vocals and he was like, 'right on.' We wanted to try our best to do what people did in the '50s, '60s, and '70s when they pushed music into something new. We couldn't use the same old stuff and expect new results. We needed the right tools.

"I plan to sample some of my own spaces. I have this warehouse in San Francisco that has this amazing room, and there's a park way up in the mountains at Berkeley where I walk my dog where there's this incredible redwood grove."

PRODUCTION NOTES: Carmer concludes, "The first project I did with Third Eye Blind was a soundtrack for a Scooby-Doo cartoon years ago and we hit it off immediately. I recently co-produced, engineered, and mixed their third album titled *Crystal Baller*. We spent a lot of time in preproduction where we worked on 30-odd songs until we chose the select tracks. We basically recorded eight songs as a group, embellished them, and then, once we got those songs done, we completed the rest of the album.

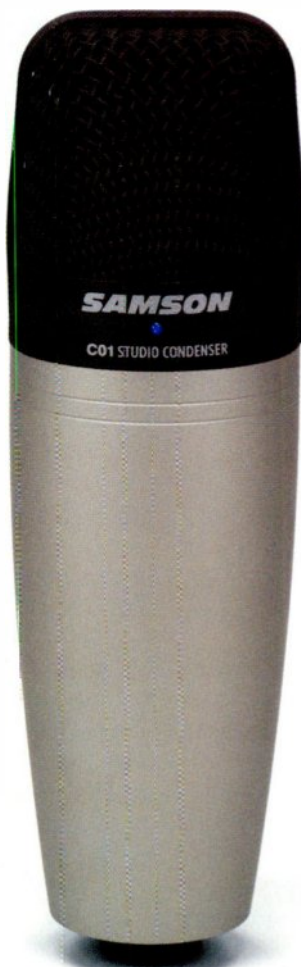
"It's a beautiful record, really diverse. It's always rewarding to work on a project you believe in. Stephen is a great lyricist. *Crystal Baller* has some great love songs and some really rockin' songs. We were all so excited to do the record. There was a culmination of realizing that we had our own place, that everything was running well and, more importantly, sounded great. 'Palm Reader' was the first song we did vocals on. Stephen just ripped through it. We did a couple of takes, and it sounded amazing. It was one of those times when you say to yourself, 'This is why I do this.'

"Mixing the record was both challenging and exciting. In the past, we would have gone to some commercial studio and mixed on a [SSL] J series like everybody else, and instead we opted to roll the dice. We had all this crazy equipment here and we put it all together, and recorded something different. At this day and age in the music industry, it's not a time where people are really pushing the envelope. They are much more interested in playing it safe. We didn't want another 'Semi-Charmed Life,' so we took it to the next level." ■



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By Lisa Roy

Mark O'Connor Violin

Capturing the Grammy-winner's strings for high-resolution reproduction

"Because of experience, I know how my violin should sound on record by now," reflects Mark O'Connor, the Grammy-winning violinist whose recordings are often described as "genius" and "brilliantly original." O'Connor and his engineer, Richard King, have worked together on three albums for Sony Classical and are about to head back into the studio for a fourth. "Being knowledgeable about the recording process and having engineered albums myself gives me an idea of what to look for in an engineer. When there are problems, I sometimes know why, for instance. Therefore my expectations of a great engineer can be more carefully organized than someone who has less experience around the techs. That is why I do know that Richard is incredible at recording me and my violin," O'Connor states. "I look for a darker golden sound but still very open-feeling. I want the final result to mirror not so much what I hear while playing, but what I'm trying to accomplish with the instrument in the recording

space. Therefore the environment becomes the instrument that I want to capture as much as the violin itself. On the last three albums with Richard, the proof is on tape — or the 1's and 0's as it were."

SIGNAL PATH

"I'd like to begin with the recording venue, since it played such a prominent role in the recording," recounts King, this year's Grammy Classical Engineer of the Year. "Steven Epstein chose this hall because it is built in the European tradition — old-style construction of wood and plaster that yields beautiful acoustics. We ended up incorporating the sound of the hall as if it were another instrument in the ensemble. The balance of direct sound to the room sound is as important to us as the balance of solo violin is to an orchestra. Steve and I approach each project we do together as a team, discussing the mic setup and technique we will implement before the recording begins."

King's signal path starts with "two AKG C12 VR mics that have been modified at Sony Music Studios in New York. Both the microphone and the power supply have been carefully refined for extended dynamic range and improved resolution. The power supply output then runs about four feet to a Mastering Lab tube preamp, then the signal runs at line level to the control room (approx. 100 feet). The next step is a Meitner Direct Stream Digital A-to-D converter, which then feeds the Sonoma hard disk recorder via an optical cable. 'DSD' is a single-bit system that runs at 2.8 GHz (64 times the speed of the current standard of 44.1 kHz for digital audio), and is the recording format used in the production of

DATE: May 1st and 2nd, 2001
STUDIO: Mechanics Hall
LOCATION: Worcester, MA
ARTIST: Mark O'Connor
PROJECT: *The American Seasons*
TRACK: Entire album
PRODUCER: Steven Epstein
ENGINEER: Richard King
ASSISTANT ENGINEER: Jen Wylar
REMOTE TECHNICAL SUPERVISOR: Mark Betts

NUENDO

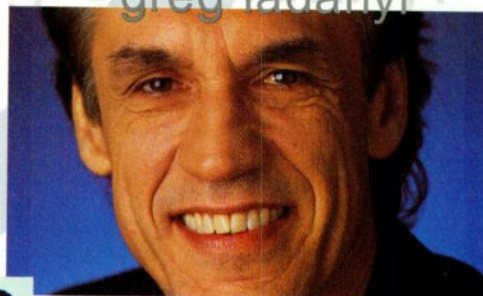
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Super Audio CDs (SACD). This project was an eight-track recording, which was recorded, edited, and mixed on the Sonoma System."

MIC POSITION

"The two C12 VR's were positioned up and over Mark's violin, about a bow's length away (3-4 feet), with the mics about 12 inches apart and both mics on-axis to the instrument," reveals King. "The [pattern switches] were set for cardioid, with no pads or filters. Mark himself was positioned directly in front of the ensemble, facing in, so that the main/overall pickup comprised about 70% of his sound. Three mics, in a Left/Center/Right configuration about 10 feet up over the conductor, were DPA (B&K) 4053 omni's, which are similar to a 4006. Other mics were B&K 4006 for room/surround pickup, and an AKG C414TLII on guitar as an accent mic."

PROCESSING

King confides, "No processing was used during the recording. Some reverb was added in the sidechain [aux

send/return] during the mix, which was a Lexicon 960L running at 96 kHz. No EQ was used at any time, except for a slight low-frequency dip on the surround tracks during the multichannel mix. We arrived at a basic overall sound by adjusting the mic placement itself. The type of mic and the mic/pre-amp combination also changes the color and dimension of the sound. The DSD converters also tend to color the sound, but in a pleasing manner (much like analog recording)."

TRACK NOTES

"Mark is both a fantastic musician and a fantastic composer, and has such a robust and beautiful sound. It was very easy for us to create a natural balance of violin to ensemble," concludes King. "Everything fell into place very quickly — Steve and I have found the hall to be very consistent over the years, even for different types of ensembles, and is especially impressive for multichannel/surround recording! We like to say that we are trying to create the illusion of reality — and so the less variables involved, the better." ■

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World Radio History



Go Live!

by Gerhard Behles

Ableton's Live is a brilliant program for loop-oriented music that deftly bridges the gap between studio and stage. EQ was fortunate enough to get these 10 tips directly from one of the program's primary architects.

1. Assembling clips in the Arranger.

Although most people drop clips from the Browser into the Session View, you can also drop them into the Arranger View, then put the pieces together in the Arranger.

2. Dragging clips from the Session View into the Arranger.

First, drag the clips onto the Arranger icon (upper right corner). The Arranger appears, then drop the clips where desired. This also works with multiple selections. In addition to drag/drop, copy/paste works, too.

3. Dragging/pasting clips from the Arrangement into the Session.

Suppose you want to play a piece in the Arrangement live, or jam with it:

- Select a time range across several tracks.
- Copy them to the clipboard.
- Switch to the Session View (e.g., hit the Tab button).
- Choose *Edit > Paste Scenes* to insert the clips. Live will attempt to maintain the time order of the pasted clips from top to bottom.

4. Selecting time instead of clips without unfolding an Arranger track.

Hold the Alt/Option modifier key while mousing over a clip box; the cursor changes to the Time Selection cursor, which normally appears only while mousing over the waveform. Clicking and dragging into a clip box with the modifier held selects time. To split a clip without unfolding, you can also Alt/Option-click the clip, and go *Edit > Split*.

5. Fast Arranger scrolling/zooming.

Click in the song time ruler (above the tracks) and drag left/right to scroll the dis-

play; drag up/down to zoom. To scroll and avoid changing the zoom, click and drag the minutes:seconds ruler below the tracks.

6. Choosing parameters for automation display. Click on a mixer or effect parameter to view and edit its automation. Unfolded tracks show the parameter's break-point envelope, and the right-hand side of the track displays the parameter name.

7. Better control over Session View clip behavior. You can remove the Stop buttons from slots to make sure launching a scene won't interrupt clips currently playing in a track. To do this, select one or several slots; choose *Edit > Remove Slot Buttons*. The Stop button will disappear in the selected slots. Also, note that no Record buttons will appear in those slots when you activate the Mixer's Monitor (Microphone) button. This allows launching scenes without accidentally recording new clips while, for instance, monitoring a signal coming in through Rewire.

8. Using long samples. Long samples (including entire tunes, even if they have tempo variations) can play in sync with the project tempo. For details, check out the manual chapter "Setting the Warp Markers" (pages 73 to 77).

9. Individual clip quantization. In version 1.5, every clip can have its own launch quantization. Double-click a clip to see it in the Clip View. The "Clip" section includes a menu for choosing quantization. Select "Global" to launch the clip with the global quantization (as

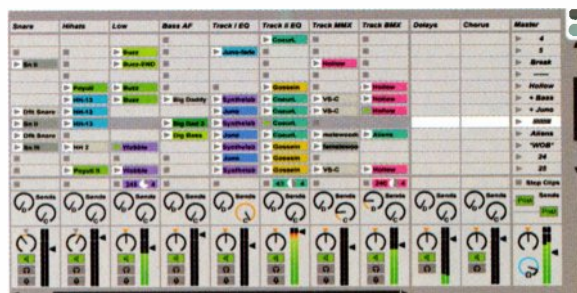
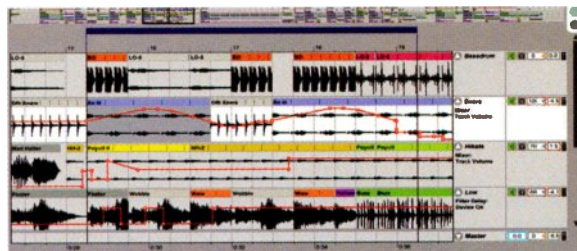
adjusted in the Control Bar at the top of the Live screen), or choose a quantization specific to that clip.

10. Using the Arrow keys in the Clip View's sample display. Setting and adjusting Warp Markers to get a long sample to line up with the beat can be tedious, but, in Version 1.5, your computer's arrow keys can navigate and adjust the Markers:

- Arrowing left and right moves the selected Warp Marker by one pixel.
- Control/command arrowing left and right selects Warp Markers.
- Arrowing up and down makes the loop hop by its current size.

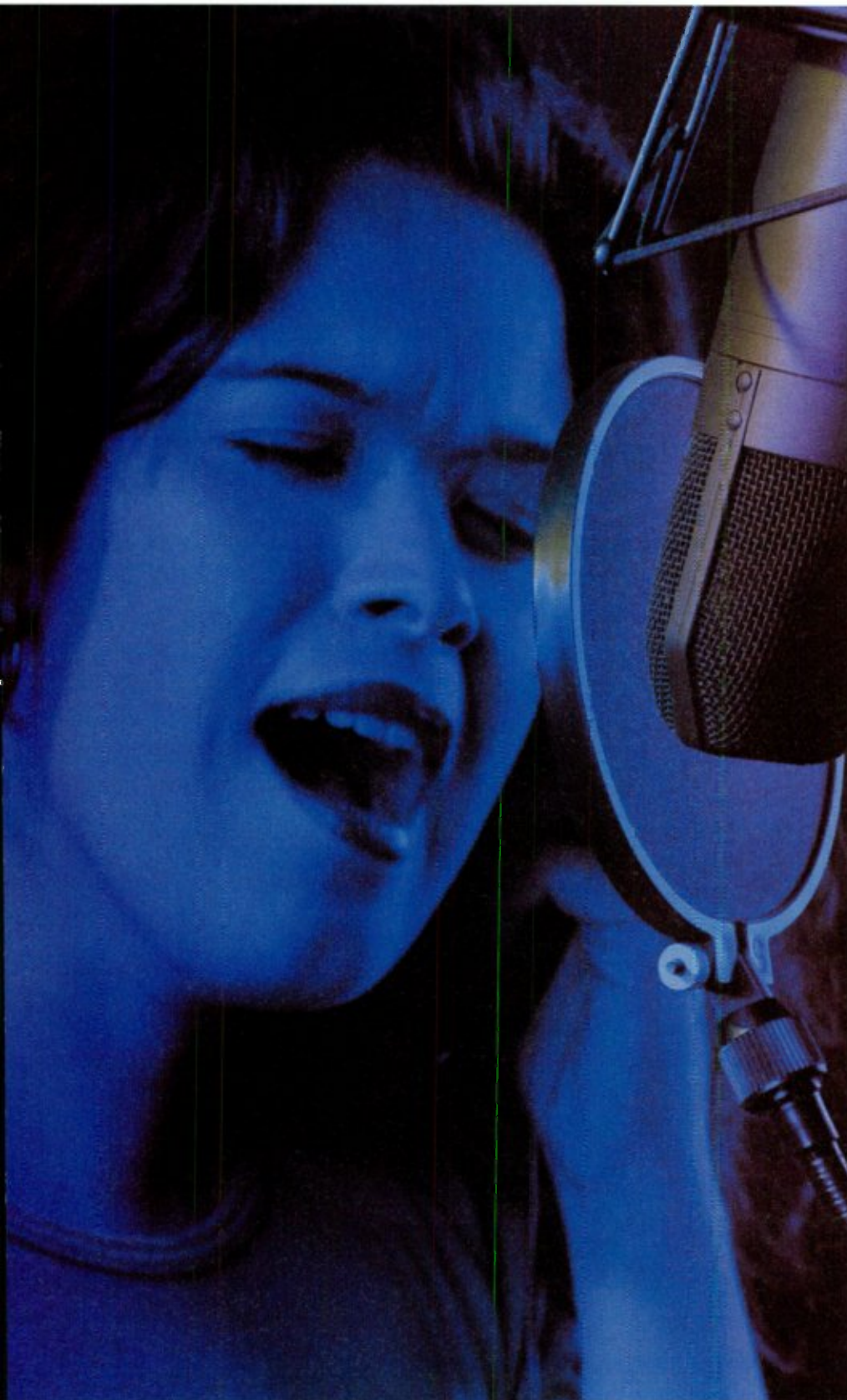
Set the loop length to one bar, and jump through the sample while it plays. The view will scroll and zoom to show just what you need to see.

Gerhard Behles, Ableton's CEO, was formerly part of the "Monolake" electronic music project, which released several albums and played live in Europe and the U.S. He and Monolake partner Robert Henke teamed up with others and formed Ableton.



With Ableton's Live, you can drag clips from the Session View (below) to the Arranger View.

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FAST AND FURIOUS

In this "FAST AND FURIOUS" time of galloping audio technology, Brian Transeau, known as "BT," is constantly rewiring himself and reinventing the music he's identified with. BT was banging out tunes on his toy piano at the age of two and got serious with classical music by the age of seven. The classical gas permeated his innovative style of house music in the '90s, which helped re-inflate the music scene and made him a leading figure in the British arena. He is widely cited as the originator of trance, also labeled "epic house."

His debut on Deep Dish Records in 1993 with the singles "A Moment Of Truth" and "Relativity" tastefully rattled the floorboards of trend-setting clubs. With his debut album in 1995 as BT, his collaboration with Tori Amos, "Blue Skies," became one of the most-played hypno-cuts in both America and England. Evolution of the BT genre resulted in yet another musical permutation known as "dream house." He moved on, of course, with his 1998 album *ESCM*, followed by 2000's *Movement in Still Life*.

In the brutal world of film scoring, he has composed soundtrack music for *Go*, *Driven*, *Tomb Raider*, and the hugely successful *The Fast and the Furious*. He has remixed Madonna, Seal, and Sarah McLachlan, to name a few. BT has also teamed with premiere soundware manufacturer East West to create two remarkable sample-accurate libraries of his killer sounds entitled *Breakz from the Nu Skool* and *Twisted Textures*. And along the way he produced last year's #1 N'Sync hit, "Pop." Over 2,000 edits in eight bars — count 'em!

In the L.A. times, Peter Gabriel, whom BT has worked with, is quoted as saying: "BT mounts mesmerizing journeys with his compositions. He is not only a virtuoso programmer, but an extremely gifted musician." Let's drop in at BT's personal workspace, dubbed 4Box, to learn about his eclectic gear and the true meaning of some rather esoteric terms.

EQ: What would you call your occupation these days?

BT: I'd call myself a composer.

You went to the Berklee College of Music — how did you fit in?

It's a really funny question, because I make frequent trips back to Berklee to have a gander at their curriculum and see what's going on, while I'm doing shows in Boston — playing at Axis and different venues. When I check out the synth department and the film scoring department, there is such a plethora of technology that the students have access to now, which was unheard of

when I was going to school. I was a sort of an outcast, trying to assimilate as much harmony and theory information as I could, and studying jazz, but I was not interested in being able to play at 250 beats a minute. While everybody was practicing, I was taking apart my Roland 808 drum machine and sticking screwdrivers in it to see what kind of weird sounds I could come up with. I was a complete freak at the time — and now there are lots of people who are studying the new forms of a similar technology. The whole time I was there no one cared about that.

When were you there?

Early '90s.

So you can go back and be a professor now.

That's scary, isn't it?

How would you define "house" music?

It originated in Chicago and Detroit in the early- to mid-'80s, and the name obviously comes from people making

music in their house. Its roots are in disco, hence the 4-on-the-floor rhythm and off-beat hi-hats. But I think the important thing is the ethos of the music — sort of punk rock D-I-Y type of thing, and I think that's what makes house music special — the energy and integrity of it, and not necessarily even the music, but more the thoughts that go behind it.

I've heard that you invented trance music....

I know, I hear that all the time.

What is trance music exactly?

Trance connotes something really different to me now than it did when we were making it and there wasn't a name for it. In the early '90s, the tracks that I did then — lots and lots and lots of tracks — people would listen to the stuff and they didn't know what to call it. Non-linear house music that was influenced harmonically by film scores and classical music, and has huge swells and breakdowns and stuff. The name "trance" came up.

The reason I have a problem with

using that word now is that people have pilfered from my original compositions, Sasha's original compositions, and the bunch of us who were there at the beginning when it didn't have a name. And the imitators made it the lowest common denominator — taking elements that are easily recognizable, the breakdown, the top line, the builds, and made an entire idiom of music out of that. We were experimenting with that stuff in the early '90s when there wasn't a name for it, when it was not formulaic. It turned very formulaic and that's why I have a problem with the word "trance." Before it had a name, it was very special music.

Let's take a big leap from that period in your life to working with N'Sync last year. How did you fit into that gigantic organization?

For a start, JC, one of the guys in the band, was coming out to my live shows to watch me play with a '60s band. Funny story — my tour manager would tease me, "Your boy-band friend is here and



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USED & VINTAGE



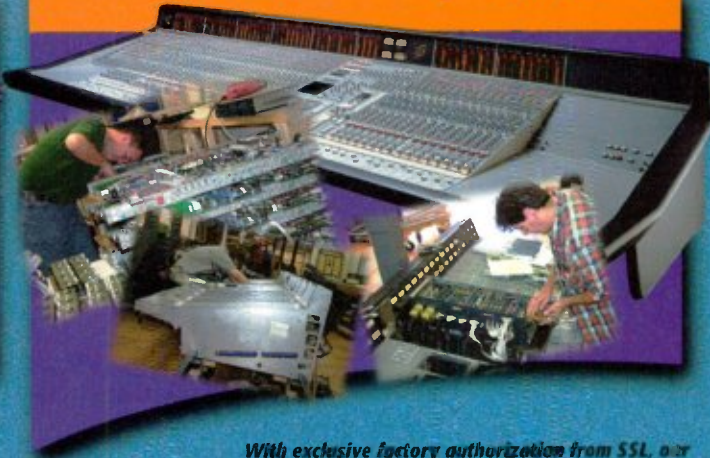
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wants to say 'hi' after the show." But I became friendly with those guys and I liked them — they are very cool people and really clued up. It was a surprise and a good lesson in judgment for me,

wanted a song that had really percussive sounding vocals. I went through a lot of cool stutter edits, which I've been developing for the last six or seven years. That's my new thing that every-

Roland vocoders, esoteric shareware programs, I did coding in Super Collider — 40+ vocal treatments and I edited together the vocal that is in the finished song. I had Justin beatbox into a pair of

old broken headphones. There are over 2,000 edits to that vocal in eight bars. I spent about two weeks editing the vocal and then built the track up around it, called 'em up, and told them to come and check it out. They were like "Oh-oh-oh!" freakin' out. We did good.

The *Fast and Furious* soundtrack has, shall we call it, an orchestral score?

Yes, it is. I wrote a lot of music for an 80-piece.

I'm interested in how you transmute writing for an orchestra to getting a couple of your buddies to beat up a car with hammers.

It's all in the vein of contemporary composers that I really like — John Cage, Karlheinz Stockhausen, and other



Add "sound library producer" to BT's list of accomplishments. Two libraries of his sample-accurate sounds are available from East-West.

because, like many people, we assume things about those involved in popular culture, things that are not necessarily true. I found them to be interesting and talented people, and they can sing like you would not believe.

So you were impressed by their vocal abilities.

