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exclusive:
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1997 • ISSUE FOUR

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FUTURE

by george massenburg

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Our compact mixers and 8-bus consoles re-defined their product categories by combining high performance, great value and extra features. Now our Fast Recovery Series™ M•1200 sets a new benchmark for amplifier value.

It can help your speaker cabinets put out tighter bass. It can enhance high-end audibility and detail. And it can survive sizzling ambient temperatures and brown-out voltage drops that shut down lesser amps.

ADVANCED TECHNOLOGY MEETS ADVANCED MANUFACTURING.

The FR engineering team is supervised by Greg Mackie and headed by Cal Perkins. Back in the late '60s, both of them were building their first amps. Greg's blew up a lot. Cal's didn't. Cal went on to become one of the pro audio industry's acknowledged power amplifier experts. Although Greg decided to major in mixers, he maintained an on-going interest in amplifier design. Now Cal & Greg have joined forces — backed by a talented support team and state-of-the-art automated manufacturing facilities that keep prices low and quality high.

The FR Series Development Team

FAST RECOVERY DESIGN SOUNDS GREAT AT MAXIMUM OUTPUT LEVELS.

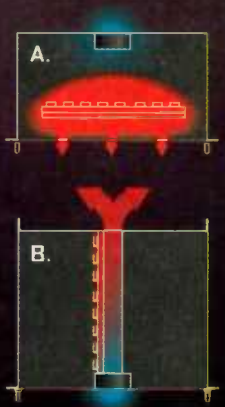
Thanks to exotic technology borrowed from high-speed digital components — and sparing use of negative feedback — the M•1200 keeps sounding good when driven to the edge and beyond into big, ugly reactive loudspeaker loads. Feedback from an amp's output section "tells" its front end how to behave.

Unfortunately, when a conventional amplifier is driven into clipping, "corrective" feedback actually makes things worse. Most amplifiers experience internal saturation that keeps them "latched" in a state of clipping longer than necessary, resulting in painfully audible distortion. The M•1200 uses a high-speed, latch-proof design with extremely low negative feedback. It eliminates high-frequency "sticking" and gives the amp enhanced stability when playing into reactive loads that can cause audible parasitic oscillations. Until now, this solid, proven circuit principle has only been found in very expensive power amplifier designs.

The M•1200 achieves efficiency just 3.5% under the theoretical maximum possible (versus typical amps that run at 65% efficiency or less). For lower distortion and wider power bandwidth, our fully discrete Fast Recovery design employs full complementary-symmetry all the way from input to output. The output stage delivers in excess of 60 amps of current and is capable of 4000 watts dissipation.

T-DESIGN CONSTANT GRADIENT COOLING FOR ENHANCED THERMAL STABILITY.

If the intense heat generated by amplifier output devices isn't conducted away, reliability drops dramatically. Cheaply-built amps just push air through the whole chassis (Fig. A). Not much of it actually gets to the hot output transistors — and the rest ends up coating the amplifier's internal electronics with rat fur and tavern dust. Better amp designs use a linear cooling tunnel with a fan at one end (Fig. B). But the transistors farthest away from the fan get bathed in progressively hotter air, causing a temperature increase of up to



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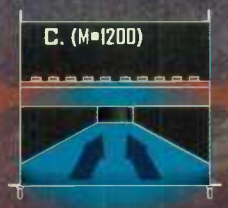
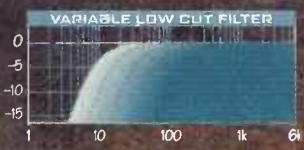


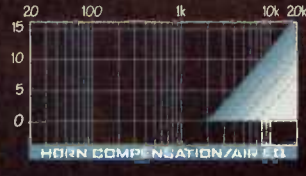
80° F (and potential failure).

The M•1200 uses a T-design that cuts tunnel distance in half. All power transistors are flooded with cool air concentrated through an oversize front manifold (Fig. C) that keeps airborn spooge away from internal electronics. A variable-speed fan controls air flow based on the cooling demands of the amplifier. The result is a far more constant temperature gradient and vastly increased reliability. In fact, the M•1200 will run all day into 2-ohm loads at ambient air temperatures as high as 113° F!



No extra plug-in cards. No unsuccessful fiddling with a graphic equalizer. Instead, precise control.

Variable high frequency compensation. All compression drivers mounted on Constant Directivity horns require compensation somewhere between 2.5kHz and 5kHz. But until now you had to rely on hard-to-find, harder-to-adjust crossover modules (or resort to tweaking a graphic equalizer, which works poorly if at all). The M•1200 has variable compensation that's sweepable from 2kHz to 6kHz (we extended the high end boost another 1K so that you can also use the control to add "air" equalization).



Subsonic stabilization. Visible, random woofer cone movement is a symptom of subsonics. Caused by the extended low-end bandwidth of modern condenser mics and exaggerated by stage vibration, subsonics rob amp power and cause intermodulation distortion. The M•1200's input stage includes a circuit that eliminates subsonics. Woofer cones stay rock steady, centered in their voice coil gaps, ready to reproduce only the frequencies that you can hear.

BUILT-IN FEATURES INSTEAD OF EXPENSIVE ADD-ON MODULES.

Switchable low pass subwoofer crossover. Want more bass in your PA system? Just buy an M•1200 and a subwoofer. There's no need for an external electronic crossover or plug-in amp module... because the M•1200 has a built-in 18dB/octave, linear-phase, uniform-time-delay filter with selectable 63 and 120Hz roll-off frequencies.

Variable low cut filter. Feeding a speaker system frequencies below its tuned bass cut-off point, results in terrible sound and potential woofer damage. Our variable low-cut filter lets you dial in the right transition frequency for your speaker cabinets or stage monitors — anywhere up to 170Hz.

WE HAVE BOTH ENDS COVERED.

Compare the M•1200's front LED displays with comparably-priced amps. We not only provide Signal Present, Standby and 5-step level displays for each channel...we also include Cold and Hot temperature indicators and an industry first — a Short Circuit LED that warns you in advance of a short circuit during set-up or operation. Multi-step detented Level controls are calibrated in both dB and volts for accurate system set up and adjustment.

The back panel is equally complete. Instead of just 1/4" input jacks found on "stripped down" amp models, we've also included a balanced female/male XLR set to make signal pass-through and signal splitting easy. Outputs include extra-heavy-duty binding posts spaced on 3/4" centers for bridged operation.

5-way binding posts & 1/4" TS outputs
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Clipping Eliminator/Subwoofer switch
Stereo/Mono/Bridge selector
Ch. 2 horn/"Air" EQ control
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Plus there are a lot more features including elaborate short circuit, overload and thermal protection, automatic turn-on delay, lighted rocker power switch, double-sided thru-hole-plated fiberglass circuit boards, up-front center of gravity and rear rails for extra stability in road racks.

We could go on and on. And we *will* if you call us toll-free for more detailed information.

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EQ
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& SOUND TECHNIQUES
VOLUME 8, ISSUE 4
APRIL 1997

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The introduction of DVD-Audio opens up a whole new world to the audio-production community — if the standards are set properly. In this EQ exclusive, George Massenburg reveals how he feels this exciting new format should be handled and why we as an industry should support it.

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The many faces of George Massenburg. Photo by Ed Freeman.

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Playback to the **Future**

Why we've done what we've done this month

This issue's cover story began in a bar in Las Vegas. Actually, you should credit it to Herbie Hancock, a fellow project studio owner, a fellow *EQ* reader, and a former cover story himself.

There I was at the Consumer Electronics Show (CES) having a drink with a friend. And there he was, right off the exhibition floor where he had been looking at all the latest gadgets. He joined me for a drink and the conversation quickly turned to the latest DVD players on display at the show.

"What's it going to mean to audio?" Hancock was asked.

"It's going to mean a lot of things — if *they* let *us*," he replied.

The word *us* was the key to his comment because he was talking about *us*, the creative recording community. *Us* referred to the guys who actually make the records to begin with. *They* referred to the mega-electronics conglomerate powers that be.

"What I've always thought," Hancock continued, "is that it would be great to make a record that sounded like it does in the best seat in the house."

"And where's that?" he was asked.