Yes, and I didn't really know their music. The songs I knew weren't really my kind of music, but as people I was impressed with them, especially with their vocal abilities. So we started hanging out and when they asked me to do a song, I said no for a long time and there was a lot of arm-twisting. One night Justin called and liked my "Hip-Hop Phenomenon," which is on a version of *Still Life* — I said if you want to do something crazy like that, I'm definitely game to do it.

And that ended up as "Pop," the big single?

Yeah — it was weird. *Fast and Furious* and "Pop" were out at the same time. I had the #1 film score and the #1 pop song at the same time...it was a weird week.

Tell me a few production details for "Pop."

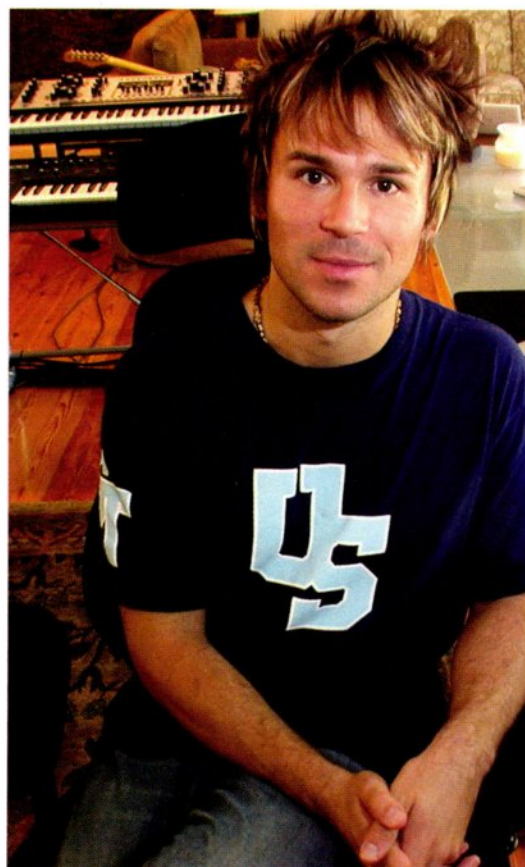
Basically, it was from the ground up. I went through a bunch of songs — I

body's ripping off. [Laughs.] I wanted percussive vocals for a stutter treatment. I came across "Pop" and felt that I could do something really interesting with it, so I started working on a track. The demo went pretty whack, but I liked the vocal a lot. So I started working on the track and writing, put that together — sort of a demo version of the track — and brought it over to the Pro Tools rig in a comfortable studio where everyone felt good, where we could track vocals. I sat with Justin and JC and recorded the vocals.

Do you do the engineering yourself?

Yeah, I do, actually. I mixed that record. When we're in the studio recording vocals, I have someone set up a mic so I can sit at the computer and coach them on the vocals. I sat with Justin and we worked on a background arrangement together. I kept getting him to sing ninths when he wanted to sing thirds. And we did some interesting background vocal stuff, recorded hundreds of takes of the material.

Then I got about the business of cutting up and editing together their vocal. I took this all back to my studio, and did about 40 vocal treatments. I ran their vocals through ring modulator pedals, guitar amps, ran them through old



rebels. My heroes inspire me to do crazy things. I also love industrial music and *musique concrete*. I wanted to come up with something thematic that was subliminal. I wrote melodic themes — obviously you have to do that for a film like *The Fast and the Furious*, but I wanted to come up with something subliminal that made the listener feel in motion, in movement, in flux. I thought it would be cool to use the noise derived from cars as percussion instruments.

What did you bang? The fenders? A carburetor?

Absolutely — we took two car chassis, a bunch of spare car parts, and dragged them into the studio. I wrote down and notated like you do for traditional percussion parts: orchestral bass drum, tympani, piatti, and all the rest. Then I sat down with my friends Curt and Allen, who are orchestral percussionists, with these car chassis. Orchestral bass drum part — let's see what we can do that will work. Improvising with car parts, we came up with the trunk. Dropping the trunk of this car sounded really good, like an 808 kick that was filtered. We used that for the bass drum. Instead of using a hand bell, we ended up using hubcaps. Instead of piatti, we used brake drums. It was a process of substitution.



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And how about processing those sounds?

I just completely smacked it, flipped it, rubbed it down in Pro Tools, and completely freaked all those sounds. I recorded everything individually so I could work on it very intensely.

What is "aleotoric"?

Aleotoricism started with composers as an extension of the whole Bartok 12-tone row thing. He was the first guy to say let's never repeat a note or musical phrase. The next logical idea after that was, hey, let's not play notes — let's play something random. That's basically what aleotoricism is, introducing randomization into a composition.

You give the players a motif or a theme, or a range you want them to play in. Grab a note and hold it, or play this phrase. At any quarter-tone, at any full-step, half-step — anywhere you want it, play it on the instrument. It just makes hideous, ugly, scary music. It's fun to do in films and it's very wild. You have to control it to an extent, and that's the challenging thing about it. Oftentimes, if you are doing a cue that features aleotoricism, the notation for the cue will actually be longer than the musical notes you write. A half-page of instructions, then a string of ten notes. It's an incredible sound when you get it right.

**Let's take a look at your racks.
Here's an Akai MPC3000 sampling
workstation....**

I love it and it's cool — I had it modded and pimped out. Mine looks like a low-rider. These come stock in gray, but I found this guy who actually paints cars as a hobby, so I had mine customized, had a Zip drive put in. It's a great piece, and, in some sort of warped way, I love it 'cause I got to put my initials on it — very rad.

Emagic Uitor8 MIDI interface....

It sends MIDI information to all my keyboards, but I don't use MIDI, *per se*, in records. I use it as a master controller to play one of my synths and then record it in as audio and time correct.

EMU XL1....

That space in my rack is always filled with some sound module that's useful when I end up using two patches — pulling a sound module out and putting another one in. If I can't find a sound and I need one, there's a quick replacement slot in my rack.

Kurzweil K2600R....

That's a rackmount sampler I had modded so it's got a two-gig drive, which is cool. I keep a lot of string sounds in it for films, although I have moved away from that and started using a Gigasampler. I use that a lot now, but the Kurzweil has some great synthesis algorithms, and I still use it for acid lines and things like that, more than sampling.

Roland JD990....

That's an old piece that is used very infrequently, but I've made some beautiful

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pads in there. If I'm looking for beds for things, I'll pull that out.

Korg O3R/W....

The O3R is one of my oldest pieces of the newer stuff. I have different groups of equipment, from when I bought gear as a kid, you know, and then there was a time period in the early '90s when I scrounged together enough money to buy that and a couple other pieces, a Zoom, a D70, and an MPC60. That's featured prominently on my first record — I did so much sound designing and programming in that little box. So, it's got some of my classic patches in it. It's a really good piece for pads.

Presonus DigiMax mic preamp....

A preamp I plug mics into for recording everything from a hammered dulcimer to guitar amps. It's a really good, clean, straight mic preamp.

Furman Power Conditioner....

That's an essential piece in the rack for every musician. If you have a spike or a brown-out, all your bits won't get fried.

Interfaces for Pro Tools....

Yeah, I've got piles of 'em.

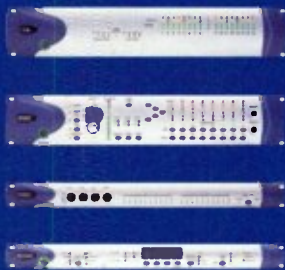
Next rack to the left: Avalon 737....

A brilliant mic tube preamp. For recording, plug a mic into it and it makes anything that you run through it sound super warm. I use that for vocals. It's just a great piece, and then below it I've got a Focusrite Red 7 — a mic amp that is solid state, and it's very clean sounding. The 737 really colors the sound, so if I'm looking to record someone's voice to

► continued on page 124



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World Radio History




Meredith Brooks
turns from artist to
producer on both her
new album and the
latest effort from
Jennifer Love Hewitt.

JUMPING BEHIND THE

BOARD

BY HOWARD MASSEY



eredith Brooks's 1997 smash hit single "Bitch" marked her as one of the new legion of female singer-songwriters unafraid to speak their mind in a male-dominated world. Unusually for this genre, Brooks is also an ace guitar player who takes great care in crafting a distinctive sound. Her blues and R&B roots are apparent in her passionate playing and singing style, and her 1999 follow-up album, *Deconstruction* (with guest star Queen Latifah), even unearthed an unlikely connection to rap and hip-hop.

Little wonder, then, that this Renaissance woman is now tackling the world of engineering and record production, not only co-producing her third CD, *Lucky Day* [Gold Circle], with veteran David Darling, but simultaneously handling sole production chores for a new Jennifer Love Hewitt album. Effusive, lively, and with self-deprecating humor, we visited her recently at her newly constructed home studio, where she enthused about the wonders of modern recording technology.

EQ: The hardest thing for anybody trying to produce themselves is knowing when to stop working on a track, knowing when it's done. What yardstick do you use?

MEREDITH BROOKS: I kind of allow the track to tell me. My story gets told through just allowing, and when I feel like I've gotten it to the place to where I really don't have anything else I want to say, then it's done. Back in the old days, when we recorded on tape, people would say, "this song's marinated" — something would seem to shift in the night. I can remember recording on ADATs and something wouldn't sound right, then the next day we would come in and it would sound so good! Probably our ears adjusted, or enough dirt got on the heads or something, but it would happen — and I believe it can happen with Pro Tools, too. There are times when I'll load a file back in and go, "It didn't come up the same as before, it came up different — and it sounds really good right now the way it is." It's just that thing when it finally gets.

What's the theme of the new album?

This new CD sure has been about exploration for me. Before, I just could not "get" recording. I used to write on my boom box with loops blaring in the background, and that was about my level of expertise. But now I've started getting into Pro Tools, and I can remember exactly when I "got" it — I'd had it maybe three days, and one morning I woke up and I was just like, "Wow!" Either I had a dream or something — I don't know what — but I walked downstairs and I just knew how to use it. It was this intuition that happened all of a sudden, and it freed

me up. I was still pretty scared — I always had lots of other people I relied on for Pro Tooling — but, all of a sudden, I could get by. So this whole album is about freedom and being more of a real producer than having it all in my head and having to express what was in my head to somebody who could actually do it. Pro Tools allows me to get in there and express my creativity by experimenting.

You know, I really believe that a good song can be interpreted in pretty much any style, and Pro Tools allows me to do just that. I have one song on the new album that I recorded so many different ways; had I had Pro Tools when I first started it, I would have spent a quarter of the time and money to get it right. Now, if I don't like the way a song is going, instead of losing everything, it can be a matter of just chopping the whole thing up to fix the problem. I can sit with this stuff forever now and make sure it's really what I want; it just saves so much anguish.

And, to me, the sounds are as much a part of today's records as the songs are, though a lot of people — especially A&R and radio people — would disagree. You can have a great song, but if it's not produced in a certain way, it won't get played on the radio. Finding all those sounds is fun, and it's also inspired me to write better.

Do you really think that if you dress up a mediocre song with great sounds, it can be a hit?

Well, I think we've heard that it can be a hit today; we have one copycat song after another on the charts. I know for a fact of one song that became #1 — and I believe it probably was a hit — but then afterwards the A&R person went in, grabbed three songs, and gave them to a bunch of producers and said, "Okay, the first one who comes up with the closest sound to her hit gets the gig." That's a lot of what goes on; I think certain songs don't get the opportunity to be a hit because they may not fit a certain format right now. It's so clear to me whenever I hear a song and somebody goes, "Oh, I just don't hear it as a hit." I have to ask the question, "Are you hearing the song as not a hit, or

JUMPING BEHIND THE BOARD

are you hearing it as not a hit because it doesn't have that hit sound?" I mean, would "Bitch" have been a hit without that hit sound?

Are you asking me personally?

Yes.

Yes, I think so, mostly because the song had a relentless hook.

Probably it would have, but when I first wrote that song it was a lot slower and it sounded, as every single song of mine does, a little country. Seriously! That's how we had it going until all of a sudden, *kaplowie!*, with all of these hip cool loops. My initial reaction was, "Oh my God! You just made it a disco song!" I went home and cried. Then somebody said, "That's a huge hit, are you crazy?" But I didn't know it was, at first.

So, can a bad song be a hit just because it has great sounds? I don't know, but I do think that a hit song can be wrecked if the production isn't right. So I don't chance it any more; I don't want people hearing my songs until they're way into a finished state. I once turned in a bad, rough mix, and had one guy say, "Hey, you're a guitar player, and I don't hear any guitars." I'm like, "Hello, I'm not a mixer." I've become everything *but*, give me a break. That's like, way in grand retirement, maybe next lifetime. I don't *want* to be a mixer; what a hard, hard job.

So you're saying that having all this gear here at home has given you the freedom to experiment without being tied to someone else's timetable or agenda.

Exactly. What I typically do is, I'll put up a beat and do my guitar and vocal. Then I'll send the file over to Colin Goldo, who is one of the main people I work with, or to Michael Bradford, or David Darling. They do all the programming stuff, because I'm not into programming. I know what I like and don't like, but I'm not good at where exactly the kick needs to go in a particular measure. I find that, by the time I spend that much time on a kick drum, I could have written three more hopefully hit songs.

Then I'll go over to Goldo's studio, where he's maybe playing around with some fun sounds or keyboard stuff. I'll

go through all of the things that he's put up, and I'll say, "Let's take this, put this here, let's try turning this around, let's put a stutter kick in here, can we do a record scratch here?" And he knows me so well now, he actually goes ahead and loads up the songs with most of those effects beforehand so I can just start pulling things out. He actually over-records that stuff now, and I'm usually the one that comes in and clears out tracks. I learned that from David Darling, who taught me a lot about leaving space and making space in different ranges for the tracks.

What's your typical guitar recording chain?

I start from the amp — most usually my Overbuilt [Clubber] or Vox AC30 or Valvetronix, close-miked with a Shure SM57. That will get routed to my [Envoice] MindPrint or dbx [386] tube preamp, and, from there, directly into Pro Tools. If I want a less organic sound on my guitar, I'll use the Johnson [Marquis]. But I've been really into my Hughes and Kettner effects pedals. I use them and my E-Bow to death.

You know, in putting together this

studio, there is one area where I probably screwed up a little bit. I kept thinking, "It's just going to be a writing studio, I'm not going to make this the real thing." And, of course, as I got into it, I found that it absolutely *is* the real thing. It makes me wish I had Neve and Avalon and Manley preamps, which I am definitely going to invest in next, and probably go up to a Neumann vocal mic, although I have to say that I'm totally shocked at how much I love the Shure KSM44 on vocals. I also do a lot of vocals on the [AKG] C12 or on Neumanns.

Do you use plug-ins for effects?

Oh, sure. I love Reverb 1 on my vocal, and I love the Bomb Factory LA-2A. If I have to use a de-esser, I do, but, for me, Autotune doesn't work. I either sing in tune or forget it; I've never really not been able to sing in tune, anyway. So if I'm a little off, it's faster and better for me to just go in and nail it. There are also a couple of spots where I'll use Amp Farm; for example, if I laid something down and it wasn't quite dirty enough, I'll go in and use Amp Farm to beef it up.

Meredith Brooks Home Studio Equipment List

RECORDING GEAR

- Apple Power Mac G4 450 MHz Computer
- Magma 7-slot expansion chassis
- Digidesign Pro Tools 5.1.1
- Glyph 18 GB hard drive [5], 9 GB hard drives [3]
- MOTU MIDI Timepiece AV
- Alesis ADAT XT20 [2], BRC
- TASCAM D-30 MKII DAT
- Mackie HUI, HR284 monitors

PREAMPS

- Envoice MindPrint tube preamp
- DBX 386 dual tube preamp

KEYBOARDS AND TONE GENERATORS

- Akai MPC 2000XL, S6000
- Korg Karma, MS2000
- Roland MC303 groovebox

EFFECTS

- Johnson J-Station
- Electrix Filter Factory, Warp Factory, EQ Killer
- Alesis MIDverb 4, Q20, 3630 compressor
- Behringer Composer

MICROPHONES

- AKG C-12, SolidTube
- Shure KSM44 [2], SM57A, Green Bullet, VP88, SM58, Beta 87 [2], Beta 52 [2], Beta 56 [2], Beta 58 [3], A98D [3], SM81LC [3]
- Audio-Technica AT4033A
- CAD VSM-1

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- BLUE Microphone Blueberry mic
- Sony C800G mic
- Neve 1073 preamp
- Avalon 2044 compressor

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Shania Twain
Andrea Bocelli
Pavarotti
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MTV Music Awards
Jimmy Douglass
Los Angeles Philharmonic
San Francisco Symphony
Cleveland Orchestra
Baltimore Symphony
Seattle Symphony (24 ch)
Houston Grand Opera
Berlin Philharmonic
Czech Philharmonic (32 ch)
Dallas Symphony
New World Symphony
La Scala Opera House
San Francisco Opera
L.A. Opera
Hollywood Bowl (54 ch)
Kennedy Center
Paramount Pictures
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Sony Pictures
The White House
Bruce Swedien
Bob Clearmountain
Walter Afanasieff
Frank Serafine
Marc Anthony
Les Paul
NPR (80+ ch)
Keith Jarrett
Clair Brothers
Hans Zimmer
Walter Becker
Harmonia Mundi
George Benson
Koch Intl
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Muscle Shoales Recording
Record Plant
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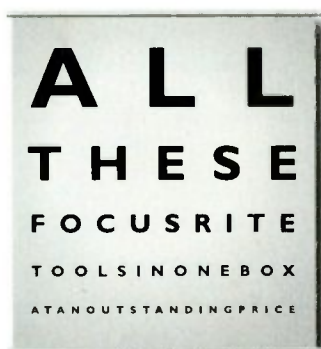
What mics do you use on acoustic guitar?

I use the Shure KSM44, and I've tried the CAD [VSM1] — I use that on my voice, too, as a matter of fact. The Audio-Technica 4033A is a really good mic. Mine was a present from Randy Scruggs. I said to him, "I need a good mic that isn't ridiculously expensive" — that was back when I thought I was just going to have a writing studio! I use that

sometimes on my guitar, but I'm not as picky about acoustics because I never feature them and I do EQ them to a place where they're fine.

One thing I do is that, after I've laid my drums down — because this is all about drums and bass, after all — I will go back in and redo acoustic guitars, because you've got to lock them into those drums, you've got to have that sway. It's a magical moment, it's a communion.

That's another thing that David Darling got me into. He always thought there was something in my first or second take — when I was just screwing around — that I would never do again. And you know, I love those guitar solos where you're saying, "Oh, are they going to make it?" They're just not Yngwie; they're more moments of jazz. You just fall and flop into it. David and I used to have arguments: "I'm not letting that stay on my record." He'd say, "Let's come back to it in two weeks." And sure enough I'd listen to it, and go, "Oh my



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god, that's amazing! How did I even make it? That's so cool."

What do you see as being the difference between demos and masters?

Nothing. These days, there is no difference. The vocal on "Bitch" was my scratch vocal. And so was the guitar; we never could beat it. A lot of the keepers on this album come from my walking over to Goldo's on a certain day and just happening to sing. A lot of times, when I'm sitting there getting an overdub ready for him, those guitars

and those vocals are what ends up staying the best. I try redoing them, and then I start to think, "Why am I redoing this?" They become the comp track, the main track I use. It's made me realize how important it is to use really good equipment — and don't ever plan on things not being keepers.

What made you decide to go with the Mackie [HR284] monitors?

The first time I heard these were at

Michael Bradford's. I had some other speakers here, and every time I'd come back from Bradford's I would hate my mix so much. I asked him, "Why doesn't this sound good?" and he told me, "It's because you have really crappy speakers." [Laughs.] So I tried these out and I just became addicted to them. Half the people that I work with use these now.

But isn't a good mix supposed to



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sound good even on crappy speakers?

Yes, it's nice if you're mixing here and you take it to any speaker and it sounds good. But I wasn't getting that experience. Though, I have to say, the other day I was at Goldo's — he now has my old speakers that I hated so much — and we put up a mix and my voice sounded so honkey, I kept EQ'ing it to death. Then we listened to the mix on his Genelecs, and it sounded okay, but there was too much bottom; it was just boomy. I said, "Let's not touch this, because it sounds good on these two sets of speakers — one that's completely high-end and one that's completely low-end." And you know what? It was awesome when I got the mix back here. Plus my car has the worst speakers on earth, so if the mix sounds good there, it will sound good *anywhere*. But I do like to hear the truth, so I love these speakers.

With the benefit of hindsight, what were the biggest mistakes you made

when putting together your home studio?

Well, I'm not sure you can avoid mistakes, because a lot of getting to the place I'm at, where I'm completely comfortable, came from making the mistakes. As in playing or writing, you have to keep looking at the failures and the things that don't work and then grab the things out of that day that *did* work. For me, it was so simple. Whatever happened for me with Pro Tools contributed to the next level of me being an artist. That's because I felt very stuck not being able to record myself. It was too complicated; there were too many things to turn and twist. I still don't want to be the engineer, but I'd like to know what these eighteen parts sound like together. And I don't want to have to mic every single thing every single time; I want it to be very simple.

I don't know what it is for me, but I just understood Pro Tools, almost right

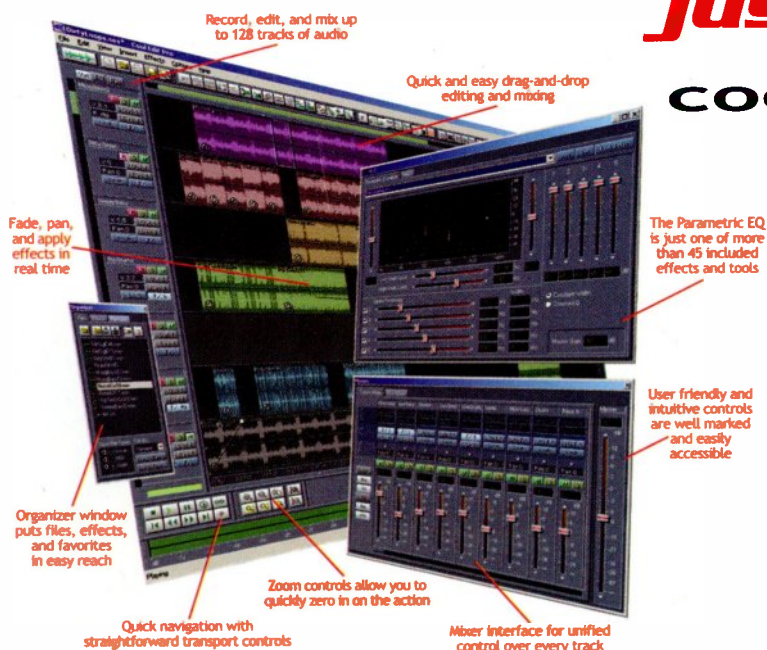
away. Maybe it's because I'm a visual person. I had thought the simplest thing was going to be getting the ADATs all hooked up to a BRC; really, it is easy. But it just left me rolling tape back and forth. It took me too left-lobe; it took me way too technical. But I don't leave my creativity when I'm recording on Pro Tools. I'm right with my creativity; in fact, I go to *another* level of creativity. Now, when I get bogged down, when there's a problem, I'll just turn away from it and maybe work on a lyric for a few minutes or something. I'm very much into protecting my mode. But usually with this stuff it's left-lobe or right-lobe. It's hard to flip back and forth, but I seem to be able to do that very easily.