"On stage. Nobody ever hears a performance as good as it sounds on stage, when you are right in the middle of the music. Imagine being able to place the listener right on stage as a member of the band. Imagine being able to move that listening position around from place to place with a mouse — so you can hear the performance from the piano bench, or from behind the drum kit, or from across stage where the bass player is playing."

This was only an idea that could come from a musician. It was nothing that some ivory-tower audio engineer would ever dream of back in his lab in Tokyo. It was the kind of concept that only could come from someone who knew, firsthand, what music should sound like and where it could sound the best.

That's when it came to me. Somebody has to set the record straight. Before the hardware marketers and their engineering departments determined what the audio playback standard will be for the next 20 years, somebody had to stand up and be counted. That somebody had to be from the recording community. That somebody had to have credibility with the hardware community as well as the respect of the record companies. *EQ* would offer the forum, even though such a mission is beyond the domain of our usual "how-to, hands on" editorial. But then again, we're talking about changing the world, establishing the future of recording. That's something we've done before when we were the first to preach the gospel of the project studio long before anyone else.

Herbie told me he was too busy to write such an article. That's when I realized who the author had to be.

I called George Massenburg the very next day and gave him no other choice but to write the definitive manifesto about what the next generation of audio should and could be. George was too busy. George was off to Japan. George simply had too much to do.

George had no choice. I didn't give him one. Besides, the opportunity and its potential impact obviously intrigued him.

The result is our cover story this month — the longest, most technical article we have ever published in *EQ*. We encourage everyone to read it and pass it on. Talk it over. Argue about it. Scream and shout. Get excited and overheated about its implications. Spew your guts on the Internet. And maybe — just maybe — someone will actually listen to what we, the creative recording community, have to say. We're the ones making the records — shouldn't we have some input about how they're going to sound when they finally reach the consumer?

The rest will be history — at least, that's what we're hoping.

Martin Porter
Executive Editor

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COLOR MY WORLD

I would like to make several corrections to Eddie Ciletti's "Electric Crayons, Anyone?" article in the January '97 issue.

First, Jensen Transformers moved from the address listed under "Where to Find It" in 1993. Our correct address is 7135 Hayvenhurst Avenue, Van Nuys, CA 94106.

Second, unless your readers are looking for lots of unpredictable "crayon colors" caused by output loads, the listed "6110k-b" and "10kb-b" are very poor choices. These parts were designed to be *input* transformers driving specific, purely resistive loads. *We know — these models were "cloned" from us over seven years ago.* They will exhibit wide variations in frequency response when driving real-world cable capacitances and inputs that could range from 600 ohms to 50 kohms. Incidentally, the model numbers for these parts should include the RE- prefix. The impedance ratio for the "13k6c" is 150/3.7k, *not* 150/37k as listed.

Third, readers should exercise caution replacing selenium rectifiers with silicon in DC filament supplies. In fig. 4, this could result in 15 to 16 volts on the heaters. I'd suggest starting with R10 around 10 ohms and adjusting its value downward until heater voltage is within a few percent of 12.6 VDC at normal power line. Even a 10-percent increase in heater voltage dramatically shortens a tube's life and increases its self-noise as well.

Also in fig. 4, the center conductor of the power cord, which I assume to be safety ground, isn't connected to anything! Need I remind everyone that disconnecting safety grounds can be a fatally dangerous practice...even if it does fix a hum problem? A dotted line, which normally indicates a Faraday shield (copper foil placed between primary and secondary to prevent capacitive coupling), is shown on the primary side of the power transformer. Did the original transformer actually have a Faraday shield?

Overall, I liked the article and think it is a good one for novices. Keep up the good work Eddie!

William E. (Bill) Whitlock
President
Jensen Transformers
Van Nuys, CA

[Eddie Ciletti responds: Thanks for the comments Bill. Prior to this letter, I had actually noticed that the table printed was not the last one I had sent. It listed both Jensen and Reichenbach as manufacturers. The latter had been updated to Bauer Communications via e-mail, but apparently didn't make it to press. My apologies to Jensen for using an out-of-date address and to Bauer for the name mix-up (a long story that I will spare everyone).

Bill's point about increased filament voltage is well taken. Funny, I had no intention of encouraging users to remove the third-pin ground connection from the power cable to the chassis. While I do modify schematics to make them more readable, the omission of this connection is the fault of the original schematic and not representative of the actual construction. (I'll take credit for not spotting it.)