How did you get hooked up with Jennifer Love Hewitt?

She had apparently gone to her publisher six months earlier to listen to some music that Brian McKnight and I wrote. The publisher loved it for her,

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and they loved the production. I guess two words into it, she said, "Who is this?" and they said "Meredith Brooks," and she said, "I want a meeting with her." [Laughs.] I don't even think she heard the song through! So we got together and we started writing together the very first day.

Are you playing guitar on her record, too?

Oh, yeah. I've been playing on it, but what I really enjoy is just producing. I've been doing most of the engineering on it, too. In the beginning, I was using some engineers, because there's a part of me that doesn't like to produce and engineer at the same time — it's harder to listen. But the translation time became more frustrating, so, for the most part, I just go ahead and do both now.

I discovered that Jennifer doesn't like to sing in a studio; she prefers just being here in my little vibe. We tried her in a couple of big studios, but she had a bad experience from the past, so we built a retractable vocal booth here for her to sing in. What's interesting is that we did a mic trial on her, and we're pretty much opposite in the mics that we use. I mostly use an AKG C-12, which is great on my voice, but it's not great on hers. But here's the craziest thing: We put up, oh, ten mics one day, including my Audio-Technica 4033A — and I listened to them blind, because I didn't want to know which mic was which — and the two mics that sounded the best were the Sony C800G and the Audio-Technica. [Laughs.] And the Sony is a \$10,000 mic! So if we're down for a day and I don't have that mic available and I need to fill in a little piece or a background or whatever, I pull out my little Audio-Technica.

Have you found the transition from artist to producer/engineer to be a difficult one? Does this mark a whole new career for you?

I don't know. I don't know if I'll ever find another Jennifer or someone that will intrigue me that way. It's been a challenge to be the producer and wear this hat and have to deal with a record label on a corporate level — to do the business thing. And I do feel incredibly

protective of her, and I now understand why other people have been that way with me in the past. So it is an energy — it's like building a muscle. You know, the first couple of rounds would exhaust me, and now I feel pretty much in my game.

It's not that I'm not loyal to the label, but I will never *not* be loyal to my artist first. I understand that the label is going to want certain things: they are going to

want to make hit records and make money. I have learned that you either make money or you don't for them. There are very few labels — if any — that want an artist because they want a creative entity, and that goes for independent labels and new age labels, too. Certainly there are very few major labels that go, "Yeah, we don't really care if you have a hit — we just want your art, man." [Laughs.]

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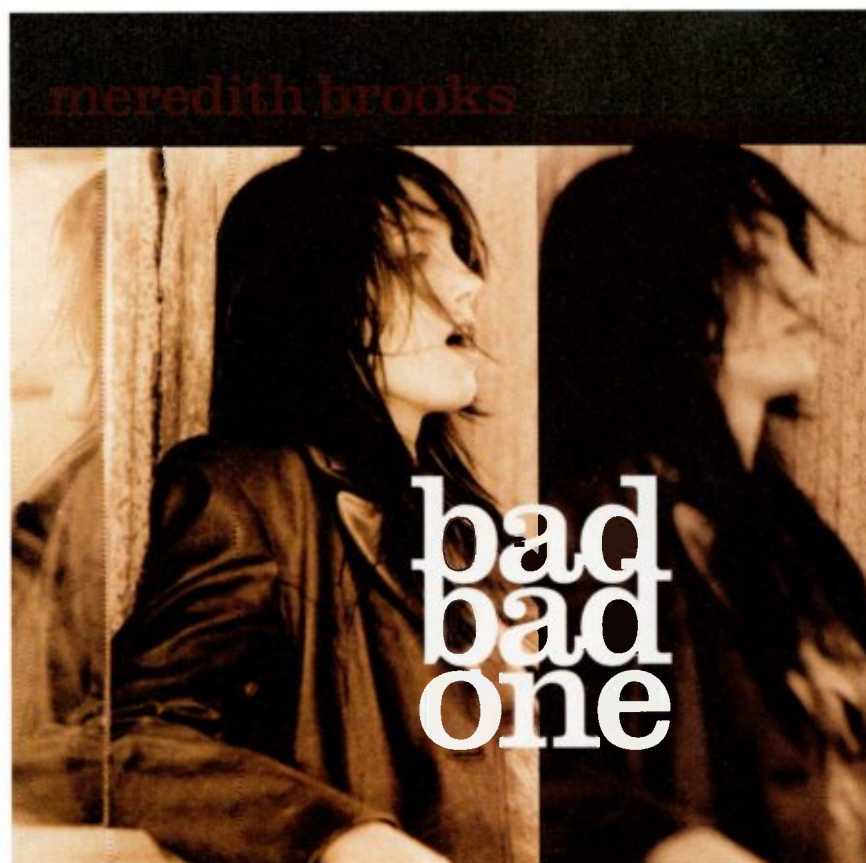
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JUMPING BEHIND THE BOARD



You're talking about balancing the aesthetic considerations of the artist with the commercial considerations of the record label.

Absolutely. I just spoke at a lawyers convention, of all things, which is kind of crazy, but my speech was about the relationship between artists, managers, and lawyers. What I was saying was, "Look, we need to form coalitions. We need to be together, not at odds, because if your artist quits making money, you quit making money, bottom line. You've got to learn to help your artist create, and the artist has to become educated, so that the managers and the lawyers and the labels feel that they can talk to them in an educated way." But as soon as we start saying things to our artists that put these pressures on to become commercial, we will shut down as artists. I've seen this not only with me in the past, but also with the artists that I'm working with — not just Jennifer. I just hope that they talk to me first,

because as soon as anybody starts thinking, "I have to write something in a certain way," it's over. Great music becomes a hit because there's something that appeals and is connecting with other people. If you can't be in that space where you can find out what you feel because you're in so much fear of writing the next hit, you're not going to write it.

It seems like you're almost doing a Prince kind of thing now — first you produce your own album as an artist, and now you're producing other artists.

It's really awesome, too, because the thing with Jennifer is that she can say things and be things and do things that I can't, and that gives me so much freedom to be a different way and to get all this other creativity out of me. Another interesting thing is that I'm co-producing my album with David Darling, but I have no problem being the sole producer on Jennifer's record. For me, as the artist, it's hard to be that

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objective. When you're by yourself, sitting there for the fifteenth hour working on a vocal or a guitar or comping tracks, getting them nice and neat and ready for a mix, burning files, it is not glamorous — it's lonely! And for me, as the artist, I don't want to feel that way. There's a point where I just want to turn that over so I can still feel like I want to be creative. But when you're the producer, it's *all* a bunch of detail, busy work. [Laughs.]

It's got to be hard to be objective about yourself as an artist.

Yeah, it's hard. I do pretty well when it comes to the guitars, but when it comes to vocals, I'll lay down six or seven tracks and I'll comp my version, and then David will come in and he'll do a version. And usually it will be a combination, or he'll say "Do it again." On my own, I wouldn't have thought to do it again, and now that I have Jennifer, boy, am I a lot more respectful to people that work with me, because I understand that they're trying to be there to get me to do my best.

Now that you've sat in both chairs, it's easy to see.

And I wouldn't trade it for the world! [Laughs.] More has been revealed and opened up to me in this past year than I ever expected would happen. And now that I'm in my little creative cocoon, I'd have to say that most of the time, I'm happier than I've ever been.

So it's not true that you have to have a broken heart to write great songs?

Well, you can write great songs if you're happy, too. I'm more creative when I'm happy. After September 11, I was hardly able to work. It was so difficult, partially because every word felt different, and deeper. The one thing I did do was I jumped right back into my album and looked at where it was at: Was this the album I really wanted to put out in my life? I saw that it was, and in many ways it meant more — it was closer to the way I was feeling than I even had realized.

Howard Massey's latest book, *Behind The Glass*, is a collection of interviews with record producers, now available from Backbeat (Miller-Freeman) Books.

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DIGITAL'S DARK SIDE

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THE (IN)HUMAN INTERFACE. Computer-based systems lose the rich physical interface that provides the immediacy of instant control associated with conventional mixers and signal processors. Fortunately, manufacturers are responding to this need with control surfaces designed specifically for audio work, but many of these aren't universally compatible, working only with specific programs.

WINDOWS HIDING WINDOWS HIDING WINDOWS. Another consideration is that if you're using a computer for everything, you need a lot of screen space to show all the windows you'll be opening — you can't just scan a bunch of hardware control surfaces. One choice is a huge monitor, but a more space-efficient (and potentially pricey) option is to use multiple flat-panel LCD screens. Both Mac and Windows machines can drive multiple monitors (although the Mac does so more elegantly).

THE LATENCY PROBLEM. The most serious issue of all is latency (delay through a system), a limitation that affects all digital systems. There are really two delay issues: audio delays and delay in control response.

Unlike analog audio, it takes time for a digital system to analyze a signal, process it, and play it. Therefore, it may take several milliseconds before the input appears at the output. Some of the worst offenders are consumer-oriented sound cards: if you're recording and monitoring your input signal through the sound card, delays may exceed 100 ms. Better drivers can greatly improve matters, although the general workaround is to monitor the sound card input while recording. However, matters aren't always this simple; some software recorders attempt to compensate for latency by positioning a newly recorded track slightly early, so it aligns with what you were hearing through the monitors while overdubbing. Therefore, you may have monitoring problems that disappear on playback.

Plug-ins are theoretically useable "live," where you send a signal into your computer, process it with the plug-in, then send it to the output. But unless you have a fast computer teamed with a sound card that uses efficient drivers, you'll notice an input to output delay. If this exceeds more than a few milliseconds, you'll find the delay annoying at best, and a "feel-killer" at worst.

There is one place where digital solves delay problems: software synths are driven by MIDI data, but don't have to go through any external MIDI interface, which gives far tighter timing than external boxes. But if you want to tweak the synthesizer's knobs while you play, you may find that the controls have a sluggish response. Again, a faster computer will help, but it's hard to have the same kind of immediacy you get with analog gear.

The best way to reduce latency is with efficient sound card drivers. The ASIO protocol, developed by Steinberg, typically cuts latencies to barely noticeable levels. WDM, Microsoft's kernel-level driver, is also blazingly fast. With either protocol, the right audio I/O hardware and computer can render latency close to undetectable.

QUANTIZATION. Although digital cleans up analog problems such as hiss, it brings its own baggage. Because controls are quantized into steps, sometimes you can hear audible "stepping" or "zippering" when changing a parameter. This isn't an issue with analog. Also, subtle, difficult-to-measure problems can occur due to unstable master clocks, bad circuit board grounding, and a host of other gremlins. Like analog gear, digital gear needs very careful design to reach its fullest potential.

BEWARE OF HYPE. Did you know there is no such thing as a 24-bit converter? Sure, it says it's 24-bit, but show me a converter that delivers a true 144 dB of dynamic range (the theoretical maximum for 24 bits). It's more likely that the 24-bit converter delivers more like 19 or 20 "real" bits. And if there's clock jitter, the fidelity will be degraded in a way that all the bits in the world can't fix.

The bottom line is the same as always: use specs to *guide*, not judge. Converters with the same specs can sound very different, and they can also be affected by such esoteric factors as circuit board layouts. If you've educated your ears, trust them: you can hear things that test equipment can't.

BUYING THE WRONG HARDWARE. Betting on the wrong horse can leave you with a system that's incompatible with the rest of the world and has little, if any, resale value. (If you bought an eight-track reel-to-reel tape recorder the day before the Alesis ADAT was announced, you know exactly what I mean.) Another issue is support: when a piece of gear creates a new standard, how do you know that other manufacturers will support it? Certainly, the world would be a very different place if software developers had decided that Digidesign's TDM bus wasn't worth supporting. With the accelerating pace of technology, you have to be part soothsayer and part business analyst just to make sure you get your money's worth from your investments.

Of course, the bright side is that, if something works, it will (hopefully) continue to work in the future. For example, I have a Power Computing Mac clone that runs PARIS 2.0. Even though Power Computing's Macs are a distant memory and E-mu recently announced no further hardware development for PARIS, the system still does what it did when I bought it. But it has no future, and at some point, there will be no parts to keep it alive — assuming, of course, that it will be worth keeping alive in a world where it will have been eclipsed by newer technology.

Or consider Seasound's cross-platform computer interface. Although there still isn't anything quite like it on the market, the company is out of business, making driver support for OS X or Windows XP highly unlikely. The issue of drivers in general is particularly problematic, because companies can be torn resource-wise between developing drivers for new products, and supporting a dwindling base of older products. If you want to avoid having a bunch of expensive doorstops sitting around, learn how to foretell the future. And when you figure that out, write and tell us all how you did it!

DUTY NOW FOR THE FUTURE? A major concern with digital media is playback device compatibility and longevity. If the Dead Sea Scrolls had been recorded in a proprietary digital format, we'd probably still be trying to translate them. We can play back wax cylinders from the late 1800s, but will we be able to play back CDs in the year 2100? Already, if you have data on 8-inch floppy disks (which were the dominant personal computer storage format 25 years ago), you're going to have a very hard time recovering it.

But the source of the problem — digital technology — also holds the solution. Older formats can be cloned to newer formats; for example, the handwriting is on the wall that, eventually, you'll likely want to archive your CDs as DVDs. Also, thanks to digital, you can make multiple backups and do offsite backup, just in case. Maintaining media in the digital world requires some vigilance, though — you have to make your clones before the media you're cloning develops problems.



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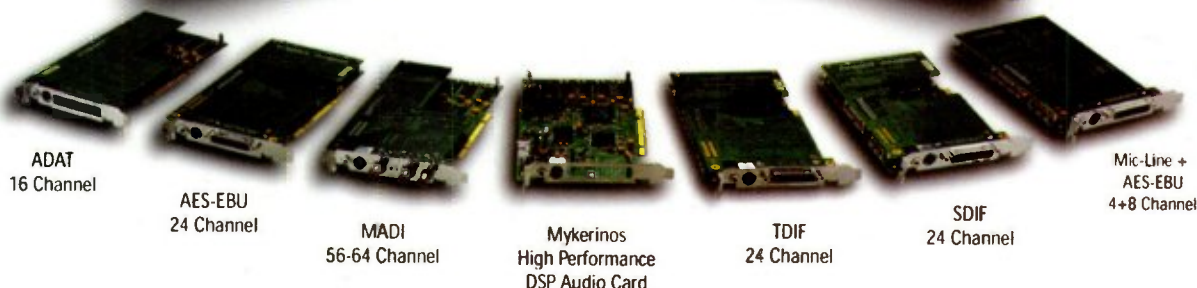
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16-bit resolution has been the digital audio standard, with 32 kHz for most digital broadcasting applications and 48 kHz for some pro audio and video applications. Now, thanks to surround sound, we're being hit with a bunch of standards: acceptable surround formats can use 16-, 20-, or 24-bit resolution, and a variety of sample rates up to 192 kHz. Because the high bit resolutions and sample rates devour storage space, a variety of data compression schemes have been devised, with the two main (and non-compatible) contenders for digital audio being Dolby Digital (AC-3) and DTS. AC-3 uses higher compression ratios, and DTS claims to be more hi-fi, but the jury is still out as to which will prevail.

Even the audio delivery medium of the future is in question. There's now a set of standards for DVD-Audio, but Sony and Philips are pushing their Super Audio CD. Cynics point out that this may just be an attempt for these companies to continue picking up royalties on the CD format, but, in any event, there's another format battle shaping up.



The computer-based, all-digital studio got a major boost when Steinberg's VST 1.0 spec integrated plug-in signal processors with sequencers. Later, VST 2.0 added software synthesizers to the mix.

But that battle may be moot: it seems the most popular new format is MP3, which implies that consumers care a lot

less about fidelity than about convenience and the ability to customize their choice of tunes. It's weird that while

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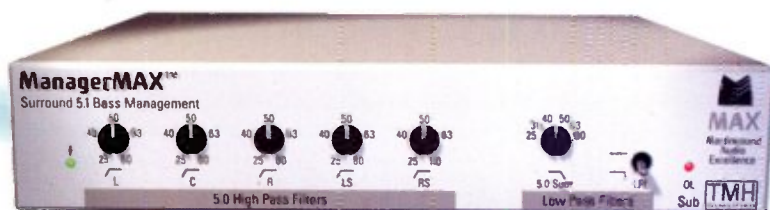
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EQ0203

some factions are trying to dumb down audio via data compression (MP3, MiniDisc, RealAudio, etc), others are looking for super-fidelity.

So what does this mean in your own studio? For some reason, people think this is a cut-and-dry situation — either you're 16/44.1, or 24/96 (or even 24/192). But step back for a second and look at history. When 24-track analog recorders appeared, some people bought them, but other people carried on with their 8- or 16-track machines. Some studios went for top-of-the-line Dolby SR, while others stuck with the much less expensive Dolby B. The point is that we must never lose sight of the fact that what you record is vastly more important than the recording medium itself. Don't feel you ever need to upgrade just for the sake of upgrading. Make sure it all makes practical and economic sense.

Ideally, of course, you have an unlimited budget, unlimited storage space, and hardware that requires no compromises for high-resolution audio. But few people fall into that category. It's important to remember that, for the moment, high-resolution native audio will stress your computer (which means reduced track count, fewer plug-ins, etc.), or, if done in a hardware box, will be more expensive than 16/44.1. Fortunately, many devices let you choose between lower and higher sample rates/resolutions, so use the technology that's most appropriate.

For example, if you're remixing a

dance tune where the meters seldom go below -20 and there are lots of tracks, high-resolution audio would probably be overkill. But if you have an audiophile-level mic and preamp to record a beautiful classical guitar, by all means go for 24/96 or beyond.

Incidentally, if you can't afford to go full 24/96, but only one or the other, most engineers would agree that 24-bit resolution is more important than a higher sampling rate.

THE IMPORTANCE OF WORD CLOCK

Word clock is a protocol that ensures digital audio remains in sync. This has nothing to do with SMPTE, MIDI TimeCode, or other position-related synchronization schemes (e.g., is my hard disk recorder at the same bar and beat in the song as my MIDI sequencer?). Instead, word clock makes sure that all the sample rates for various pieces of gear are in sync, and is one of the most important factors in having a good sounding digital studio.

As to why this is important, consider a scenario where two devices with digital outputs feed two digital mixer inputs. In order to transfer the audio into the mixer, the mixer has to listen to the digital output and detect each clock cycle so that it receives the audio properly. However, with two different outputs, which does it follow? If they drift even slightly out of sync — and they will — there will be ticks, pops, and other problems due to

THE ULTIMATE DIGITAL STUDIO ACCESSORY?

You'll need several accessories for an all-digital studio: a good set of A/D and D/A converters, a "human interface" for your audio/sequencing software that can also control MIDI gear, outboard compressors and equalizers to complement your computer's plug-ins, format converters (e.g., S/PDIF to two channels of ADAT lightpipe, ADAT to TDIF, two channels of ADAT to AES/EBU, etc.), and a digital patchbay. So why not just get a digital mixer instead?

A digital mixer is a collection of modules whose most common (but not only) configuration is as a mixer. The converters can interface analog signals with all-digital sound cards, and the mixer can offload lots of processing from your computer by providing EQ and dynamics control (and sometimes even other effects). To top it all off, you can move real faders to change levels instead of mousing around on a screen. Some mixers even let the faders serve as MIDI controller generators, which is great for programming MIDI-controlled gear.

Digital mixer prices have fallen dramatically. Older models are sometimes being blown out at under half-price, while newer models are cracking the sub-\$2,000 price barrier. Before you go too far in putting together a studio, do a reality check and consider whether a digital mixer will be more cost-effective than getting a pile of outboard modules.



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the audio not being transferred precisely at the "tick" of each clock.

A master word clock source generates a stable clock frequency and connects to each piece of digital gear's word clock input. This ensures that all clock frequencies are locked precisely, so each one sends and/or receives the audio stream at exactly the right time. Typically, word clock signals are daisy-chained, with the master clock out feeding one device's word clock in, whose word clock out then feeds the next device's word clock in, etc. Usually the final word clock input needs to be terminated, typically with a 75-ohm resistor (although some use "active" termination, which minimizes reflections on the line).

Unfortunately, some devices don't have word clock in on the assumption that they will always be the word clock master. If only one device has to be the master, then everything else can slave to it. But if multiple devices (such as

synthesizers with digital outs) all want to be the master, you're in trouble. In these situations, the simplest solution is often to simply to use analog connections instead of digital ones.

RESOLUTION: NOT JUST ABOUT INS AND OUTS

In 16-bit systems, it's not unusual to see a spec such as "24-bit internal processing." Twenty-four-bit systems might boast "32-bit floating point internal processing," "64-bit internal processing," etc. Why bother having a bigger bit resolution for internal processing when the input/output resolution is far less?

This higher internal resolution is needed because, during processing, data is subject to mathematical operations such as multiplication, division, etc. These operations can produce numbers that need more bits to be properly expressed — for example, if you multiply 4 X 4, even though these are single-digit numbers,

you need a two-digit number to store the result of 16.

If the system doesn't accommodate the higher resolution, then the number gets rounded off. A single round-off isn't going to make a big difference in the sound, but the more times it gets rounded off, the greater the chance to introduce errors. Back in the days of 16-bit systems with 16-bit internal resolution, doing multiple operations (changing level, normalizing, adding dynamic processing, EQ, etc.) could produce a sort of audible "fuzziness" if enough round-off errors accumulated to be significant — and it didn't take many operations to affect the sound.

As a general rule of thumb, the higher the internal resolution, the better.

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outputs audio at 24 bits...but, generally, the result ends up on a 16-bit CD, which means you have to get rid of eight bits somewhere along the way.

Cutting off the last eight bits is called *truncation*. Truncation removes the very lowest end of the dynamic range; during long fades, reverb tails, and the like, at some point the signal just ends abruptly rather than fades out. At the end of the decay, you'll also hear a slight buzzing as the least significant bit, which tries to follow the audio signal, switches back and forth between 1 and 0. Of course, there are varying levels between that "on" and "off" condition, but the resolution simply isn't there to reproduce those changes. This buzzing is called quantization noise, because the noise occurs during the process of quantizing the analog audio into discrete digital steps. Even though this noise is very low-level, it can still add an unpleasant fuzziness to the sound.

The dithering process adds random noise to the lowest eight bits. This noise is different for the two channels to maintain stereo separation. (Technically, we're *re-dithering* the output because some dithering may have already occurred internally in the system, but this is a fine point, and we'll continue to refer to the output process as dithering.)

Adding noise to the lower eight bits increases their amplitude and pushes that information into the sixteenth bit. Therefore, the sixteenth bit no longer correlates directly to the original signal, but to a combination of the noise source and information present in the lower eight bits. This reduces quantization noise, providing in its place a smoother type of hiss, modulated by the lower-level information. The most obvious audible benefit is that fades become smoother and more realistic, but there's also more sonic detail.

Normally, adding hiss would sound like a really dumb thing to do, but this is where psychoacoustics comes into play. Because any hiss is constant, our ears have an easy time picking out the content (signal) from the noise. We've lived with noise long enough that a little bit hanging around at -96 dB or so is tolerable, particularly if it allows us to hear a subjectively extended dynamic range.

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However, there are different types of dither, with varying degrees of audibility. For example, the Waves IDR (Increased Digital Resolution) system has two types of dither. One is wide-band, and trades off the lowest distortion for slightly higher perceived noise. Another uses a much narrower band of noise and sounds quieter. However, some extremely low-level distortion remains.

One way to minimize the audible effects of dithering is called *noise-shaping*, which distributes noise across the spectrum so that the bulk of it lies where the ear is least sensitive (i.e., higher frequencies). Some noise shaping curves are extremely complex — they're not just a straight line, but dip down in regions of maximum sensitivity (typically the midrange).

Different manufacturers design different noise-shaping algorithms. Digital audio editing programs sometimes offer variations on their dithering and noise-shaping algorithms so you can choose the combination that works best for different types of program material. Suffice it to say, not all of these algorithms are created equal, nor do they all sound equal. They can involve tremendously complex calculations using very high internal resolution (64 bits or more), and some systems need to do this offline — real-time auditioning isn't really practical.



Several companies have decided that the future of samplers is inside computers, either as stand-alone devices or virtual instruments. Kontakt from Native Instruments is one of the latest ones.

The main rule about dithering is not to dither more than once. Dithering should happen only when converting your high bit-rate source format to its final, 16-bit, mixed-for-CD format. If you're given an already-dithered 16-bit file to edit on a high-resolution waveform editor, that 16-bit file already contains the dithered data, and the higher-resolution editor should (hopefully) preserve it. When it's time to mix the edited version back down to 16 bits,

simply transfer over the existing file, without dithering. The results will likely sound better than if you re-dither a second time.

Another possible problem is if you give a mastering or duplication facility two dithered, 16-bit files that are meant to be cross-faded. Cross-fading the dithered sections could lead to artifacts; you're better off crossfading the two, then dithering the combination.

FUN WITH HARD DISK DELAY

Hard disk digital audio editing techniques make it easy to create echoes: just copy a track and shift it later. However, you can also take this process one step further, and choose specific phrases, or even individual notes, to echo.

For example, suppose you're processing a solo guitar part that alternates between stark, accented notes, and riffs of faster notes in between. You could use onboard DSP to add echo, but while the accented notes will sound great when echoed, echoing the riffs could muddy the overall sound.

The solution is to create a track that contains only those notes that sound good when echoed. Here's how to do it:

1. COPY THE ORIGINAL TRACK
2. CUT OUT THE RIFFS YOU DON'T WANT ECHOED
3. ADD SLIGHT (3-4 MS) FADE-INS AND OUTS TO THE REMAINING SECTIONS TO PREVENT CLICKS OR POPS
4. SHIFT THE EDITED TRACK LATER IN TIME TO WHEN THE FIRST ECHO WOULD NORMALLY HIT, AND ALSO FEED THE ONBOARD DSP TO PROVIDE ADDITIONAL, REPETITIVE ECHOES.

The overall effect should give some nice echoes, but retain a sense of space.

DIGITAL TRANSFER PROTOCOLS

If you need to get digital audio from one place to another through a cable, several standards have evolved to meet that need.

S/PDIF (Sony/Philips Digital InterFace) is a "consumer" stereo digital audio transfer protocol. It uses coaxial wire with RCA phono jacks or optical cable. Although it can carry 24 bits of information, in consumer gear four of those bits are usually reserved for such things as the Serial Copy Management System. This effort to thwart piracy prevents making a digital copy of a digital copy, which can be disaster for the studio if you've digitally copied a bunch of tunes to

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something like DAT, then want to make a safety copy. As a result, "pro" or "semipro" gear that uses S/PDIF generally ignores SCMS, and allows using all 24 bits for audio transfers. While this works fine when transferring between 24-bit S/PDIF devices, occasional problems have been reported when transferring from pro to consumer gear.

The **AES/EBU** (Audio Engineering Society/European Broadcast Union) standard is the "professional" stereo digital audio transfer protocol. It's usually implemented with wire using balanced XLR connectors (although other types of connectors show up sometimes), allowing longer cable runs than S/PDIF. Optical connections are also allowed, but rarely used. Interestingly,

most AES/EBU and S/PDIF I/O is designed with enough room for error that the two can "talk" to each other as long as you have suitable adapters to accommodate the different connector types.

The **ADAT Optical Interface**, originally designed to transfer tracks among multiple Alesis ADAT digital tape recorders, is an eight-channel digital audio transfer protocol that works only with optical cables. Over time, this interface has become a pretty much open standard, and you'll find hard disk recorders, mixers, synthesizers, sound cards, and other digital devices sporting the optical interface (also called "lightpipe") connector.

TDIF is TASCAM's answer to an eight-channel digital audio transfer protocol, and was introduced originally in their DA-88 digital audio tape recorder. It uses wire only, and, like the ADAT lightpipe, often shows up in other pieces of gear. For example, virtually all digital mixers offer TDIF interface cards (often as an option) so you can hook TASCAM digital tape ins and outs directly into the mixer.

All of these standards are relatively old, although they continue to be relevant. However, newer options are on the horizon. Yamaha's **mLAN** protocol, based on the IEEE-1394 ("FireWire") interface, accommodates digital audio and MIDI with a digital network. Furthermore, both Windows and Mac computers can communicate digital audio over USB, and interfaces that communicate with computers are widely available in both FireWire and USB formats. Gibson also has an entry in the digital interface race that's designed specifically for musical applications.

In addition, there are converter boxes to translate from one format to another. One popular type is the ADAT <> TDIF box, or S/PDIF optical <> S/PDIF electrical. These are all pretty painless to use — they take about as much technical smarts as hooking up a direct box to a guitar.

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Hugh Robjohns, *Sound On Sound*, March 2002



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Steve La Cerra, *EQ*, May 2002



M177

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Tim Lawrence, Live Sound Engineer for Usher, Steve Earle, CCR (Creedence Clearwater Revisited) and Ritchie Blackmore

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John Tristao, Vocalist, Creedence Clearwater Revisited



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World Radio History

SURVIVING IN THE ALL-DIGITAL STUDIO

is slightly different. One metering problem relates to making the transition from analog to digital. Suppose you replace your analog mixer with a digital one, and you notice that signals that used to register at 0 VU now show up at around -12 or -15 VU. What happened? Simple: with an analog mixer, clipping does not occur at 0 VU. Instead, you have at least 10-20 additional dB of "headroom" to accommodate transients without distorting.

Digital gear has no headroom; above 0 VU, clipping occurs — period. If digital 0 VU matched analog 0 VU, then the signals that exceed analog 0 VU would cause major distortion. By ratcheting down digital 0 VU, the digital gear provides the equivalent of headroom when being fed by analog machines. In an all-digital environment, this is not an issue,

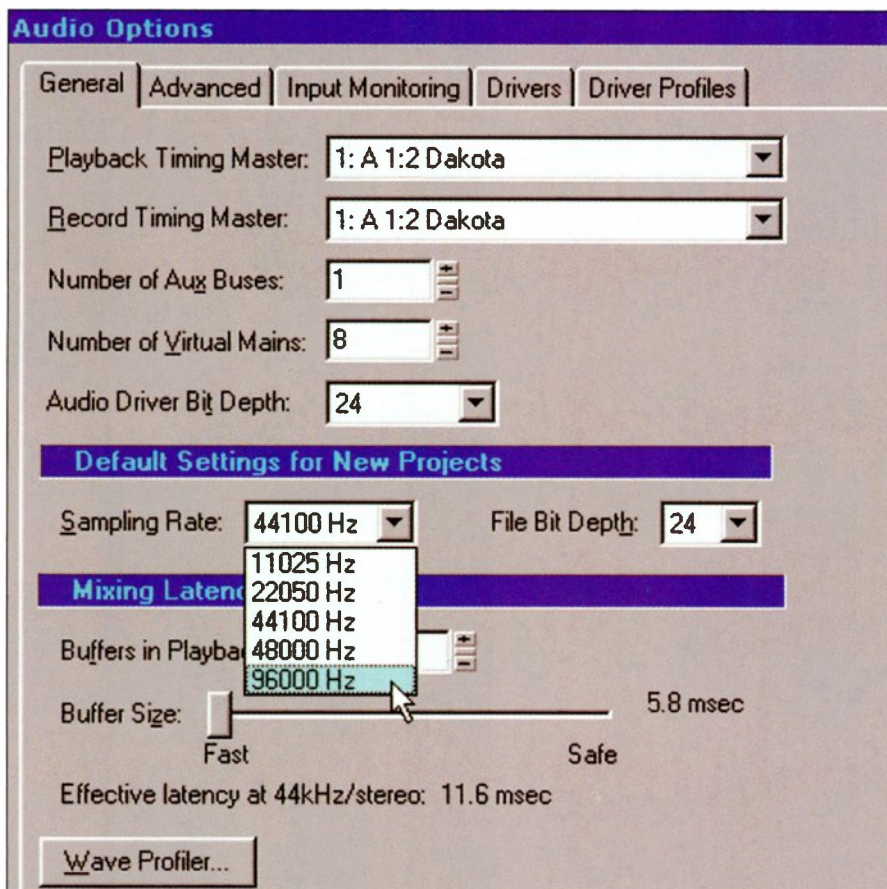
as long as all your digital gear is calibrated accurately.

But there's no guarantee that's the case. Although digital signals are very precise, there is a surprisingly great deal of "slop" among various audio devices in measuring those signals. Feed a "full code" (maximum possible level) digital signal into several digital audio devices, and you'll be lucky if they all read the same.

Why is this? First, engineers sometimes build in a slight "margin of error" so that the clipping indicator actually fires at around something like -6 dB. This attempts to emulate the headroom found in analog gear, but can be confusing when the red light is flashing a lot, yet distortion is not occurring. Second, sometimes calibration just isn't that rigorous — one piece of

gear might show 0 VU and another -1 VU when presented with the same signal. A third problem is that not all meters are fast enough to catch an individual sample that overloads. It might be necessary that a certain number of samples, for example, 10 or 12, exceed the available headroom for the meter to show that clipping has occurred.

The only way to know for sure how your device reads level is to feed it a full code signal, and look at the output with an oscilloscope or digital audio editing program to see whether clipping has occurred. Several software programs (e.g., Steinberg's Wavelab) have extremely precise metering; set the output to exactly 0, send the digital output to a digital input, and see how the input meter reacts.



In addition to the appropriate hardware, sometimes all you need to go 24/96 is to find the right software switches in a preferences or options page. You may need to change several parameters, though; in this Audio Options page from Cakewalk Sonar 2.0, it's important to set both the Driver Bit Depth and File Bit Depth to 24 bits. However, the sample rate adjustment is just a single parameter.

THE BURNING QUESTION: MAKING YOUR OWN CD

The ability to make your own CDs — in other words, to save your music in its final delivery medium — represents a huge power shift. In the days of vinyl, while mixing you pretty much had to guess how the process of mastering for vinyl was going to affect your work. Sometimes, a trip to the mastering lab revealed problems that required going back and doing a remix. But thanks to digital audio, you can know exactly what the final product will sound like.

The one-off test CD has been a boon to studios. No longer do you need to duplicate bad-sounding cassettes for band members to judge a mix; give 'em a CD. Play it in a bunch of environments to make sure the mix is "transportable," and if it isn't, then just pull up your automated mix data, make the appropriate changes, and try again. Reference CDs are also a great service to clients — you can test the music under real-world conditions before committing to a major production run.

You can even buy small-scale duplicators and CD label printers, then press the CDs you sell at gigs to your loyal fans. Or really go nuts and convert every song you've ever recorded into MP3 format and save them all to CD so

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that all your songs can be played back from your computer.

Given the universality of the CD, many studios have added CD-burning capabilities to their computers. But also consider stand-alone CD burners such as those made by Alesis, HHB, Marantz, etc. Computers often like to have the CD burning process all to themselves, so using an outboard unit lets you make CDs unattended, while your computer continues to record, edit, or whatever. Some units even let you store multiple playlists, so you could, for example, burn CDs with different song orders to test which sounds better.

With computers getting faster, memory getting cheaper, and CD-R drives now including "coaster-proof" technology, at some point burning CDs on your computer will be a painless, simple background activity. For the moment, though, a stand-alone unit can be a very useful adjunct to any studio.

CAUTION — DUPLICATION AHEAD

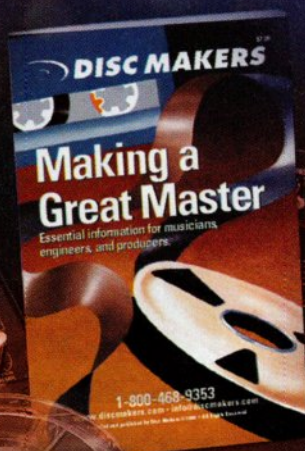
Mastering at home makes a lot of sense for tunes to be streamed over the Web, one-off CDs, and the like. But if you're about to burn a quantity of CDs, you'd better consult with a professional mastering engineer first. The CD created in your computer may have "overs" (clipped samples), misplaced P & Q codes, and other errors that could cause the duplicator to faithfully duplicate 1,000 coasters.

Many duplication facilities have staff mastering engineers who can assist you with the process of getting your material duplicated. Using the staff engineers means you're off the hook if there's a problem, because when they signed off on your CD, proper duplication became their responsibility.

If the facility doesn't have a mastering engineer in-house, it's well worth the investment to go to a pro who can make sure that what you have is truly ready for duplication. If it isn't, the engineer can usually transfer the tracks over and fix any problems prior to creating a master the duplicators will accept.

Bottom line: it's nice to do it yourself, but when thousands of dollars are at stake, it's worth spending a few hundred as a reality check. ■

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INSIDE:

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Martin Audio Wavefront W8L

90> Rule The Airwaves

RULE THE

AIRWAVES

TIPS ON GETTING
THE BEST WIRELESS
FREQUENCIES IN
ANY AREA



BY STEVE LA CERRA

MARTIN AUDIO WAVEFRONT W8L

The Wavefront W8L from Martin Audio is a horizontal-format line array enclosure that combines line array technology with horn loading to produce a loudspeaker system with high SPL capabilities and a well-controlled, 90° coverage pattern. Intended for touring sound applications, the W8L features vertically coupled waveguides and true constant directivity horns to achieve a high efficiency as well as consistent coverage. The W8L horns produce low-curvature wave fronts for smooth, horizontal coupling, free of comb-filtering effects — a feature not possible with spaced, point-source drivers.

Each W8L includes a single 15-inch woofer, dual eight-inch mid-frequency drivers, and three 1-inch compression drivers. The 15-inch woofer employs a four-inch voice coil and is loaded into a Hybrid enclosure. A proprietary Martin Audio design, the Hybrid enclosure yields the high efficiency and sonic impact of horn loading along with the extended low-frequency response of a bass reflex enclosure. The result is a sensitivity rating of 106 dB (for a one-watt input measured at one meter) in the low-frequency range. By comparison, a dual 15-inch enclosure using direct radiating drivers typically exhibits an efficiency of around 100 dB for the same input.

For the mid-frequency section, the Wavefront W8L employs two 8-inch cone drivers that are

vertically coupled in a 2-x8-inch constant-directivity midrange horn. These drivers are loaded using a toroidal phase plug, producing lower distortion and tighter horizontal pattern control than typical waveguide-loaded compression drivers or cross-fired direct radiators. This design allows the midrange to be crossed over to the high-frequency section at 2.5 kHz — a frequency higher than often used in three-way designs.

Three 1-inch compression drivers are used for the high-frequency section, helping maintain definition at the top of the HF range. The compression drivers are mounted on a constant directivity high-frequency horn, producing a 90° horizontal dispersion pattern that closely matches that of the midrange horn, and keeps off-axis response consistent throughout the mid and high frequencies. Efficiency of the W8L's high-frequency section is rated at 113 dB (one watt/one meter), while maximum SPL is specified at 136 dB continuous, 142 dB peak.

An interesting characteristic of the Wavefront W8L is that each frequency range of the cabinet has a nominal 8-ohm impedance rating. This enables two enclosures to be easily driven using three amplifier channels (one for each frequency band), with each amp channel seeing a 4-ohm load.

The Wavefront W8L includes captive rigging with splay angles variable from 0 to 7.5° (selected by rear link), enabling the W8L to be quickly and accurately configured. Single-wheelboard or multi-cabinet dolly options are available. The W8L cabinet measures 51.7 wide x 19.3 high x 33.7 deep (inches), with a flown weight of 277 pounds including rigging hardware. Overall frequency response of the Wavefront W8L is stated as 50 Hz to 18 kHz (–3 dB). In many applications, the W8L may be used without a subwoofer, but the cabinet is compatible with Martin Audio's WSX horn-loaded subwoofer, as well as their W8C "fill" cabinets. ■

FIRST LOOK

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BY STEVE LA CERRA

RULE THE AIRWAVES

TIPS ON GETTING THE BEST WIRELESS FREQUENCIES IN ANY AREA

Everyone is using wireless technology these days — it's not just on stage anymore. With increasing numbers of local TV stations, emergency communications, wireless intercoms, and digital television looming on the horizon, competition for the airwaves is fierce! No one wants an emergency police call coming out of the lead vocalist's receiver, and with a little bit of care such problems can be avoided.

CRASH COURSE

The vast majority of wireless systems used for pro audio are frequency modulation type (FM) systems that operate in either the VHF (Very High Frequency) or UHF (Ultra High Frequency) bands. The VHF band consists of TV channels 2 through 13, while the UHF channels range from 14 to 69, though not every one of these is actually used for television. Each TV channel is spread across a 6 MHz band. Analog TV uses three distinct frequencies to broadcast a single TV channel: one frequency carries the picture, a second, color information, and the third carries audio. All of these carriers are modulated (see sidebar), and they have to be spaced apart so as not to interfere with each other when they modulate. When we say "channel 11," we really are referring to a frequency group between 198 and 204 MHz. Luckily, the FCC has

standardized the broadcast frequencies for each TV channel, so you can drag your TV across the country and still use it to receive channel 11 in another city. Wireless microphones operate across the same range of frequencies as these TV channels, so if your wireless system happens to be tuned to the audio carrier of TV channel 11, you're liable to get the local news instead of lead guitar. Not a good thing.

As of this writing, there are also at least three wireless digital audio systems available: the Sennheiser Digital 1000 Series, Telex S.A.F.E., and Zaxcom. These systems convert audio to digital information, and then broadcast digital data to the receiver where it is decoded back into analog audio.

Regardless of the type of system in use, many RF problems can be avoided by following some basic suggestions before purchasing any gear. Choice of frequencies for the systems is crucial. Never use two systems on the same frequency. Interference can also occur when the operating frequencies of two systems are too close to each other, and the receiver from one system can't reject the transmitter from the other system. This depends largely upon a receiver's ability to reject weak signals and is referred to as "selectivity." Some manufacturers suggest a minimum of 1 MHz between systems, while others say a 200-kHz spacing

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RULE THE AIRWAVES

is sufficient — so check for specific manufacturer recommendations.

Nearby TV stations can cause major interference, especially if the wireless system is operating on a frequency that falls within the 6 MHz band allocated to the TV channel. If you're operating a wireless mic at 490 MHz in an area with an active TV station on channel 17, you're likely to experience interference because channel 17 encompasses the frequencies from 488 to 494 MHz. You're also likely to annoy the FCC, since operating a wireless mic on a frequency used by a local TV channel is illegal.

A well-informed dealer can be a valuable resource when it comes to selecting wireless frequencies for use in your area. Companies such as Shure and Audio-Technica offer online software applications that can help you choose an appropriate channel in your area without conflicting local TV stations. Keep in mind that the maximum number of wireless systems that can be used simultaneously in one location will depend on the specific gear you are using.

Remote antennas can help improve wireless performance, but be careful of how they are connected to the

FREQUENCY MODULATION

UHF and VHF wireless audio systems broadcast using the same principle as FM radio. A transmitter sends out a basic radio frequency known as the carrier. This carrier frequency is modulated (varied) by the audio signal, causing it to deviate up and down from the basic frequency. The receiver is tuned to accept this signal, "demodulates" or separates the carrier frequency from the audio signal, and delivers a mic- or line-level audio signal to the output jacks. Even though we say that a wireless mic is operating on a certain frequency, it really is operating plus or minus around a certain frequency. You may have noticed that FM radio stations are spaced a certain distance apart with (for example) one station broadcasting at 105.1 and the next closest station at 105.5. This is because each station requires a certain amount of "elbow room" to keep from messing up the next station; wireless mics require the same margins to operate without interference.



Remote antennas amplify not only the signals you want to receive, but also noise and potential interference.