I cannot confirm the existence of a Faraday shield. The power transformer is a Peerless 6359 and it does have a braided wire coming from somewhere within the windings and connected to the chassis. I did confirm that changing the oxide-style diodes to silicon increased the high voltage supply. The selenium rectifier is still functioning. Had it been changed, I would have noticed an increase in the filament voltage.

Some of the changes had already been made to the version of the article presented at my web site: www.tangibletechnolgy.com.]

CORRECTIONS & CLARIFICATIONS

EQ Magazine apologizes for inaccurate information that appeared in the March 1997 issue, in which it was claimed that a studio is using Summit equipment personally built by Mr. Rupert Neve. This statement is not true.

In order to avoid confusion among Mr. Rupert Neve's clients and customers, *EQ* would like to make it clear that currently available Microphone Amplifier designs by Mr. Rupert Neve include:

- System 9098 Equalizer and Microphone Amplifier
  By AMEK Systems and Controls, Ltd.
- System 9098 Remote Control Microphone Amplifier
  By AMEK Systems and Controls, Ltd.
- System 9098 Dual Control Microphone Amplifier (First advertised on page 59 of the March 1997 issue of *EQ* Magazine)
  By AMEK Systems and Controls, Ltd.

In addition to the above list, several of the currently available AMEK range of consoles include Microphone Amplifiers designed by Mr. Rupert Neve.

Mr. Rupert Neve is vigilant to protect against inaccurate attributions, either inadvertent or intentional, of designs under his name He understands that in the aforementioned article, the inaccurate attribution was by an end-user and not by the manufacturer. He wishes it to be known that he personally knows the Directors and Owners of Summit Audio, Inc. and has the highest respect for them, their products, and their Company.

Martin Porter, Executive Editor

This letter is in reference to the cover story in the March 1997 issue.

Mr. Neve has never designed or built any equipment for Summit Audio.

I know that Rupert Neve's name has been used freely in the sale of questionable equipment. Summit is sensitive to this issue, and does not wish to be included among those who have no compunctions about using Mr. Neve's most valuable asset, his name, without permission.

It is my pleasure to know Mr. Neve, and I have the utmost respect for his capabilities and contributions to our industry.

Michael Papp, President
Summit Audio, Inc.

TAXMAN

I read with some interest the article by Martin Polon in the February 1997 issue about independent contractors. As this has been a topic of serious study and practice for me for many years, I would like to expand on several of the points made by Mr. Polon.

No one should structure their business, finances, or tax life based on a magazine article. But it is a springboard from which one can and should plunge into the pool of resources available for study, research, and planning.

One of the best of these resources is *The IRS vs. The Film and TV Industry* by Richard Sheffield, and published by The Association of Freelance Professionals. (As of this writing, the phone number for this organization is out of service.) Mr. Sheffield has put together an excellent practical guide for independent contractors and their po-

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I'm in Heaven, Michael Melinda – Electronic Musician July 1996
It's Spectacular, Zenon Schoepe – EQ, Full Review, December 1995

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tential employers in entertainment-related fields.

On June 30, 1995, Rep. Jon Christensen (R.-Nebraska) placed a bill into the U.S. House of Representatives (H.R. 1972) to address the issue and simplify the IRS classification factors from 20 to 3. His bill makes a great deal of sense for entertainment professionals. Although Mr. Christensen does not represent my district, I have written to him voicing my support of his bill from a small business point of view. As of January 29, 1997, the status of the bill in the House Ways & Means Committee shows "No Action Taken." I urge all audio professionals to read Mr. Christensen's bill. If it makes sense to you, contact him as well as your own representative, and voice your concerns and support.

The issue of independent contractor vs. employer vs. the IRS should be at the forefront of every independent audio professional's mind. Don't allow yourself to see the "dark side" of the law. I urge you to study further and seek good counsel from a tax professional of your choice.

For those who may be interested, I have placed many of the resources, as well as other materials relating to IC status in "The Library" section of my Web page. Please feel free to access the information.