THE MOD SQUAD

Another way interference rears its ugly head is intermodulation or "intermod" (IM). Intermod refers to the way multiple wireless systems and/or TV stations interact with each other to produce additional frequencies. Kelly Epperson, systems engineer at OSA International (Detroit, MI) cautions that "channel spacing is not simply a matter of picking a frequency that's 400 kHz away. When you get into multiple channels, interaction

between two transmitters actually creates a third frequency known as the intermod, a third-order harmonic. When that third frequency is created (albeit at a much lower level in terms of RF power) and you add a third wireless unit, if it hap-

pens to be at the same frequency as or very near the third-order harmonic, then the third wireless won't operate properly. You'll get dropouts and noises indicating interference."

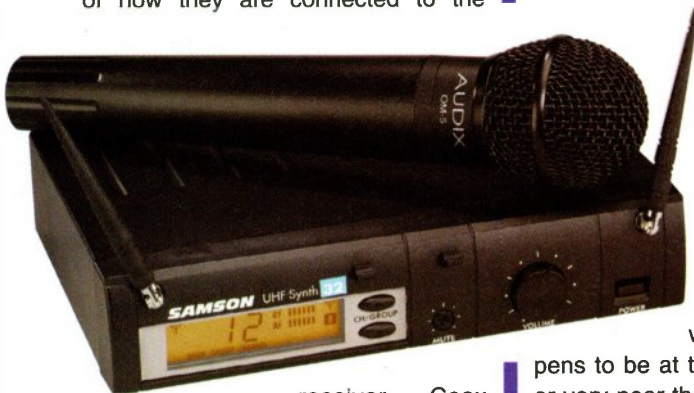
If you're concerned about intermod, you can do some preliminary brainwork to figure out at least some of the frequencies at which interference will be created. The simplest IM frequencies occur at $f_1 + f_2$ and $f_1 - f_2$, where f_1 is the frequency of the first wireless system and f_2 is the frequency of the second. If $f_1 = 250$ MHz and $f_2 = 600$

MHz, then IM occurs at 850 MHz ($f_1 + f_2$) as well as 350 MHz ($f_1 - f_2$); other IM products will occur at varying multiples of these values. In this case, it'd be a bad idea to choose a third wireless system operating at 850 MHz because IM created by the 250 and 600 MHz systems will cause interference. Shure and Audio-Technica have extensive information regarding IM posted on their Web sites (see the Weblink for more information).

An interesting approach to reducing intermod has been put to work by Samson Technologies in their Synth Six UHF wireless system. The Synth Six system reduces transmitter power to 1 milliwatt (about one-tenth typical output level), resulting in a dramatic reduction of intermod. Of course, reducing the output power also reduces the transmission range of the system, so the Synth Six employs active antennae to restore the system's range. Synth Six wireless units maybe used in conjunction with Samson's WSM (Wireless System Manager) software for computer control and remote monitoring of up to eight Samson receivers. WSM also provides advanced features such as RF spectrum analysis (which displays active frequencies in the vicinity) and automated channel planning.

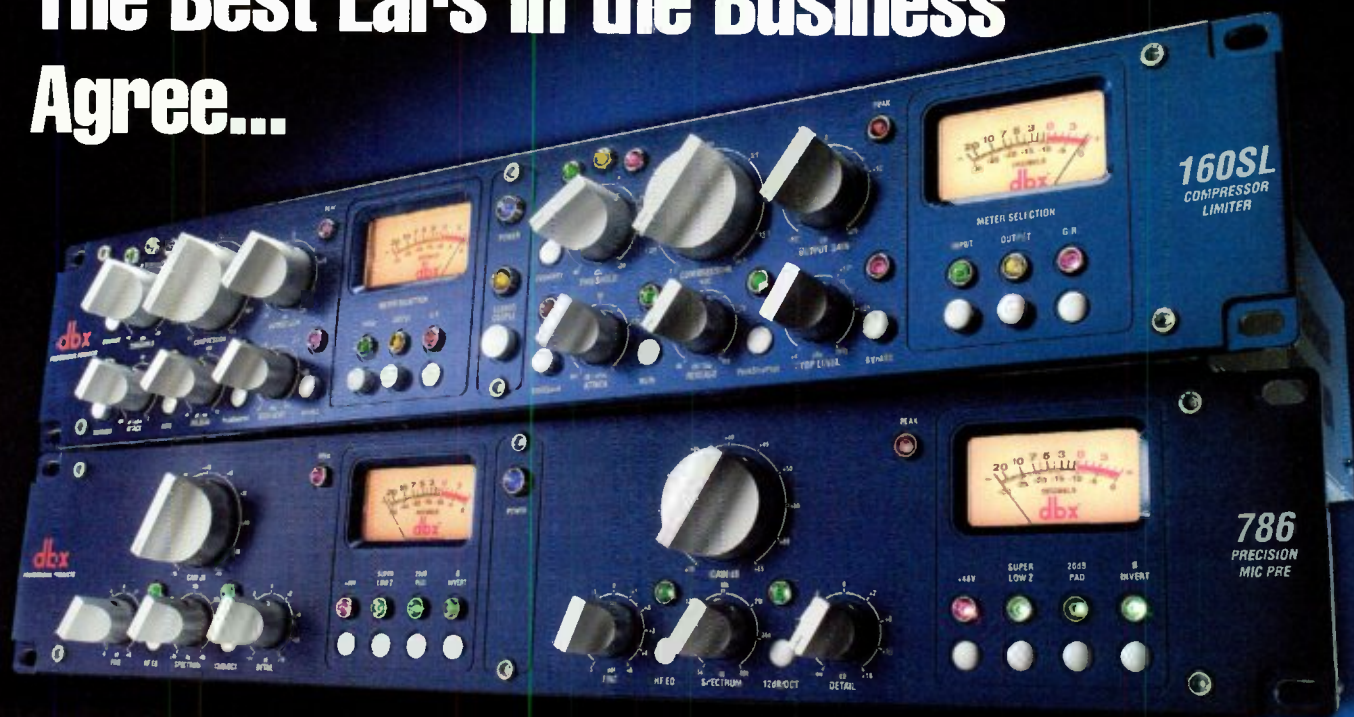
MULTIPLE PERSONALITIES

Any situation involving multiple wireless systems requires some investigation. "It's a good practice not to use a wireless frequency that is the same or near one of the three carrier frequencies in a nearby TV channel," explains



receiver. Coax cable suffers signal loss at the high frequencies used for RF, and can actually *reduce* operating range. Make sure that the cables are the correct impedance and are properly terminated with the appropriate connectors. Stay away from adapters and spliced coax. If you are using remote antennas, be aware that most need to be mounted on a flat metal surface to perform properly (36x36 inches for VHF, 12x12 inches for UHF). Remember:

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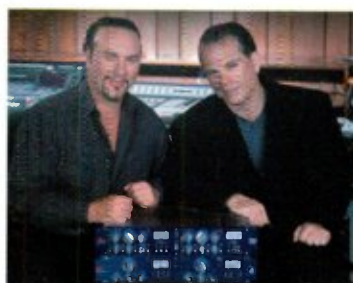
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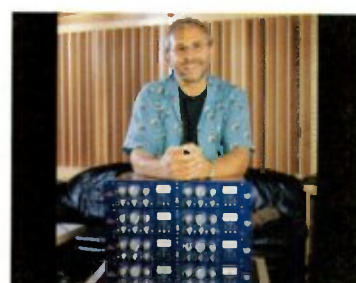
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Kelly. "Before I go to a city to do an event, I find out which TV stations are active. The NAB and FCC Web sites (as well as those of many manufacturers) list active TV stations in a given area. On the Shure site there are resources that walk you through the process of figuring out the preferred channel grouping for a specific area. For a few major cities such as L.A. or New York, you'll see a lot of 'Not Preferred' because the density of operating TV stations is so high that finding frequencies that work well becomes a very difficult proposition."

"If I'm working a show at a casino or hotel," Epperson continues, "I'll try to get a list from the house A/V company ahead of time showing which frequencies are in use for wireless mics as well as for wireless intercom, because wireless intercoms operate in the same bands as wireless mics. I also use several software programs to help find clear frequencies. Shure offers software for use with their U-series that works along with the UA-111, a small device that interfaces your laptop to a receiver, and essentially uses your receiver as an RF spectrum analyzer. It sweeps the room and 'looks' at the frequencies to which this particular receiver can tune. It'll show you different spikes across the spectrum, which represent active frequencies. If there's an active TV channel in town that's fairly strong, you'll see spikes from the three carriers. You'll

also see spikes from other wireless units operating in the vicinity. It gives you a way of knowing what frequencies to be concerned about.

"We also have a couple of proprietary OSA programs where we can enter parameters such as the number of wireless mics we need for an event, the frequencies they operate on, and existing

different UHF bands. Since each TV channel is 6 MHz wide, you will need to tune across multiple TV channels to get 20 wireless microphones to work interference-free.

"A recent important development is automatic frequency selection (AFS), where a receiver automatically searches different frequency groups, deter-



frequencies in use, and I can find out what the potential sources of interference might be. Since the math gets fairly intense — especially when you get up to 20 wireless frequencies — the software is a huge time saver. An average show for us consists of 16 wireless mics and at least two wireless intercom systems (which represent another 10 wireless frequencies) — so right there we are running almost 30 simultaneous frequencies. If I have IEMs, that's another two, three, or four frequencies, plus IFB for talent or drivers in cars, etc. I might be using 30 to 40 frequencies between 450 MHz and 806 MHz. Part of our planning is to place different aspects into different frequency bands so that some are in the VHF band and others are placed in

mines how many channels are available in each group, and then shows this information on the front-panel LCD. This helps you select a group with the requisite number of clear channels. But AFS doesn't replace good old homework, because it can only look at whatever is on at the time. I still have to consider channels that *potentially could be in use at various times of the day*. When I do a scan, the bar or another ballroom might be closed or not in use, but when they open for the evening or begin rehearsing, all of a sudden ten extra frequencies light up that didn't show when I scanned during the day."

CALLING ALL CARS....

One of OSA's recent projects was the Detroit Auto Show, and Epperson reveals that there was a lot of potential for RF problems: "We had GM and Chrysler each using 12 wireless frequencies in the same exhibition hall. Across from there we had Mercedes with another eight channels of wireless, plus a couple of smaller shows. All told, we were running between 30 and 35 channels of wireless microphones, 30 frequencies of wireless intercom, five wireless IFB systems, and 30 two-way radios on the show floor. This doesn't include the other manufacturers and their audio vendors: VW brought in eight channels, Acura had theirs, Honda, Toyota, etc.

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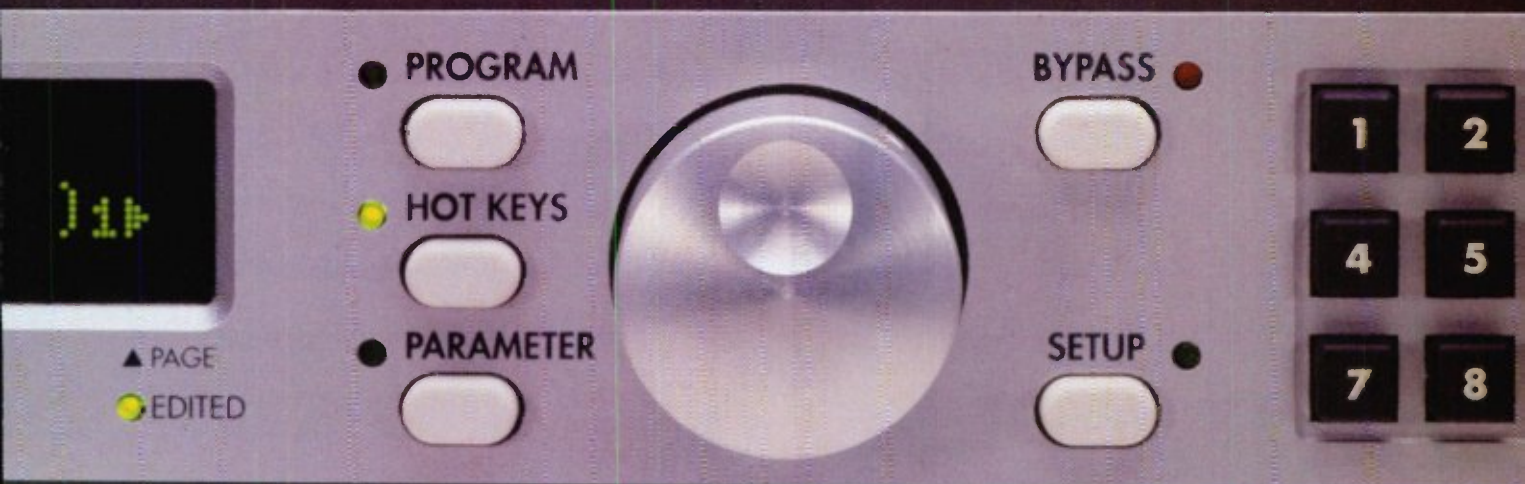


"For an event like this, I start by figuring out how many shows we have on the floor and how many wireless are needed in each. I assign different frequency groups to different shows so that I can guarantee — as best is possible with RF — that the OSA shows will operate interference-free among themselves (we try to keep our inventory diversified throughout the different band splits). From that point we try to coordinate with other audio companies as a professional courtesy because the bottom line is that within a TV channel there are only so many frequencies you can use simultaneously due to inter-modulation problems."

Epperson sees digital television as having the potential for significant impact on wireless audio in the future. "DTV uses the same 6 MHz block as allowed by the FCC for a TV station, but the difference is that DTV modulates across the entire 6 MHz window — it's a broad band of information. If you look at it on a spectrum analyzer, you'll see the first and last frequencies in the 6 MHz window, with this huge block of what looks like noise in between. In the past, if I went into a really busy city, I could use a spectrum analyzer to look at an analog TV signal, and maybe tuck a wireless mic between the picture and color carriers. Or perhaps tuck something above the sound carrier frequency before it hits the border frequency for the next channel. I can't do that with DTV because the signal actually modulates throughout that 6 MHz window, and that means the whole area is unusable. So now we're concerned with what's active in a city on analog TV and DTV, as well as what's active in the next city. If you're working in New York, you have to look at what's active in New Jersey, as well as what is *supposed* to be active because there are DTV stations testing even though they are unofficially on the air."

Kelly Epperson may be reached via email kepperson@osacorp.com.

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Antares AVP-1 Voice Processor and Pitch Corrector

"Antares's greatest hits" migrate to a cost-effective rack signal processor

We've seen Auto-Tune, we've seen mic modeling...but now they're in a 1U rack package, along with compression, EQ, tube emulation, doubling, and de-essing, for under \$600. Sound interesting? I thought so too, so when given a chance to review the AVP-1, I couldn't resist.

INS AND OUTS

The AVP-1 has an unbalanced TRS 1/4-inch line in, two similar line outs (one for the main signal, one for an artificially doubled version), MIDI in and out, footswitch, and a jack for the wall-wart power adapter.

Surprisingly, there's no XLR mic in. Hey — isn't this a vocal processor? Well, Antares recommends using the AVP-1 as a channel insert effect, preferably on an already-recorded vocal so you can experiment freely with the various tweaks. This is fine with traditional analog consoles, but if you're running a mostly digital studio, you'll need to send some signal to an analog out, process it, then bring it back in and convert back to digital (which will add several milliseconds of delay in addition to the unit's inherent latency). Digital fans may instead want to investigate Antares's excellent Auto-Tune and mic modeling plug-ins, then use them in conjunction with other plug-ins for compression, EQ, etc.

However, the no-mic-in approach has a major plus: you're not locked into a particular mic pre-amp. Use your favorite and enjoy the cost savings that accrue from not have a mic pre built into the box.

INTERFACING

The front panel has 31 buttons, a data wheel, and a 2-line x 20-character LCD. To program, you push a button and choose the value with the data wheel.

For

example, the compressor has dedicated buttons for Attack, Decay, Knee, Compressor, and Gate. The latter two pages have multiple parameters, selected by arrow buttons.

ANTARES AVP-1

MANUFACTURER: Antares, 231 Technology Circle, Scotts Valley, CA 95066. Tel: 831-461-7800. Web: www.antarestech.com.

SUMMARY: The AVP-1 has the usual tools for processing vocals, but the standout features are mic modeling and Auto-Tune pitch correction.

STRENGTHS: Quite easy to use. Well-thought-out combination of functions. Mic modeling works surprisingly well. Auto-Tune is a very useful adjunct. Excellent documentation. Cost-effective.

LIMITATIONS: No mic in. Can't switch EQ pre-compressor. Gate decay can be abrupt. Double track effect is unconvincing except for live use.

PRICE: \$599

Speaking of the compressor, it also has a gain reduction meter on the front panel, and a more detailed one on the LCD that is accessed by hitting the Comp or Gate button twice. The gate is nothing fancy, just threshold and reduction ratio parameters. Although it shares the decay time parameter with the compressor, the gate decay seems more like a "hold time" before the signal goes away rather than of a smooth, linear fade.

EQ

The two parametric EQ sections are bypassed as a pair (although you can disable either section independently). Each can choose among several responses: low shelf, high shelf, peaking, notch, bandpass, lowpass 6 dB, lowpass 12 dB, highpass 6 dB, and highpass 12 dB. Available parameters depend on the filter type; there are 51

fixed filter frequencies. Interestingly, 50 and 60 Hz aren't among them (52 and 63 are), so if you need to notch out hum, you can't get there

from here.

One very nice feature is that the display jumps to another page only if you select a parameter button, not if you merely enable or disable an effect. So you can, for example, adjust EQ while bringing compression in and out to see how that affects the sound, with the EQ page displayed the whole time.

I do wish the EQ could patch pre- or post-compressor. I generally prefer having EQ post-compressor (as set in the AVP-1), but there are times when EQ before dynamics is the way to go.



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MIC MODELER

This is a major plus. You select your source mic from 14 specific models or five generic types, then select the mic type you want from 11 options (hand-held dynamic, studio dynamic, two different small-diaphragm condensers, three different large-diaphragm condensers, drum mic kick, drum mic snare, drum mic cymbal, and telephone). You can also tweak low-cut filter settings and the amount of proximity effect, as well as add some modeled tube distortion.

AUTO-TUNE

By now just about everyone is familiar with the Auto-Tune process, which compensates electronically for out-of-tune vocals. Yes, the AVP-1 has Auto-Tune, and it works pretty much like its hardware and plug-in predecessors: you set up the

audio type, sensitivity, and speed, dial in a scale, and let the machine do the rest (which it does remarkably transparently, given the complexity of the process).

DOUBLE TRACK

The double track feature didn't knock me out. It uses the guts of the Auto-Tune section, but, in general, I found that putting the two tracks in mono ended up sounding too phasey — it would definitely benefit from a bit more initial delay on the doubled track. My advice for using this feature is the same as for all automatic double-tracking effects I've tried: turn it off and sing the part again. For live stereo setups, though, the effect does indeed widen and expand the voice.

THE AVP-1 IN REAL LIFE

Despite Antares's recommendation regarding inserts, I tried recording through the AVP-1, and it works fine as long as you don't want to add Auto-Tune. In fact, I liked the way my voice sounded so much (using mic modeling, compression, and a tiny bit of EQ) I think it led to

a better vocal — something that would not have happened if I'd used it as an after-the-fact insert effect.

With Auto-Tune, though, you do want offline tweaking. What works for me is tracking with the AVP-1 to provide the basic vocal sound, and again as an insert effect while mixing. The tube distortion is also something that wants to be set during a mix. A little goes a long way — the effect was too obvious for me once it got past five on a scale of 0–12 — and it's too risky to use it while tracking, just in case the voice level increases enough to enter into the distortion's Ugly Zone.

Antares has put together a potent package of processors with the AVP-1. If you work mostly in the digital domain, you're better off with the plug-in versions, but for live use and analog consoles, the AVP-1 provides the secret sauce of mic modeling and pitch correction.

If you have a mic pre or recorded vocal and want to spruce up, re-mic, and/or pitch-correct your sound without busting your budget, this box delivers the goods. ■

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CAD M177 and M179 Condenser Microphones

High-quality
condenser mics
at a nice price

The M177 and M179 from CAD are the first two entries in the company's latest generation of solid-state condenser microphones. The M177 employs a single-pattern version of the capsule used in CAD's popular Equitek E-300 microphone, while the M179 utilizes a dual-sided version to allow adjustable polar patterns. Both capsules have 1.1-inch, gold-sputtered diaphragms and low-noise head amps with transformerless-balanced outputs. Externally, the two mics appear very similar, with a black and gray exterior, two-layer windscreen, and -20 dB pad and 100 Hz highpass filter switches. The M179 adds a rotary pattern selector switch. Unlike most microphones in this price range, the M179 isn't limited to the three standard patterns, and may be continuously varied from figure-eight through cardioid to omnidirectional. Also unusual for mics in this price range, every M177 and M179 is provided with a frequency response test chart, and is shipped in an aluminum carry case. The mics may be powered via phantom, with a minimum requirement of 24 volts. Detachable swivel mounts are included, allowing each mic to be pivoted as well as rotated for easy placement in tough positions.

I used the CAD M177 and M179 in a variety of circumstances, starting with the M177 on a live bass rig consisting of a pair of Hartke 4x10 cabinets powered by a Gallien-Kruger pre-amp/amp. Since this was a loud stage, I had to place the M177 very close to the cabinet — only about an inch from the front grille (normally I'd like to get a bit further away to allow some breathing room). No matter, because the M177 (with pad on) easily handled the pounding this amp dished out. The M177's low-end capabilities shone in this setting,

► CAD M177 AND M179

MANUFACTURER: CAD Professional Microphones, 341 Harbor Street, Conneaut, OH 44030. Tel: 440-593-1111. Web: www.cadmics.com.

SUMMARY: The M177 is a side-address cardioid condenser microphone, while the M179 is a side-address multi-pattern condenser microphone. Both are intended for general studio and sound reinforcement use.