Toivo Maki
Intermedia, Riverside, CA
www.pe.net/~tmaki/intermedia.htm

CORRECTIONS

What can we say except, "Oops." In the February issue's Adrian Belew cover story, the engineer pictured with Belew on page 70 is not Gary Hedden. It's Ken Latchney. Also, in the March issue, Bill Coe, who performed the Soundcraft mod for the Trocadero Club, had his phone number incorrectly listed. The correct number is 610-359-5424. We apologize for any inconveniences either of these errors may have caused.

WRITE TO US

Send your letters to:
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CIRCLE 145 ON FREE INFO CARD

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LAST-DITCH EFFORT

Q *I have problems from the 4th dimension concerning three TASCAM DA-88's with an SY-88 card in machine #1 and an RC-848 remote — actually, major problems with dropouts and noises/skritches. I have been to TASCAM twice in person and even got a tour of the repair facility plus a tutorial on how to clean the machine. They even swapped my #2 machine for a refurbished one, which didn't work out.*

I've had the machines for a couple of years — very low hours, pristine environment. I'm the only one to touch the stuff; I'm not a novice and have used TASCAM since the 3340 days, always with great results...until this system. If it won an Emmy, what's my problem?

There are some particulars about my setup's error/dropout problems that someone with experience may be able to help me with. I figure I will give it one last good go-around before I bail for Pro Tools — $12K is nothing to sneeze at in my financial circles.

I really do enjoy Eddie Ciletti's work in EQ *mag. Good communicator.*

Gary Rowles
Audio Media Services
Corvallis, OR

A Your letter addresses several issues, and so I do need more specifics. How many hours on each machine? How many cleanings? What are the serial numbers of each machine (to be kept confidential)? What brand(s) of tape do you use? Have you put the machines in test mode to determine the error rate?

Unlike the 3340, I would expect your machines to require routine service every 250 hours. The DA-88's keep track of their hours and number of cleanings. Aside from the obvious head-related problems (cleaning, tape path, etc.) there is always the possibility that the quirkier problems are due to a leaky back-up battery. This is located on the top-most board and is most easily accessed by removing the top cover — rather than pulling the card.

Not knowing your serial numbers, there is a possibility that your machines were repaired, but only partially updated. One or all of your machines may be sensitive to certain types of tape. This might not be immediately obvious, but I recommend that all users check the error rate (in test mode as per my column) immediately after formatting. If the machine has difficulty locking to the tracking signal on tape, synchronization will be troublesome.

An example of an "older" serial number would be 100000. TASCAM calls this a LOT 10 machine. More recent machines have numbers in the 440000 range. Any machine with a letter after the serial number may have received some rework if, for example, between being shipped from Japan and arrival in the states a solution to a problem was found and implemented.

In November '96, I received a packet of information that consolidated the most important of the DA-88 updates. No matter how pristine your environment (unless you have a class 100 machine room), I also recommend the fan reversal/external filter mod that I have been installing in every machine I service. Without the mod, the fan draws dirt into the machine, which does it no good at all.

I do believe in hard-disk based systems, especially for overdubs. I think tape is great for tracking, archiving, mixing, and overdubs — in that order.

Eddie Ciletti
Contributing Editor
EQ magazine

IS TAPE DEAD?

Q *A salesman recently told me that units like ADAT are on their way out, and that DAWs are taking over. Is this true, and, if so, how would projects be sent to larger studios for mastering? Is the Internet really that safe, quality, time conducive, etc.?*

Grant Conklin
via the Internet

A Regardless of what multitrack recording format you use, you're still going to have to mix down to two tracks. At the moment, DAT is the preferred medium for stereo mixes, but CD-Rs are coming on strong. Some people still prefer analog, generally 2-track/half-inch. Sending files over the Internet is not really practical yet, given that a CD holds about 600 MB. Even at 28.8k, it would take forever to send the file to a mastering house in that format.

Once the mastering house receives the 2-track master, it is generally transferred over to the Sony 1630 U-Matic format,

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Hugh Robjohns, Sound On Sound, December 1996

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Roger Nichols, EQ, December 1996

"- the Finalizer offers a tweaker's paradise"
Ty Ford, Pro Audio Review, February 1997

"Very few products have thrilled me like the Finalizer"
Florian Richter, MusikMagazin, February 1997

"Resistance is useless"
Fritz Fey, StudioMagazin, Oktober 1996

THE WIZARD M2000:

Editor's Choice 1997
Electronic Musician, January 1997

Editor's Pick 1996
Musician Magazine, December 1996

"- the Wizard stands up to the comparison with a machine costing more than twice as much"
Mark Frink, MIX, October 1996

"- The M2000 will put you just about any place you can think of, and a few you probably haven't"
Ty Ford, Pro Audio Review, July/August 1996

"TC scores big again!"
Carl Coryat, Bass Player, August 1996

"- the overall impression was 5 Stars"
Roger Nichols, EQ, April 1996

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then eventually turned into a glass master for CDs.

Craig Anderton
Technology Editor
EQ magazine

A REMOTE REMOTE

Q *I purchased a TASCAM MSR-24 tape machine new last February '96 and am now looking for the remote for this unit (RTC-24). My local music supplier has told me that the RTC-24 is no longer available. The manual lists the remote as an accessory, so I can't believe TASCAM is not supporting it. Can you help in finding out if this product is available from TASCAM or where I may find one?*

Greg Van Newkirk
South Lyon, MI

A The TASCAM MSR-24 and its remote controller, the RC-424, were discontinued toward the end of 1995. Your local music retailer was correct in informing you that the remote is no longer available.

While the unit is not in stock here at TASCAM, I suspect that it is still available at a handful of dealers. I would suggest that you try contacting an assortment of TASCAM dealers by phone to try to locate a unit or contact your Regional Sales Manager at Innovative Audio. Their phone number is 810-674-9922.

As an alternative, both the TASCAM RC-848 and the MIDIizer will control the MSR-24 and could resolve this situation. For these products, you may wish to contact The Music Box Studios, Inc. in Clinton Township, MI at 810-263-1994.

Roger Maycock
Marketing Support Representative
TASCAM

NEXT STOP, RUMORVILLE

Q *A friend of mine is building a small studio. When I asked him what [recording] machines he's using, he said, "TASCAM DA 88's." "Traitor," I sez ('cause I have an ADAT). So he says, "Well, the ADATs have more problems." "Like what?" "Well, they have problems sync'ing up and other stuff..."*

I've never heard these rumors, especially about the XT. So between you and me, what's the scoop on the comparable reliability of these two machines?

Kenny Nemiroff
via the Internet

A Both the Alesis ADAT and the TASCAM DA-88 are video tape machines, and as such require routine maintenance about every 250 hours. I service both machines on an on-going basis and have no preference. Each company's product, when new, suffered through a "de-bugging" period. Some of these bugs continue to circulate as rumors despite having been rectified some time ago. (Alesis, for example, wasn't in the tape machine business before the ADAT, while TASCAM, with about 30 years experience, also had to weather the storm.)

Unfortunately, all companies ship new products that aren't quite ready for every situation. This is not a new phenomenon. When machines were made by Ampex, 3M, or Studer, knowledgeable studio technicians intercepted problems and reported back to the manufacturer with possible solutions.

As consumers, our job is not to overreact, but to provide valuable feedback [to manufacturers] in a nonthreatening way. Remember, while the machines now are far more complex, the end-users are predominantly nontechnical.

Eddie Ciletti
Manhattan Sound Technicians
NYC, NY

0-PIN TO SUGGESTIONS

Q *How do I connect an AKG 414 microphone with pin 2 [hot] to a Summit mic preamp with pin 3 [hot]?*

Thomas Ayers
Somerset, NJ

A It doesn't really matter which pin arrangement you have as long as you are using the balanced (XLR) inputs and outputs of the Summit gear. Pin 2 and pin 3 are treated equally with our units. In other words, the signal entering a Summit preamp will exit with the identical phasing as long as you are going balanced in to balanced out.

Note that the Summit MPC-100 does feature a –10 dB unbalanced output that is referenced to pin 2. So you can also use that output and retain your proper phasing, just with a lower output.

Feel free to contact Summit (408-464-2448) with any additional questions you may have.

Chris Gordon
Technical Support
Summit Audio, Inc.