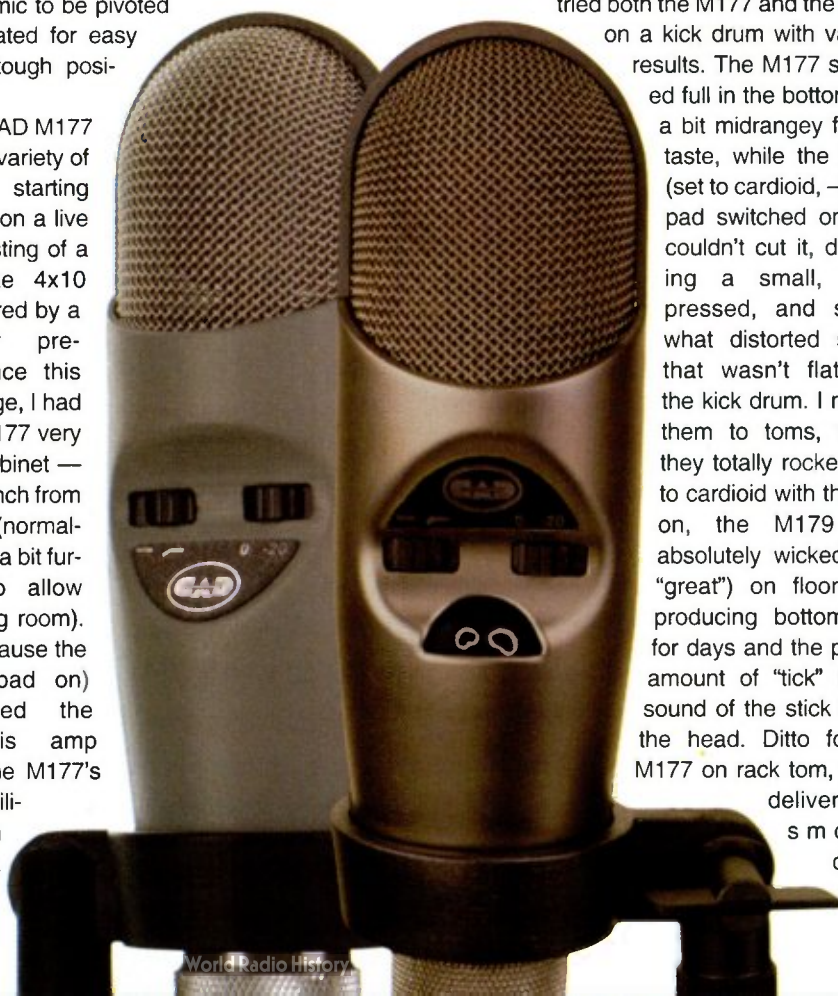
STRENGTHS: Cost-effective performance. Quiet. Extended low-frequency response. M179 provides "in-between" patterns in addition to cardioid, omni, and figure-eight.

LIMITATIONS: Sensitive to external vibration. The detent on the M179's pattern selector is difficult to feel.

PRICES: M177, \$249; M179, \$399.

capturing a bottom end that literally rattled the rafters in the small room we were working. The midrange was clean and clear, with an articulate attack of the pick on the strings.

Encouraged by the results on the bass rig, I tried both the M177 and the M179 on a kick drum with varying results. The M177 sounded full in the bottom and a bit midrangey for my taste, while the M179 (set to cardioid, -20 dB pad switched on) just couldn't cut it, delivering a small, compressed, and somewhat distorted sound that wasn't flattering the kick drum. I moved them to toms, where they totally rocked. Set to cardioid with the pad on, the M179 was absolutely wicked (*i.e.*, "great") on floor tom, producing bottom end for days and the perfect amount of "tick" in the sound of the stick hitting the head. Ditto for the M177 on rack tom, which delivered a smooth decay



with a big, round fundamental and a nice smack on top. Toms are definitely a strong point for both of these mics.

Back at the studio, I used the M177 on a Guild acoustic guitar. After moving the microphone around the guitar and listening to different positions, I opted for the old standby: twelfth fret, approximately six inches away and angled toward the neck/body joint. The guitar was a touch bright when heard by itself, but, when dropped into the mix, the attack cut through, giving the guitar presence without getting in the way of the vocals. Transient response was excellent, and the M177 did a good job of capturing the guitarist's dynamics.

On the same session I used both mics to record male vocals with excellent results. The M179 produced a clean, clear top end and full lower-mids without adding a ton of proximity effect or exaggerating the chestiness of the vocal. The M177 sounded similar to the M179 on male vocal, so much so that it was tough to tell the two apart. I thought the M177 might have captured a bit more in the top end, almost sounding like there was more "air." Both mics performed like champs when the vocalist cut loose, without even a hint that they were running out of gas or straining during the loudest passages. CAD has obviously done their homework in designing the windscreen for these mics, because they provide excellent resistance to plosive sounds — no small feat for mics with such extended low-frequency response.

The 100 Hz low-frequency rolloff switch is an extremely important feature on these microphones — especially in light of their low-frequency extension. The rolloff makes a major difference in the pickup of stand-transmitted vibrations such as foot tapping on the floor. The M177 seemed to have somewhat better isolation from external vibrations, so the difference with the rolloff was less drastic than with the M179, where it made a major reduction in the amount of stand vibration pickup. For applications requiring critical isolation of the mics from low-frequency vibration, CAD's MZM-5 is available (\$39.95 retail).

The M179's frequency response was consistent across its various polar patterns. I used the M179 in omni as well as figure-eight for backing vocals. In

SPECIFICATIONS

Frequency Response	10 to 20,000 Hz
Impedance	200 Ohms, nominal
Dynamic range	133 dB
Maximum SPL	143 dB (with pad switched on)
Total Harmonic Distortion	less than 0.15%

figure-eight, sonic differences between the front and rear of the mic were subtle. At 180°, the mic sounded a touch duller (a typical figure-eight characteristic), but this was noticeable more in the

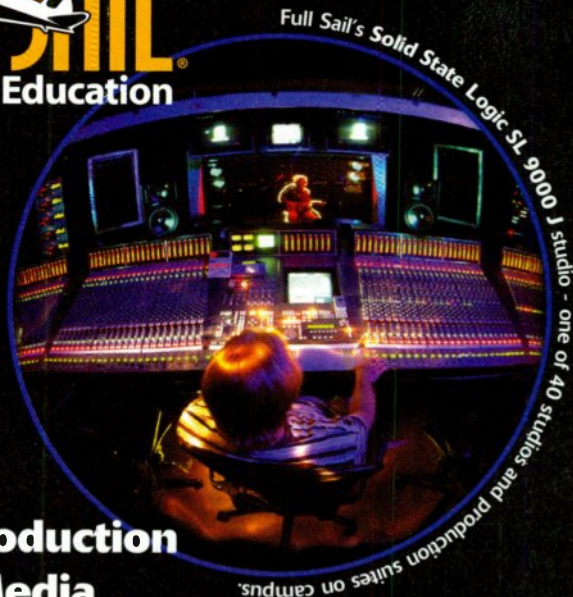
room tone or ambient pickup than it was in the direct sound. When set to omnidirectional, differences from front to rear were difficult to hear at best.

► continued on page 126

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AEA R44CNE Centennial Edition Vintage Ribbon Microphone Reissue

AEA clones the vintage RCA 44BX ribbon microphone

More than 60 years ago, engineers at Radio Corporation of America (RCA) developed a series of ribbon microphones destined to become legendary. Intended for use in broadcast, recording, and public address applications, the 44 and 77 series of microphones featured excellent transient response, smooth top end, and uncolored sound. Unfortunately, RCA ceased manufacturing microphones long ago, and, as a result, RCA 44's and 77's are becoming increasingly difficult to find — and expensive, too!

Several years ago, Wes Dooley at Audio Engineering Associates — long skilled in the restoration and re-ribboning of RCA mics — recognized this, and began filling the void with the R44C. To commemorate the 100th anniversary of the National Association of Music Merchants (NAMM), AEA introduced the R44CNE, a limited edition, museum-quality replication of the RCA 44BX. Only 100 R44CNE's will be handmade by Dooley, after which there will be no more (though he will continue to build R44C's). Like the original 44BX, the R44CNE is a bidirectional ribbon mic employing the same 1.8-micron diaphragm material used by RCA. AEA's replication is so faithful to the original that parts from the R44CNE may be interchanged with those from the original 44 and 44BX.

Interestingly, the R44CNE goes a bit further by combining some of the design elements of the original U.S.-manufactured 44 with the version produced by RCA Ltd. in the U.K. — reducing sensitivity to hum as well as reducing the mic's weight. The R44CNE sports a finish similar to RCA's black and silver "radio" finish, with the NAMM Centennial logo on the rear. Included with the R44CNE is a (hardwired) two-meter XLR cable, shockmount/mic stand adapter, and an AEA 44VC case. For an additional \$450, the mic may be ordered with AEA's "X Option," which increases the output by 6 dB. Pairs of R44CNE's may be stereo-matched at the time of ordering for an additional \$144.

It's clear that a lot of attention to detail went into the manufacturing of the

AEA R44CNE

MANUFACTURER: Audio Engineering Associates (AEA), 1029 North Allen Ave., Pasadena, CA 91104. Tel: 626-798-9128. Web: www.wesdooley.com.

SUMMARY: Super-accurate replication of the vintage RCA 44BX ribbon microphone

STRENGTHS: Sounds just like an RCA 44BX. Excellent craftsmanship.

LIMITATIONS: Low output level, though slightly higher than the original (requires quiet mic pre)

PRICE: \$3,000

R44CNE and the 44VC case as well. The R44CNE certainly looks and feels like my RCA 44BX. Dimensions are exactly the same, the only perceptible difference being the exterior paint: mine has RCA's "TV gray" finish. AEA's 44VC case is equally well-thought out, using a cordura exterior, hard foam interior shaped to safely cradle the mic, and what appears to be a hard plastic shell between the foam and the cordura to further protect the contents from impact. The case holds the mic vertically — which some say is the proper storage position for any RCA ribbon mic so that the ribbon won't sag due to the effects of gravity.

I hooked up the R44CNE and my 44BX to an Avalon AD2022 Class A mic pre for simultaneous comparison throughout a bunch of recording sessions, intentionally choosing the AD2022 because it has a variable-impedance input transformer. I wanted to see if the R44CNE was as sensitive to input loading as the RCA mic. As I changed the AD2022's input impedance from 1.5k to 600 to 150 to 50 Ohms, both mics responded in the same way: output level decreased along with input impedance, the difference being roughly 2 to 3 dB per step. Also, the bass response thinned out as the impedance was lowered. When I used both mics on the room for a drum kit, the kick drum had the most "oomph" at the highest impedance setting. Output from the AEA R44CNE was consistently higher than the RCA 44BX by about 2 dB, but otherwise the R44CNE sounded virtually identical to the 44BX. Sonic differences between the two were extremely subtle if at all discernible. I thought that the R44CNE had a slightly more extended high-frequency response and was a touch leaner in the bottom end compared to the 44BX. But I'm really splitting hairs here, and any difference may well have been due to the fact that the ribbon on my 44BX has higher mileage.



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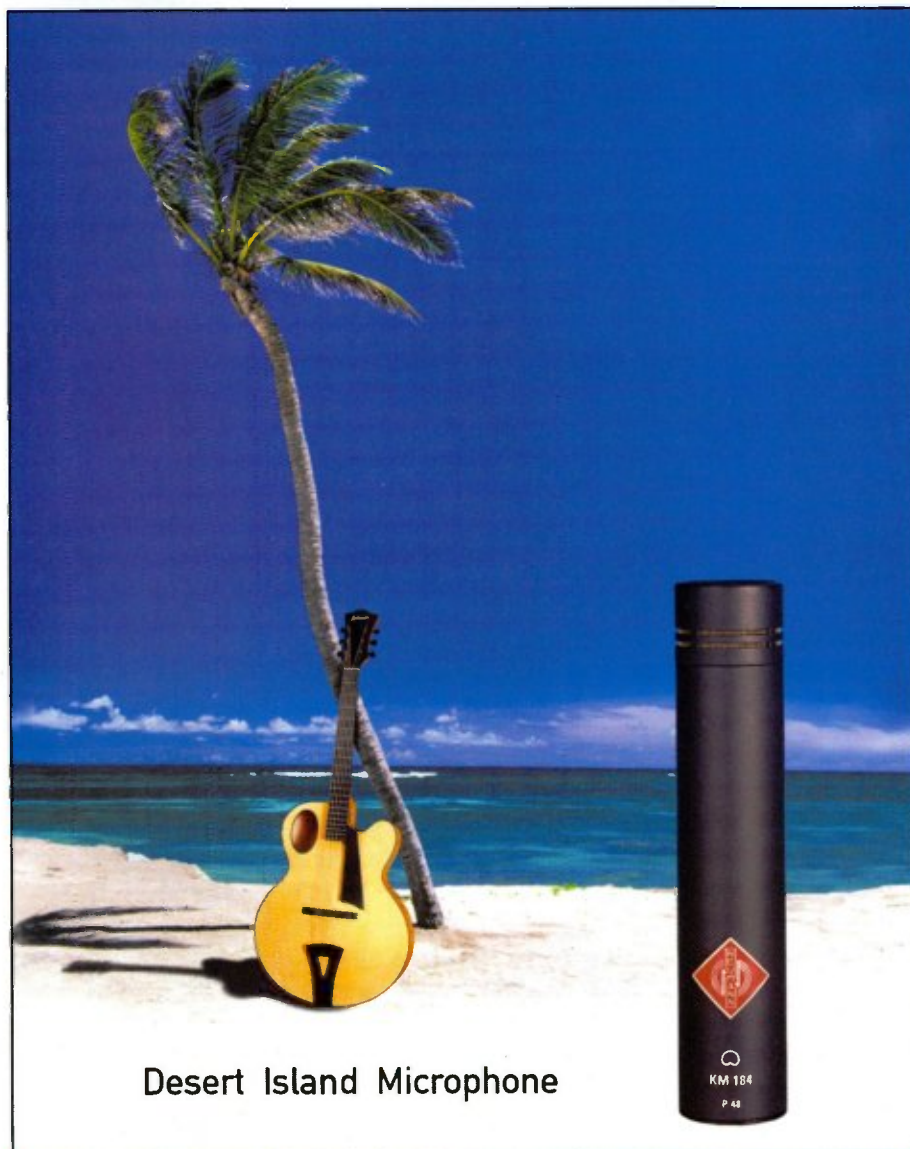
Walter Sear is owner and chief engineer at Sear Sound, the oldest independent recording studio in New York. Walter owns four RCA 44's, some RCA 77's, and various other ribbons. Each of these microphones has its own characteristics; its own personality. Sear says the AEA R44CX "compares very favorably" to his other 44's. When compared with the original RCA 44's, Walter says the AEA R44CX is "cleaner, the noise floor is better, and it's not 80 years old. It looks nice, too. I have 226 microphones in this place so there's no shortage of selection. Out of 226 microphones, the best 50 live on their own mic stands. The AEA R44CX was immediately given its own stand since it is called for so frequently." It's in regular use in his studio and an important addition to his arsenal of microphones.

Walter likes the R44CX on trumpet, trombone, French horn, and upright bass. On trumpet or trombone, he likes to put the AEA R44CX about two to three feet away, preferring to give the instrument some space. On upright bass, he recommends placing the AEA R44CX about 18 inches away at the end of the fingerboard where the strings are plucked, along with a Neumann U 67 on the bass body. Walter tells a story of a visiting engineer who asked his advice on a solo bass project. Walter suggested the use of the AEA R44CX. "The bassist was so impressed that he hired the engineer for three more albums. He said it was the first time a recording really sounded like his bass. I'm trying to talk people into using the '44 on vocals again, because it's a great vocal mic, but everybody has been so indoctrinated into using large-diaphragm vacuum tube microphones that they hesitate to try it."

Since the drum kit presented a reasonably high SPL, there wasn't much worry as far as noise was concerned. Recording an acoustic guitar presented quite a different matter. Both mics required the input gain of the Avalon pre to be cranked to maximum (64 dB), and the fine output gain control was also set to its maximum, adding another 3 dB of level to tape. Some of the mic pres I tried for this application couldn't muster up enough gain to sufficiently drive the tape machine input. However, a dbx 386 and Drawmer 1969 worked well with both 44's, easily pushing a comfortable input level to tape. The moral of this story is that — as with any ribbon mic — careful selection of the mic pre is required when using the R44CNE.

Sonic similarities were confirmed when using the R44CNE and 44BX on a male crooner, giving the vocalist a "warm and fuzzy" vibe that would have made Bing Crosby right at home. On playback, the vocalist commented that the AEA mic sounded a bit clearer than the original (I agreed). In this application, both mics required use of a highpass filter on the preamp to reduce unwanted rumble and low-frequency buildup.

With the production of the R44CNE, AEA has attained their goal of replicating the RCA 44BX, plus they've provided a slightly higher output level — which is a bonus given the inherently low output of these microphones. Initially the price tag looks high, but the fact is that you're going to have to pop between \$2,000 and \$2,500 for a used RCA 44BX in decent shape — and you don't know where it's been. For a few bucks more, you're getting a magnificent replication that sounds like the original, and is brand new. Highly recommended for fans of the RCA 44BX or for those seeking vintage ribbon mic tones. ■



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World Radio History

Earthworks Sigma 6.2 Time-Coherent Passive Studio Monitor

Earthworks
tries for the
ultimate in
accurate
monitors

Over the past few months I've been in the enviable position of evaluating and reviewing a number of new studio monitor designs. And each of those speakers has had its strengths and limitations; it's been very interesting to compare mixes and recordings on them. Through it all, I've been anxious to get my hands on the Earthworks Sigma 6.2 speakers; I'd heard them at the fall AES show in New York, and had been quite impressed with them. I finally had my chance; here's what I found.

OVERVIEW

These are big, heavy speakers — especially for a 6.5-inch woofer design. Fortunately, the large rectangular port at the top of the cabinet makes a convenient carrying handle. The cabinets are made of one-inch MDF, and are resonance-free — you can rap on the heavily damped cabinet with your knuckles, and all you'll be rewarded with is a tight tap; no ringing. The manufacturer specs the cabinet resonant frequency at 40 Hz.

The cabinets have a sort of "tiered" shape, with the woofer mounted on a slightly angled baffle. The tweeter rides in a sliding plate on the level above this, and the aforementioned port tops the cabinet at the third level. Earthworks says that this cabinet design is critical for achieving time-coherent audio from the two drivers and the port. On the downside, both cabinets had some minor wood-working and finish flaws, perhaps understandable

in handmade speakers, but nonetheless troubling given the price of these monitors. (Earthworks assures me that they have corrected these problems for future production runs.)

But there's more to the design than just time-coherency. Both drivers are offset from center to minimize boundary effect in any direction, and the cabinet is optimized to throw the sound only in the forward direction.

The speakers are shipped as a hand-matched pair, with the two woofers and

EARTHWORKS SIGMA 6.2

MANUFACTURER: Earthworks, P.O. Box 517, Wilton, NH 03086. Tel: 603-654-6427. Web: www.earthworksaudio.com.

SUMMARY: Utilizing a unique approach to improving on speaker technology, the Sigma 6.2's rank among the best close-field monitors I've heard, at any price.

STRENGTHS: Excellent open sound quality. Deep low-frequency response. Outstanding detail and imaging. Great dynamic response. Solid, non-resonant construction. Magnetically shielded.

LIMITATIONS: Pricey. Some minor woodworking and finish flaws.

PRICE: \$3,000 (matched pair), \$4,500 (matched set of 3)

the two tweeters in the pair matched and with each crossover custom-tuned to its corresponding drivers.

The rear of the cabinets feature very cool gold-plated WBT-brand binding posts, which are covered with clear plastic casings, as well as gold-plated Speakon connectors. The binding posts have big holes for accepting large-gauge speaker wire.

Earthworks says that the Sigmas were designed to present an easy-to-drive uniform load. I used them with a 9505 amplifier provided by Hafler, and found the system to sound unstrained even at loud volumes.

THE SOUND

In my room, I ended up placing the Sigma 6.2's a bit further away than my regular monitors — 4-6 feet rather than 3-4 feet seemed to work better for low-end response and for imaging.

If I had to characterize the "sound" of the Sigma's, I'd say that they have some things in common with the Genelec family of speakers — but this is a very broad and, in some ways, a completely inaccurate characterization. Some things sounded almost the same when played on the Sigma's and my Genelec 1030a's. For example, Marc Cohn's "Healing Hands" reveals a very similar tonality. But other reference tracks sounded very different; it was hard to pin down exactly what the differences were and what was causing them in the source material.

One thing jumped out immediately: These speakers offer outstanding imaging. Since the tweeters are offset from center, I tried them with the tweeters both in and out. Both sounded fine,



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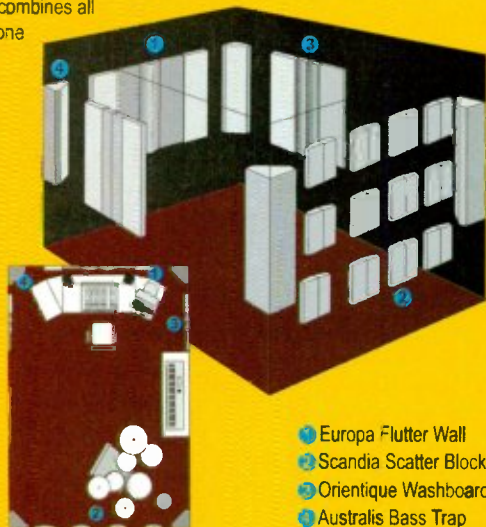
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but I preferred the tweeters on the outside for the slightly wider stereo field this produced. Because imaging is so wide and stable, it's easy to hear things panned in the middle such as lead vocals, kick, and bass. It was likewise a simple matter to pinpoint the location of tracks that weren't panned hard left or right.

The low end these cabinets put out is simply stunning — I was surprised at how much, how solid, and how deep the bass was coming from these 6.5-inch monitors.

The Sigma's aren't my favorite monitors for heavy rock; the music doesn't seem to "gel" as well as I'd like. It's hard to get it to sound like a cohesive whole. The revealing mids and highs also make the Sigma's somewhat harsh sounding with this type of music.

By contrast, these monitors *love* well-recorded acoustic music. Cuts from Douglas, Barenberg, and Meyer's *Skip, Hop, and Wobble* sounded outstanding on these speakers, with smooth, extended clarity, and excellent tight low-end on Meyer's upright bass. They sounded

SPECIFICATIONS

Frequency Response	40 Hz to greater than 40 kHz ± 2 dB
Power Handling	150 watts continuous, 400 watts peak
Sensitivity	87 dB 1 watt/1 meter
Nominal Impedance	8 Ohms
Low-Frequency Driver	6.5-inch cone driver
High-Frequency Driver	Vifa tweeter
Input Connectors	WBT binding posts, Speakon (both gold-plated)
Dimensions	16.75 (H) x 9.5 (W) x 15.5 (D) inches
Weight	32 lbs.

extremely "real" on this CD — like you were in the room with the instruments.