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

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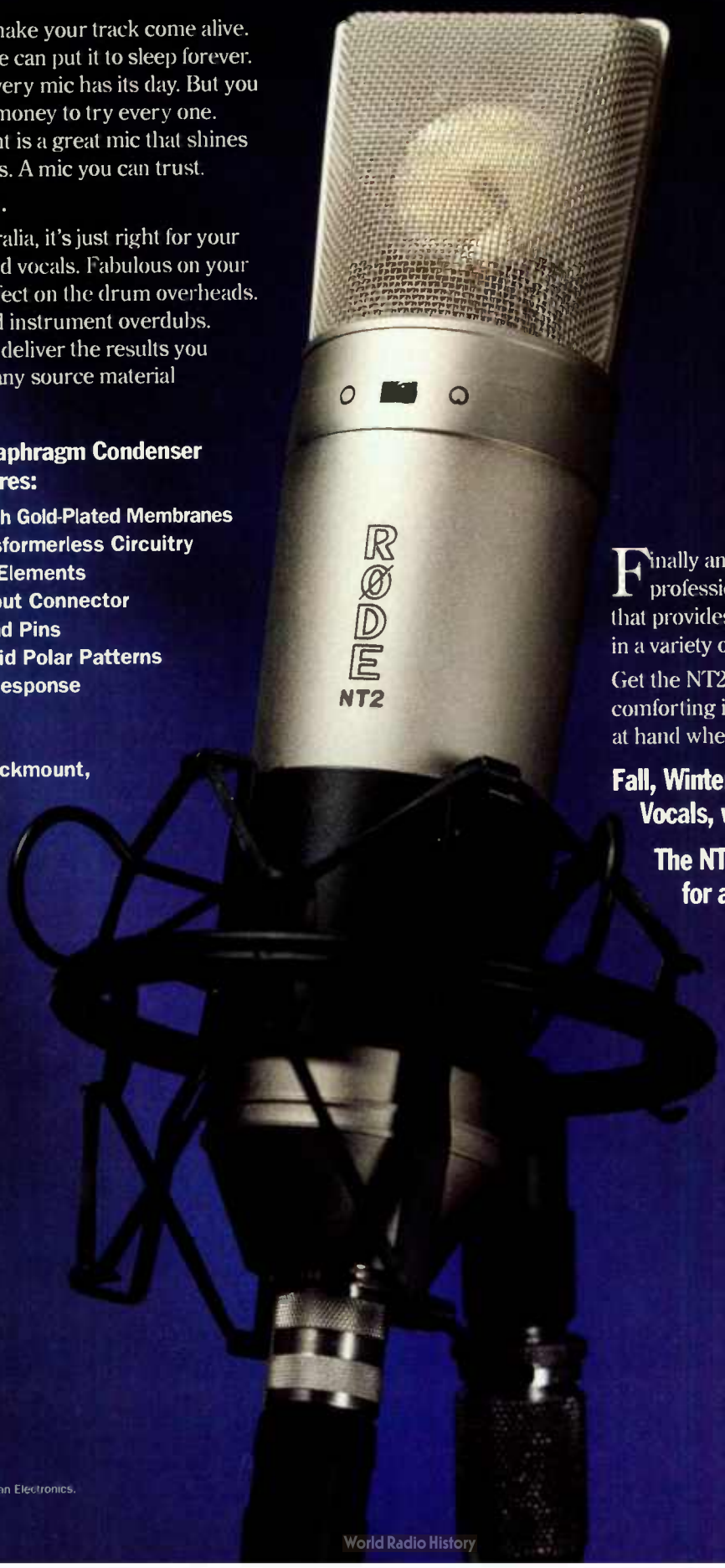

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THERE'S NO

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The TASCAM 564 Digital Portastudio®