For classical recordings, the Sigma's are gorgeous. Not just in the sense of being stunning to listen to, but also because they're so detailed and real sounding.

During a vocal tracking session, I found the Sigma 6.2's to be nicely dynamic; and I easily heard (and was therefore able to avoid) the negative audible effects of applying compression and limiting. I could also clearly hear the effects of subtly moving microphones around on sources, helping to avoid having to EQ tracks later when I mixed.

When used for mixing, the Sigma's extended top and bottom end ensure that you hear exactly what's going on in the extremes of the frequency spectrum, while the balanced neutral tone allows you to apply EQ and dynamics (where necessary) with complete confidence.

Earthworks has done an amazing job with the Sigma 6.2 monitors. The best compliment I can pay them is that, with well-recorded tracks and a good mix, the speakers seem to disappear; you just hear the music.

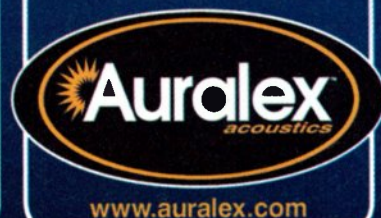
Special thanks to Hafler for the generous loan of the excellent TransNova 9505 amplifier used in this review. ■

Not Just Another Pretty Face...



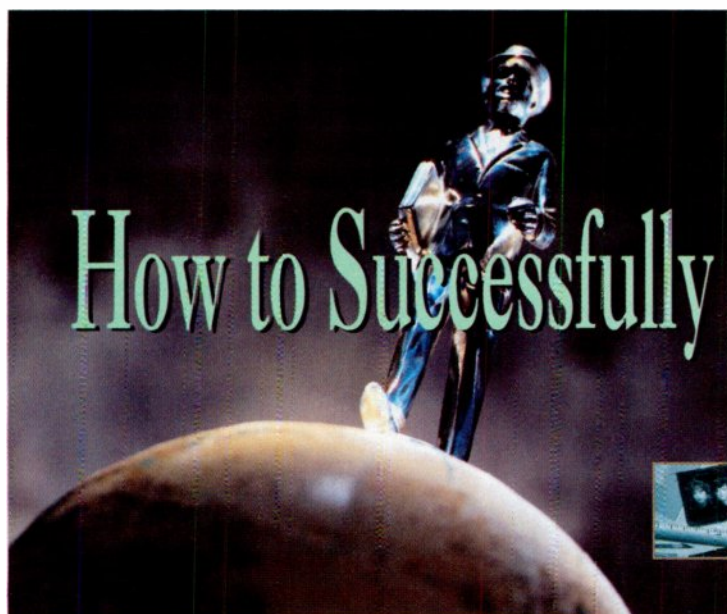
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Behringer DDX3216 Digital Mixer

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Behringer is a company that's not without controversy. But in the past few years, they've been retooling their image by introducing products that they hope will be appreciated for the technology as much as the price. Their latest, the DDX3216 automated digital mixing console, specs out competitively with other digital mixers — but costs an attention-getting \$1,999. How much can you expect in return? Let's find out.

IN AND OUT

The 32 inputs can come from any combination of the 16 analog ins (using AKM converters for A/D) and/or inputs from two expansion card slots. I tested a single ADAT card, which has 16 channels of ADAT I/O. However, because inputs are assigned in groups of eight, a 24-track digital machine could feed two ADAT or TDIF cards; channels 1–24 could come from the cards, and 25–32 from analog ins 1–8 (or 9–16 for that matter). You can even assign the bus outs to, say, the analog inputs if you wanted to process those busses with dynamics and EQ. All inputs are on top for easy patching.

Outputs can appear at the card outs, but there are also 1/4-inch control room outs, XLR main outs, S/PDIF out, RCA tape out, and four configurable outs that can serve as (for one example) aux outs to feed analog gear. But these don't have to be fed from the aux bus; any of the 16 main busses, four effects busses, solo L+R, and main L+R can patch into these outs.

Although there are eight aux busses, four are dedicated to the internal effects, leaving four for outboard gear...at least in theory. But, again, the

BEHRINGER DDX3216

MANUFACTURER: Behringer, 190 W. Dayton Ave., Suite 201, Edmonds, WA 98020. Tel: 425-672-0816. Web: www.behringer.com

SUMMARY: Given the price point, this digital mixer's depth of functionality, user interface, and sound quality is nothing short of astonishing.

STRENGTHS: Excellent value. Easy, obvious user interface. Built-in effects vary from useable to excellent. Flexible internal busing/switching. Doesn't need meter bridge. Intuitive automation with two-level undo/redo and moving faders. Efficient, clear documentation.

LIMITATIONS: Comparing processor settings can produce clicks if audio is passing through. No programmable MIDI control layer. No Mac version of file exchange software. Stereo-ganging offset faders forces them to the same levels.

PRICE: \$1,999. ADT1616 ADAT card, \$319; TDIF 1616 TDIF card, \$319; AES808 AES/EBU card, \$349.

routing flexibility allows more than you might expect. You could send the effect outs to the configurable outputs, and the aux outs to an option slot (e.g., AES/EBU), which would provide a total of eight aux out connections (four analog, four digital). The 16 main busses would typically go to the card outs if you're recording to something like a stand-alone hard disk recorder.

THE INTERFACE

My standard UI test is to see how far I can get without opening the manual. I was pleasantly surprised at the extreme ease of use. A group of buttons handle channel bus assignments, effects, EQ, channel copy, library preset recall, and other functions; when you select a channel, these buttons affect that particular channel. The six control pots also have a switching function (just push on them) to select among parameter groups.

The information on a LCD page isn't particularly dense, so changing lots of settings requires a fair amount of screen-jumping. But the process is obvious, so it's not a major hassle. Faders and mutes can be paired for stereo (there are no stereo inputs) or grouped, and it's easy to copy channel settings. The only pairing gotcha: if channel levels are offset, pairing sets them to the same level, so you can't pair them in an offset state.



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Like other digital mixers, the 16 faders are assigned in layers. Buttons determine whether they control inputs 1–16, 17–32, bus outs 1–16, or aux/effects master sends and stereo returns. The faders can't be programmed to provide specific MIDI controllers, although they do send MIDI data over fixed controller assignments.

One cool extra is that many processes have an A/B compare function, so you can switch among two presets of EQ, compression, etc. Unfortunately, if switched while signal is going through, there's a click, so don't count on using this for a quick change while recording.

Another nice feature is each channel's LED-ringed control pot. Global switches determine whether these control pan, one of the four aux sends, or one of the four effects sends.

EQ AND EFFECTS

The EQ is parametric, with the high band switchable to shelf or high-cut, and the low to shelf or low-cut. A separate high-cut filter for popping extends from 4 to 400 Hz. The compressor and gate have

the usual parameters, with curves displayed on the LCD. They not only sound fine, but can be keyed from other channels — very handy, and something I've missed on other digital mixers.

The quality of the DDX3216 effects was vastly better than I would have expected. I was able to get my favorite "trademark" vocal sounds without having to touch any outboard gear. Wisely, more subjective effects such as guitar amp simulators are absent; this mixer sticks to the basics, with stereo and mono versions of common effects.

AUTOMATION

Motorized faders are always fun, and, interestingly, these don't "clack" when they hit the extremes of their travel — something seems to put on the brakes just before that happens.

For automation, the DDX3216 can slave to SMPTE or MIDI TimeCode (there's an XLR SMPTE in jack). It worked great with Cubase generating MTC. Since Sonar still doesn't transmit MIDI TimeCode, I used the chance to try

out the DDX's response to MIDI controllers; yes, I could record fader changes in Sonar as controllers, then play them back to automate the DDX. However, it's equally possible to set the DDX3216 to internal sync and send MTC out to Sonar.

The automation memory indicator is odd. To see how many events the DDX could store, I moved as many faders as I could, as fast as I could. Within a minute, the indicator showed I'd used up all the memory. I was curious what happened if I went past that point — would the mixer crash? So I "rewound" to around 50 seconds and added another couple minutes of automation moves. Surprise — they all played back, long after the memory had supposedly been filled.

CONCLUSION

Digital mixers in general haven't taken off as the industry had hoped, but for those with tight budgets and digital mixer aspirations, the DDX3216 not only hits the target, but greatly exceeds any expectations of what something at this price point can deliver. ■

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Focusrite ISA-430

Focusrite

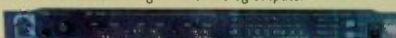
The ISA 430 is truly a "Producer's Pack", which combines the best of analogue and digital technologies, the first Focusrite product to include a range of different classic Focusrite modules in a single unit!



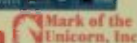
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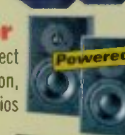
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MENTION CODE
MEQ5

Hafler TRM8.1 and TRM12.1 Active Monitor and Subwoofer

Full-range active monitoring for rooms of any size

Ah, the joys of mixing at home. I don't know about you, but nothing makes my skin itch like this thought: *I hope the bass is working*. Even a good set of nearfield monitors (a necessity in a cramped space) can give you an incomplete picture of how the bass is developing. Worse, working with nearfields without over-boosting the low end can take discipline, especially if you're moving quickly from tracking to mixing. The temptation while you're tracking is to pump more low end (or low mids) to give the track life, so, by the time you get to critical listening, your ears have become adjusted to this unbalanced picture. That's why the *second* question that came to mind with this three-piece active Hafler system — which consists of a pair of eight-inch nearfield monitors and a 12-inch floor-standing subwoofer — was: How effective would it be at curing bass anxiety in a small room? (The first question was: Is it true that three Haflers equals one and a Hafler?)

The loudspeakers we tested can function as an integrated system or as standalone components. The TRM8.1 nearfields perform very well without the sub, while the TRM 12.1 can be mated to a wide variety of nearfields with good results. Both units employ Hafler's impressive Trans-Nova amplification technology, which offers excellent peak handling characteristics.

TRM8.1 NEARFIELDS

The TRM8.1 is a little on the stocky side for a nearfield — I had to remove the my regular monitors from my workstation shelf to make room. Then again, with an eight-inch woofer and one-inch soft-dome high-frequency driver, it offers more low-end response than most speakers in the category, reaching down to 45 Hz. The biamped system delivers 150 watts (at 4 Ohms) to the low driver, and 75 (at 6 Ohms) to the tweeter.

▶ HAFLER TRM8.1 AND TRM12.1

MANUFACTURER: Hafler, 2055 E. 5th St., Tempe, AZ 85281. Tel: 480-967-3565. Web: www.hafler.com.

SUMMARY: Thanks to their generous headroom, extended frequency response, versatile connection options, and uncluttered midrange, the TRM8.1's make a good set of nearfield monitors in any critical application. But the system really shines when you mate the 8.1's to the TRM12.1 subwoofer, which dispatches lows with clarity and punch. They're not cheap — a three-piece system retails for nearly \$2,700 — but their performance and versatility place them in the sonic big leagues.

STRENGTHS: Versatile controls. Good sound. Excellent transient handling. Wide frequency response. Wide range of I/O options.

WEAKNESSES: Documentation could be more complete. The TRM8.1's large footprint might be a problem in cramped studios. Somewhat costly.

PRICE: TRM8.1, \$1,850/pair; TRM12.1, \$845

As mentioned above, Hafler's built-in amplification adds to the performance of the speakers, which boast impressive headroom and clarity throughout their frequency range.

The TRM8.1's offer a wide array of features. Connections include a combination XLR and 1/4-inch balanced and RCA unbalanced line inputs — the latter is especially welcome in a small computer-based or broadcast setup. A bank of rear-panel DIP switches let you set input sensitivity, bass shelving (the hinge point is 200 Hz), and treble shelving (hinging at 3 kHz). You can also disable the power that feeds the woofer or tweeter independently and run the speakers in passive mode (the crossover remains in effect). With the bass set flat or slightly boosted, the TRM8.1 does a nice job of handling typical nearfield chores. The monitor's headroom is especially welcome in the midrange, which remains clear even with cluttered mixes. Imaging is also impressive, though here, as with other speakers, positioning is crucial. Also, because the TRM8.1's are rear-vented, they work best when mounted at least five inches in front of any walls or other surfaces.

The TRM8.1's use a proprietary tweeter-horn technology called Wave Guide to improve efficiency, and a phase-coherent cabinet design to make sure the high and low frequencies reach your ears with minimal discrepancy. They offer



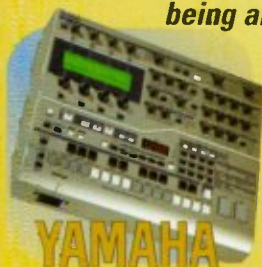
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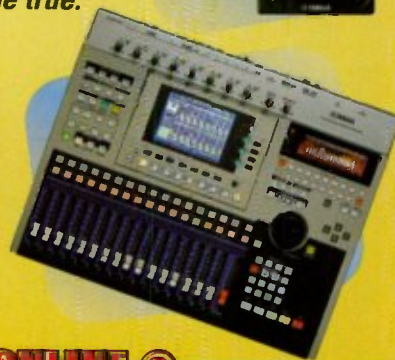


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very good off-axis response. Frequency response remains fairly consistent as you move about the room. Other features include a shielded magnet (which is necessary if you plan to place the speakers near a computer or television monitor), front-mounted high- and low-frequency status LEDs, and a front-mounted on/off switch (nice). The speakers come with an isolation pad to reduce the transmission of vibrations between the cabinet and your console or shelf.

TRM12.1 SUBWOOFER

The TRM12.1 subwoofer, which feeds 200 watts into a 12-inch speaker, integrates well into a number of environments. You can place it just about anywhere in the room, and you can use the speaker in down or forward-firing positions. Rear-panel connections include stereo XLR balanced and RCA unbalanced inputs, and XLR "pass-through" outputs (which feed your nearfields). Oddly, the pass-through connections aren't shown or mentioned in the

► continued on page 126

SPECIFICATIONS

TRM8.1

Drivers	1-inch (25-mm) soft dome high-frequency driver; 8-inch (200-mm) polypropylene low-frequency cone driver
Power Rating	75 watts @ 3 Ohms (high frequency); 150 watts @ 4 Ohms (low frequency)
Cabinet	0.45 cubic feet (13 liters), vented
Crossover	24 dB/octave Linkwitz-Riley 30 Hz or 60 Hz @ 12 dB/octave subsonic filter
Peak Acoustic Output	>123 dB (per pair @1 m)
Frequency Response	45 Hz-21 kHz ± 2 dB
Total Harmonic Distortion	Less than 0.5% 100 Hz-21 kHz
Signal-to-Noise Ratio	>100 dB
Full Power Bandwidth	405 W/4.75A @ 120 VAC
Slew Rate	100 v/ μ s
Common Mode Rejection	70 dB typical @ 1 kHz
Input Impedance	47 kOhms per phase balanced
Input Sensitivity	500 mV to 3 V (unbalanced); 275 mV to 1.5 V (per phase balanced)
Bass Shelving	40 Hz to 200 Hz (-4, -2, 0, +2, +4 dB)
Treble Shelving	3 Hz to 20 Hz (-4, -2, 0, +2, +4 dB)
Dimensions	0.25-inch W x 15.875-inch H x 13-inch D
Other Features	Inverted Nitrile rubber surround; magnetically shielded

TRM12.1

Drivers	Down-firing 12-inch (305 mm) low-frequency driver; 2.5-inch (63.5 mm) 4-layer voice coil; 102 oz. magnet
Power Rating	200 watts @ 4 Ohms
Crossover	40-110 Hz variable Linkwitz-Reilly
EQ	12 dB/octave subsonic filter
Peak Acoustic Output	>115 dB (w/music @2m)
Frequency Response	25 Hz-110 Hz ± 2 dB
Total Harmonic Distortion	Less than 3%, 25 Hz-90 Hz (90 dB @ 2 m)
Signal-to-Noise Ratio	>100 dB
Power Consumption	68 W/7.70 mA @ 120 VAC (normal power)
Slew Rate	100 v/ μ s
Common Mode Rejection	70 dB typical @ 60 Hz
Input Impedance	47 kOhms per phase balanced
Input Sensitivity	160 mV to 5 V (unbalanced); 80 mV to 2.5 V (per phase balanced)
Dimensions	19.5-inch width x 18.25 height x 19.375-inch depth

REVIEW SHORT: AURALEX MOPAD MONITOR ISOLATION PAD

Those folks over at Auralex just don't seem to stop. Not content to design and manufacture reasonably priced acoustic treatments for recording studios, control rooms, home theaters, and other sonically critical listening environments, the company has been turning out more application-specific acoustic isolation products, such as the GRAMMA guitar amplifier/speaker cabinet isolation platform reviewed in the December 2001 issue. At Winter NAMM, they continued on this path, introducing the MoPad monitor isolation pads, which retail for \$29.95 per set.

Made from high-density acoustic foam, the gray MoPads comprise two pieces: the main MoPad and the Wedge Adjuster, a wedge-shaped piece of foam that allows you to adjust the angle at which your monitors sit. Two MoPads are used under each monitor (or any other piece of gear you want

to isolate from vibration, such as a hard drive, turntable, or whatever), which results in a stable setup.

I used MoPads under my normal Genelec monitors as well as under the Earthworks and SLS monitors reviewed elsewhere in this issue. Using the MoPads and Wedge Adjusters in various combinations and orientations, you can angle your speakers up at 4° or 8°, flat, or down at 4° or 8°. For my purposes, I used just the MoPads without the Wedge Adjusters for a 4° upward angle.

The monitors were placed on a desk that also holds a pile of gear, Zip disks and CDs, a tangle of cables, and assorted junk, and were cranked up to reasonable listening levels. The desk immediately dissolved into a frenzy of vibration and rattling. Placing the MoPads under the monitors reduced this clatter immensely — the noise was only apparent at the highest volume levels. The tone of the monitors also tightened up, particularly in the low-frequency range. I've used foam mouse pads and other materials to accomplish this kind of thing in the past, but the MoPads are more effective.

If your monitors are on isolated stands, the MoPads may not interest you. But if you place your monitors on a desk or table, or — probably the most common scenario — on top of one of those studio furniture desks where there's a rack on either side of your computer monitor, purchase MoPads. The reduction in resonance in your studio furniture will likely be immediately apparent, and is well worth the price of admission.

—Mitch Gallagher



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World Radio History

Midiman Oxygen 8 USB MIDI Keyboard Controller

Not a toy — a powerful adjunct to any studio that uses MIDI

The advent of instrument/signal processor plug-ins and programs such as Reason, Live, Storm, FruityLoops, etc. has made computer-based music not only easier, but more affordable. Unfortunately, software always lacks something compared to hardware equivalents: physical control. Using a mouse to control parameters or on-screen "virtual keyboards" is a major hassle.

You can always use a MIDI keyboard and control surface such as the Peavey PC-1600X, but they take up a lot of space; arranging the ergonomics so you can work at your computer as well as tap keys and slide faders can be problematic. That's why the Oxygen 8 (Oxy8 for short) is so cool: it can fit next to your QWERTY keyboard and make it easy to provide MIDI note and controller data. It may look like a toy when you slide past it in a music store — or something for "prosumers" to use with their "hobby" programs — but the Oxy8 goes much deeper than you might think.

BASICS

Oxy8 is a Mac/Windows-compatible device that sends its notes and control signals through the computer's USB port to the program(s) of your choice. A 5-foot USB cable is included for patching the Oxy8 into your machine. In addition to needing a USB port, system requirements for PC are Windows 98/ME/2000/XP, and, for Mac, OS 9.1, OS X, and OMS 2.3.7 or 2.3.8 (supplied on the distribution CD-ROM). Incidentally, I had no problem getting Oxy8 to work on Mac OS 9.0.4.

However, the USB connection doesn't stop there. There are two MIDI out ports on the back — one to carry the events generated by the Oxy8

MIDIMAN OXYGEN 8

MANUFACTURER: Midiman, 45 E. St. Joseph St., Arcadia, CA 91006-2861. Tel: 626-445-2842. Web: www.midiman.net.

SUMMARY: If you use computer plug-ins or virtual instruments, or take a laptop on the road to play music, you can't live without this.

STRENGTHS: Full-size two-octave keyboard with velocity, aftertouch, mod wheel, and pitchbend wheel. Eight programmable knob controllers. Derives power from AC adapter, batteries, or USB port. Small size and weight.

LIMITATIONS: Can't save presets of different controller setups.

PRICE: \$179.95

and the other to serve as a MIDI interface for your computer. So, if you have a program and want to drive an external tone module, you can do so through the MIDI out.

The silver plastic package isn't much larger than the two-octave (C-C) keyboard, which uses full-size keys and boasts channel aftertouch and velocity. Pitch and mod wheels fit above the left-most keys, and the eight programming knobs sit in the upper-right corner. Toward the center is a three-digit LED display, with a data entry slider and three buttons. Programming parameters in the Oxy8 employ the space-saving tactic of using one of the buttons as a sort of "function key," which, when enabled, uses the keyboard keys to select or edit parameters. To make life easy, the functions are silk-screened above the keys, making the programming process pretty painless.

INSTALLATION

I installed Oxygen 8 on both Mac and Windows computers. The Mac installation didn't proceed exactly as described in that OMS recognized the Oxy8, but didn't name it. Big deal; after creating a new OMS studio document, it all worked fine. Perhaps this wouldn't have been an issue if I'd used the version of OMS included on the distribution CD-ROM, but, frankly, everything on my Mac is working these days, so I had no desire to install a new version of OMS.

Windows installation was the usual "search for driver" song and dance, which is complicated somewhat by the need to install



Reference Transparency

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two drivers in two different locations. Still, it all went without a hitch, and on both computers I was playing Reason's synth and sweeping its filter within minutes.

Latency was not an issue on the Mac (nor on the PC, providing ASIO or similar high-speed drivers were selected for the programs).

SO WHAT ELSE DOES IT DO?

With only a two-octave keyboard, you're safe in assuming you can shift the keyboard in octaves. But you can also:

- Assign the data slider or any of the eight control knobs to a MIDI continuous controller. Each can be on a different channel if desired. The data slider can also control velocity and aftertouch.
- Have the Oxy8 transmit over any of the 16 usual MIDI channels.
- Send program changes.
- Reset MIDI devices.
- Transpose the keyboard in semitone as well as octave steps.
- Send precise controller values using the keyboard in programming mode.
- Plug a sustain pedal into the rear panel

1/4-inch sustain pedal jack.

The process of programming the controllers is straightforward enough, because, in programming mode, some of the keyboard keys can enter numbers. For example, to program a controller, you first press the Select button, enter the controller knob's number using the numbered keyboard keys, hit Enter, press the keys that correspond to the controller number, hit Enter, similarly program the channel number, hit Enter, then press Select again. Trust me, it's not as bad as it sounds.

My only complaint is that the manual leaves out a crucial step of the MIDI channel select process, namely, you have to hit Enter after entering the channel number. It took a bit of head-scratching before I figured that out.

Although this review concentrates on the Oxy8 as a way to control programs, it doesn't require a USB port and can also serve as a stand-alone MIDI controller. It can run on batteries or from the included AC adapter, as well as derive power from USB. If you don't want to stress your

computer's USB connection, you can drive the Oxy8 from the AC adapter while it's connected to the computer via USB.

THE VERDICT

I originally got the Oxygen 8 as a loaner while working on a Quick Start book about Live; the two seemed like an ideal combination. But this little box is addictive. It has taken up permanent residence next to my QWERTY keyboard, because whenever I need to do a quick tweak to a sequence, virtual instrument, or plug-in, there it is. It's worth it just for programming drums and grooves if you don't have some "real" drum triggers sitting around. I can't believe that at one time, if I didn't want to go through the hassle of setting up a controller, I — gasp — used a mouse to draw in drum hits, one at a time. The Oxy8 has ensured that will never happen again.

For under \$180 list, you really can't go wrong; the Oxy8 is a valuable addition to any studio that uses MIDI. Try it — you won't believe the convenience it adds to day-to-day work in the studio. ■

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-Leslie Ann Jones
Director of Music Recording and
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FAST AND FURIOUS

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sound fatter and warmer than it is naturally, I will run it through the 737. The Red 7 I prefer for things like acoustic guitar and for people who already have very rich, resonant voices. It preserves that. They're good for different things, but they are similar pieces of gear.

Sherman Filter Bank....

That's a mind-warping, nasty, evil sounding filter. You just can't make a pretty sound in that thing. I absolutely love that — it's a multistage filter, and a ring modulator, and all of that and none of the above and doesn't sound like that. It sounds f**kin' dark. The Basement Jacks, they're last single, "Where's Your Head At" — that bassline is run through a Sherman, and I used it on the bassline in Mad Skills. It's just a sinister sound, and you get the toughest, most rugged bass lines you've ever heard in your life. It's a really esoteric piece, which I found about four years ago in England. They're a little more common now, but you don't see them much in the States.

TC Electronic Fireworks....

It's a multi-effects box, with really killer things that you don't find in traditional effects units, like granular synthesis, which is really strange to have in a rack-mount effects box. Very punk-rock and cool. I really like the stuff that those TC guys make — quality stuff.

Eventide H3000 Harmonizer....

Straight up old school 3000 and I still find use for it. Killer piece.

Roland SRV330 effects units....

Those two, the SRV330 and the SDE330, are Q-Sound algorithm-based delay and reverbs. I don't use all this outboard stuff much anymore, except for sound design, but they are very cool, wide spatial sounding reverbs. You are making me want to dig into some of my old pieces, man. Don't use 'em so much these days, because it's mostly Pro Tools at the moment.

What is the latest gadgetry that you are using to stay ahead of the copycats?

[Symbolic Sound] Kyma is so great because the timbral possibilities are absolutely unlimited. Only limited by your imagination and the ability to code. One of the most exciting things I've worked with. It has its own computer expansion chassis called the Capybara [multi-DSP hardware

accelerator], and the software is Kyma.

What is this Andromeda here?

There were very few of them made, and it really took a lot of guts to make that synthesizer. They made a \$4,000 or \$5,000 keyboard that was completely analog, and it sounds like it, man. That's one of the greatest analog keyboards that has been made in the last ten years.

What's the story with this suitcase-style synth in the back of the room here?

Still one of my favorites, an Arp 2600. That was actually one of Pink Floyd's Arp 2600's, which is a cool little bonus. I use it on everything, I love it so much.

How about these keyboards you've got stacked up?

An [Roland] MS2000 — a fantastic piece, physical modeling analog synth. Unique sound. Roland Juno 106, one of my first keyboards. This [Quasimidi] Raven is one of those weird pieces — it was given to me a long time ago, and when I got it had no patches, so I put 'em all in from scratch and I ended up making some killer stuff, so I use that some. Roland VP330 vocoder, and I use that like crazy. My favorite vocoder. And below that is a [Roland] Jupiter 4, a big piece used by guys like my heroes Gary Neuman, Human League, and New Order.

You've got a Pro Tools ProControl on your desk, and what about this red keyboard?

That's my Nord Modular, something I'm using quite a bit for the album I'm working on now, which should be out later this year. It's one of those pieces — like with Kyma — you would feel like a complete *schmuck* if you used some sort of preset on it. I've got it in front of the PC monitor because I use it for programming. It's like a modular synthesizer, like the Arp, except that it's digital. You've got a ton of control over strange and unusual things you can't get with an analog modular.

And this little grey box with eight faders?

That's a control surface for Kyma. Those controllers are all assignable to anything in Kyma. With real-time spectral morphing, you can put the morph value on one of the faders and do it in real time.

How would you define "real-time spectral morphing"?

That's something I did on "Pop" in Kyma. I do spectral analysis of sound in Kyma and it analyzes the sound and it

breaks it down into components — the fundamentals, the harmonics, all the spectral information of any sound. Then it allows you to manipulate all the spectral information of any sound. Real-time spectral morphing — you take two sounds, put them through spectral analysis, and then once the computer — once Kyma — knows how to build that sound using sine waves — it's called resynthesis — you can morph from one pattern of sine waves to another pattern of sine waves. Real-time spectral morphing is a process of shifting from one sound to another. It's the same as morphing in film, the same concept.

Phase Vocoding?

It's real complicated. It uses FFT [Fast Fourier Transforms] for spectral analysis of sound, but phase vocoding is time-stretching the harmonics of a sound independent of the fundamental. It's the most beautiful, languid, sort of listless sounding time-stretching — without the artifacts you get from regular time-stretching, which only works on the entire waveform — because you are dealing with the harmonic data separate from the fundamental. You can manipulate every band of harmonic spectral information independent of the others. You get this sound that is very fluid and liquid sounding. You could take a half-second vocal or sample and make it into a 30-minute pad that continues to evolve using phase vocoding. It's one of my favorite things.

Granular synthesis?

You're giving me all the hard stuff, dude! Granular synthesis, conceptually — let's say you take a sound and draw it as a waveform on a piece of paper. Granular synthesis would be the act of tearing that paper up into a thousand pieces and having all the pieces touching, and then having the ability to throw and scatter those pieces around the room and re-congeal them at will. I do it a lot, it's so unusual — you can't get it in a keyboard yet. I'll stop doing it when everybody can get their hands on the technology. It sounds like you are scattering a sound and making it come back together. You can do these rhythmic granular treatments that are amazing.

Are you working on films now?

I actually blew out all the film stuff, and I'm just concentrating on my record. The film thing is a full-time job. I'll finish my album, and then I'll probably take on another movie this summer. ■

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CAD MICROPHONES

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I really liked using the M179 for percussion. On shaker, the M179 clearly captured the attack of the beans hitting the inside of the shaker without sounding spitty. Ditto for tambourine, which can often produce a crunchy distortion in the lower-mids — this problem wasn't evident when using the M179.

For my last session with the M177 and M179, I recorded a drum kit using the mics in M-S stereo configuration. The mics were connected to an Avalon 2022 mic pre, recorded to a TASCAM DA-38, and played back through a Yamaha 02R. The M177 was used for the "mid," while the M179 was set to figure-eight and used for the "side" component of the recording. The two mics were placed about four feet high, one upside down atop the other to get the diaphragms as close as possible. Pad and rolloff were switched off. Depending on the balance between mid and side components, I was able to create a very wide stereo image of the drum kit. I particularly liked the low-end *whump* captured by the mics, which added some girth to the close mic on the kick.

The folks at CAD have really done a nice job on the M177 and M179. One thing you won't notice with these mics is self-noise, as they're very quiet — enabling effective use on quiet instruments. Though they may not be perfect for every application, both the M177 and M179 are useful in a wide variety of applications on a range of instruments. Since they're priced very reasonably, a pair of either model is within reach for just about any studio or sound company. For those who own or purchase them, these mics will find frequent use. ■

YAMAHA FIRST LOOK

► continued from page 28

transport and DAW control, 16 user-defined soft keys, word clock I/O, SMPTE and MTC inputs, MIDI I/O, and host computer connectors (serial and USB). Cascade connectors allow two 02R96's to be linked for 112-channel operation. An optional meter bridge features 12-segment LEDs for input and signal levels, plus a separate 32-segment meter for the main stereo bus. ■

HAFLER MONITORS

► continued from page 118

manual — an oversight that could lead you to think that the subwoofer is harder to wire into your system than it actually is. A series of DIP switches let you select between balanced and unbalanced input and adjust the phase (four options are provided) to help you acoustically align the sub with other speakers in your system. There are two important rotary controls — Sensitivity allows you to match input levels with the outputs of your system. Perhaps more important, the Lowpass Filter control lets you optimize the 12.1's response to match other speakers in your system.

Like the nearfields, the 12.1 offered excellent transient response and clarity. The sensitivity control made it easy to pump the bass without overloading the system. The highpass filter helped ensure good results when mating the sub to speakers from other manufacturers.

COMBINATION PLATTER

Putting a set of nearfields together with a subwoofer isn't a plug-and-play operation. It took some tweaking to get the input and crossover settings to work. The documentation, though clear, could have been more helpful by offering starting settings for the nearfield's and sub's controls. But once everything was adjusted, the system worked well. The bass handling was smooth and full — there weren't any big bumps in the lower mids. The Haflers' fast response makes them especially good for tracking: You get a real sense of attack transients, and 'plosives and other noises that you won't hear on other systems come across clearly. The smoothness of the highs and upper midrange allows you to find the spaces in your mix, but the top end doesn't sound over-hyped. These speakers don't induce much ear fatigue over long sessions.

But the important thing about a set of monitors isn't how they sound on your music, but how music you've mixed on them sounds on *other* speakers. The Haflers passed this test quite well. Mixes translated to both large and small systems with balance and clarity. If you're looking for better bass in less space, you owe yourself some seat time in front of these speakers. ■

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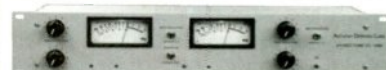
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ROGER NICHOLS

► continued from page 138

HIGH-SPEED BURN ERRORS

Since we're talking about fast CD burners, what about the error rate at higher speeds? It used to be that 2x was the best speed to burn at for low error rates. If you went any higher, you were producing an inferior product. As the disc turned faster, the laser was on for a shorter time to burn the pit because the pit went by faster. The pit geometry suffered and the error rate went up. This is no longer true.

The latest generation of CD-R recorders contain variable power lasers and therefore pump the same quanta of energy into the pit at all speeds. If the laser is on for a shorter period of time, then the power is boosted to make sure that the correct amount of energy was used to ensure the proper formation of the pit.

After error checking 17 different brands of media on seven different drives at all speeds from 1x to 40x, none of the drives produced more errors at higher speeds, and most of them produced lower error rates at the higher speeds. Mitsui silver discs showed the lowest

overall error rate at all speeds. So, as long as you use media labeled for use at the proper speed, go for it. Charge the client for an hour per disc, and burn them in less than three minutes each. That's what I call profit!

COPY PROTECTION AGAIN.

Some labels are using a new copy-protection scheme on CDs. It turns out that these copy-protected CDs won't play back on all CD players. They won't play at all on a Mac, DVD player, or game console, and it also might not play in your car. The audio can't be ripped by a CD-ROM drive. The record company has agreed to accept returns from irate customers, but most retail CD stores won't let you return a CD once it has been opened.

I think the way they do it is by pressing the CD with errors imbedded in the audio data. The player will mask the data by substituting the previous good sample. This means that the actual audio will not be exactly the same as what was mixed in the studio, but no one will notice except the artist, so who cares. These errors will be copied when the disc is

ripped, and saved on the copy as valid data, but it won't be valid audio. These errors will play back as distortion, frying, hissing, and clicking on the copy.

What these record companies don't get is that if you can hear it play back on any player, you can copy it. Even if you copy from the analog outputs of your CD player it will still sound 10 times better than the MP3 it will be turned into before it hits the Web. All they have succeeded in doing is preventing lots of people from buying the CD because they can't play it back on their CD players. So they will buy the bootleg version that will play back on anything.

Keep in mind that the Red Book standard has no provisions for copy protection, and therefore any copy-protection method makes the disc non-Red Book compliant. Sony/Philips could actually pull the license of the plant pressing these copy-protected CDs. I guess that would be the ultimate copy protection: Don't press any CDs and they can't be copied! Hang on; let me call my patent attorney — I think I could be on to something....

I'll get to DVD-A, DSSD, and FEM next month. ■

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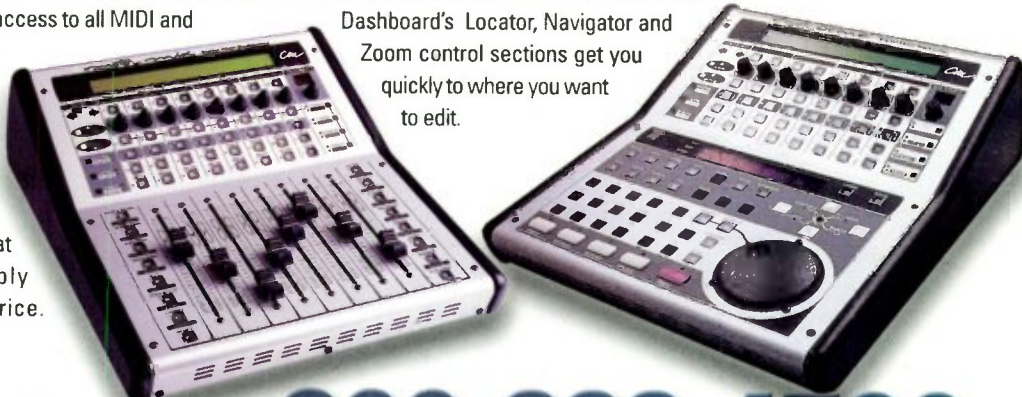
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sound creative

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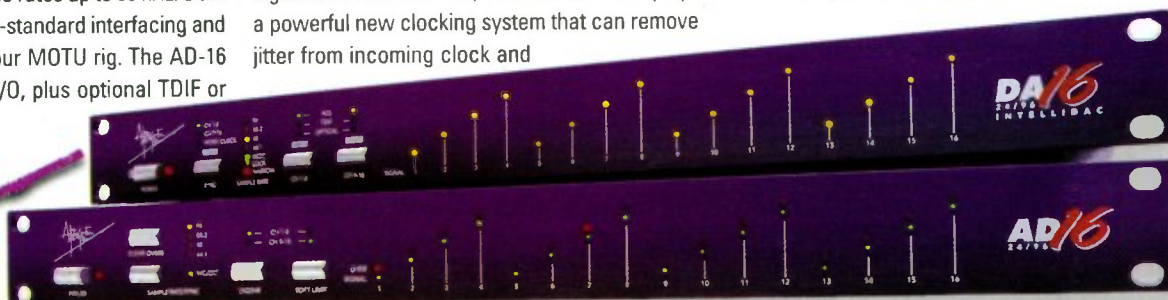
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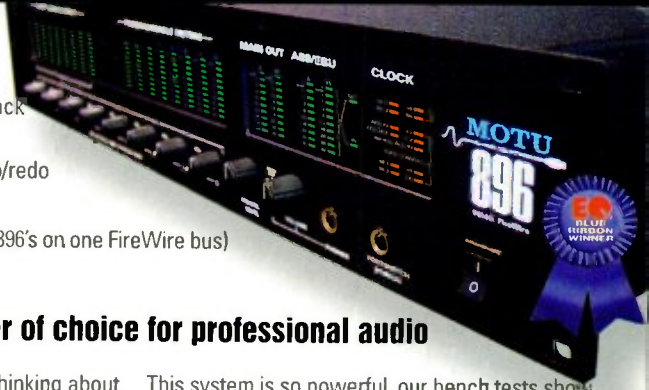
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As the disc turns

I Want My DVD

Actually, I also want my CD-R, CD-RW, CD-ROM, DVD+RW, DVD-R, DVD-RAM, CD-RW, DVD-ROM, DVD-A, DSSD, and FEM. Wasn't it much easier when there was just 33-1/3 and 45 RPM discs and cassettes? I even had a turntable that mounted under the dash so you could play records in your car. I used to make compilations of my favorite songs by copying them to my Rek-O-Kut portable disc cutter — in 1960! But I digress.

DVD+RW

The DVD+RW Alliance consists of Dell, HP, Mitsubishi Chemical/Verbatim, Philips, Ricoh, Sony, Thomson, and Yamaha. Some of these companies have started shipping re-recordable DVD+RW drives. The first version of the drives does not record DVD-R, but only DVD+RW. The next generation of drives will support DVD-R, although current drives will not be upgradeable. A DVD+RW disc is compatible with DVD-ROM drives and standard DVD players.

What makes DVD+RW different is that you can record video directly to the drive without authoring first, just like your trusty VHS machine recorded whatever you shoved into it. You can also punch into previously recorded video. This is made possible by the zero gap recording process used in DVD+RW. After you have re-recorded one minute in the middle of a two-hour disc, it will play back without a glitch on your video DVD player. As for current DVD-R/RW discs, the DVD player will not play past the first insert. As far as the player is concerned, the disc is corrupt and nothing can be accessed past the edit.

The drives will record on CD-R and CD-RW, which means you only need one drive for all of your burning desires. By the way: HP has announced that it will discontinue the manufacture of CD-R/RW drives. With prices down to \$79 for some CD-R/RW drives, it is time to move on to the next level. Backward compatibility with CD-R/RW makes the transition easier, but \$500 for a drive is a big jump for some. Just remember that one year ago DVD-R drives were \$2,000 to \$5,000. Maybe I will wait until they come down to \$79.

CD-R/RW LEFTOVERS

I still went out and bought a couple of CD-R/RW drives. Plextor is shipping their new 40x write machine. I tried it out, and a full 80-minute CD-R burned in 1:52. Yup, that is less than two minutes to burn 80 minutes of music.

The new 40x drive uses what is known as Z-CLV, or Zone-Constant Linear Velocity. Constant Linear Velocity means that the same length of groove goes by the laser whether you are reading the inner part of the CD or the outer part. That is why you see the CD slow down as the music plays. The rotation speed changes from 500 to 200 RPM, but the groove passes under the laser at a constant 1.2 meters/second. If you recorded the entire disc at 40x, the disc would be turning 20,000 RPM at the inner diameter, slowing to 8,000 RPM at the outer edge. At 20,000 RPM, someone could get hurt!

Now, if we spin the disc at 8,000 RPM, the write speed at the center would be 16x normal. As we get a little farther along, the groove is going past at 24x, and then 32x, and finally at 40x. These are the "zones" in the Z-CLV system.

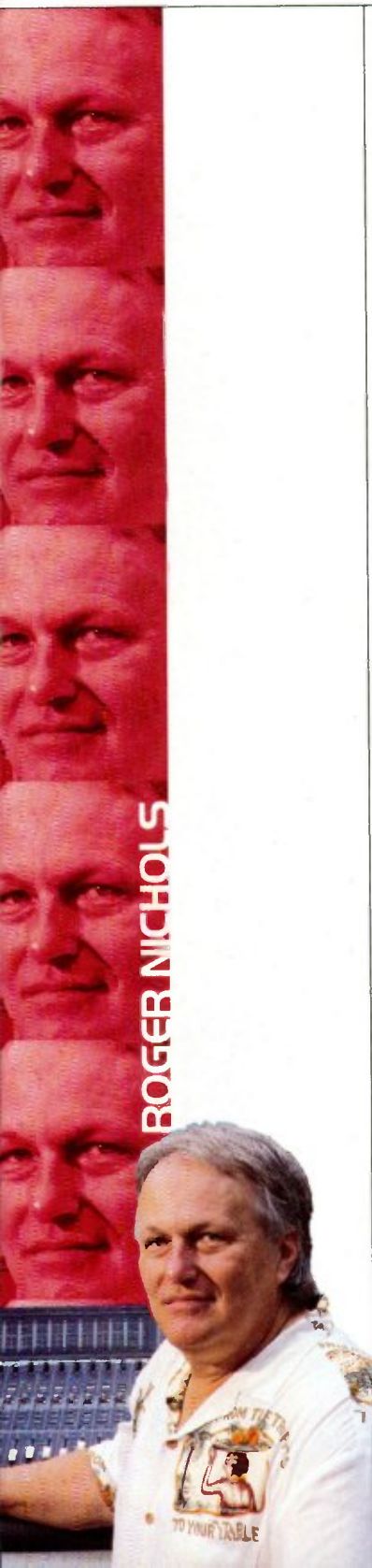
Remember that most CDs burned only contain 350 MB, so you will never get into the 32x or 40x zone. But if you're like me, you have to have one anyway.

Yamaha has another card up their sleeve with their Lightspeed 3 24x drives. They have a new slant on CD burning called "Audio Master." They actually write the disc at 1.4 meters/second instead of 1.2 meters/second. This means that you can only get 63 minutes of audio on a 74-minute disc, but the pits and lands that represent the data are slightly longer. This is still within the Red Book specification of $\pm 10\%$. The disc plays back at the same speed as it was recorded. The pits whiz by at the same number of pits per second, they're just longer so the disc spins faster. It all works out.

Yamaha says that this system reduces jitter and produces better sounding CD-Rs. I burned one today and listened back, but it sounded the same as the normal speed disc. I will have to do more checking on this one.

► continued on page 133

ROGER NICHOLS





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