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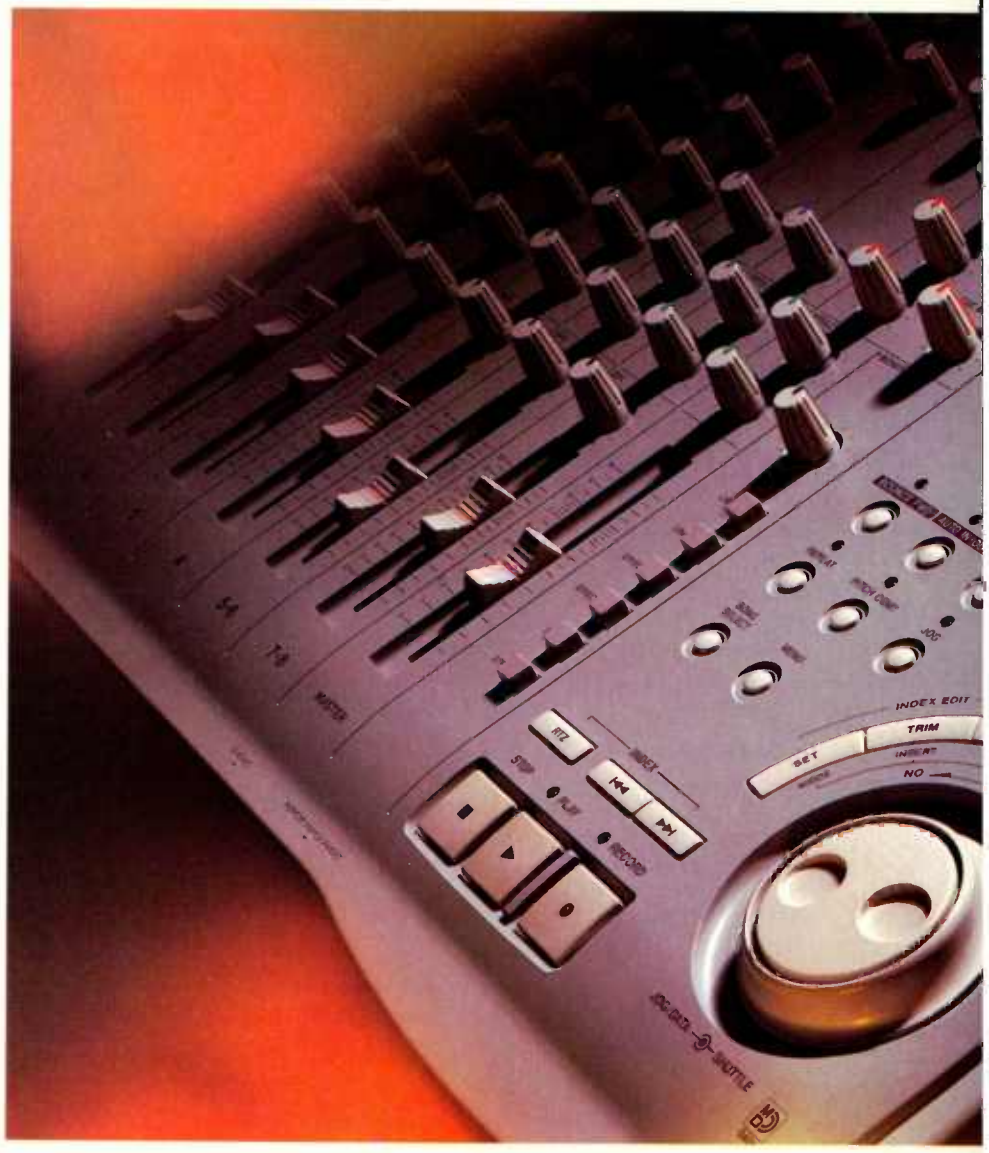
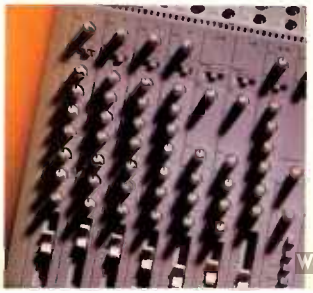
You're gonna love the 564's jog/shuttle wheel

Hear the difference! Only the 564 gives you audible, frame accurate jogging, cueing and index trimming. The others leave you guessing. Plus you can shuttle at 2, 8, 16, or 32 times normal play speed. Call up system parameters and alter values, even MOVE, ERASE and COPY with one hand tied behind your back.



Killer arrangements with exclusive Index Programming

Only the 564 lets you segment your song into as many as 20 patterns. And only the 564 has the hot new Index Program feature that lets you rearrange those patterns with as many as 99 steps for tremendous flexibility. Half the intro, double the chorus, or construct a whole new arrangement without losing the original — even after you power down.



The best mixer section in a MiniDisc Multitrack

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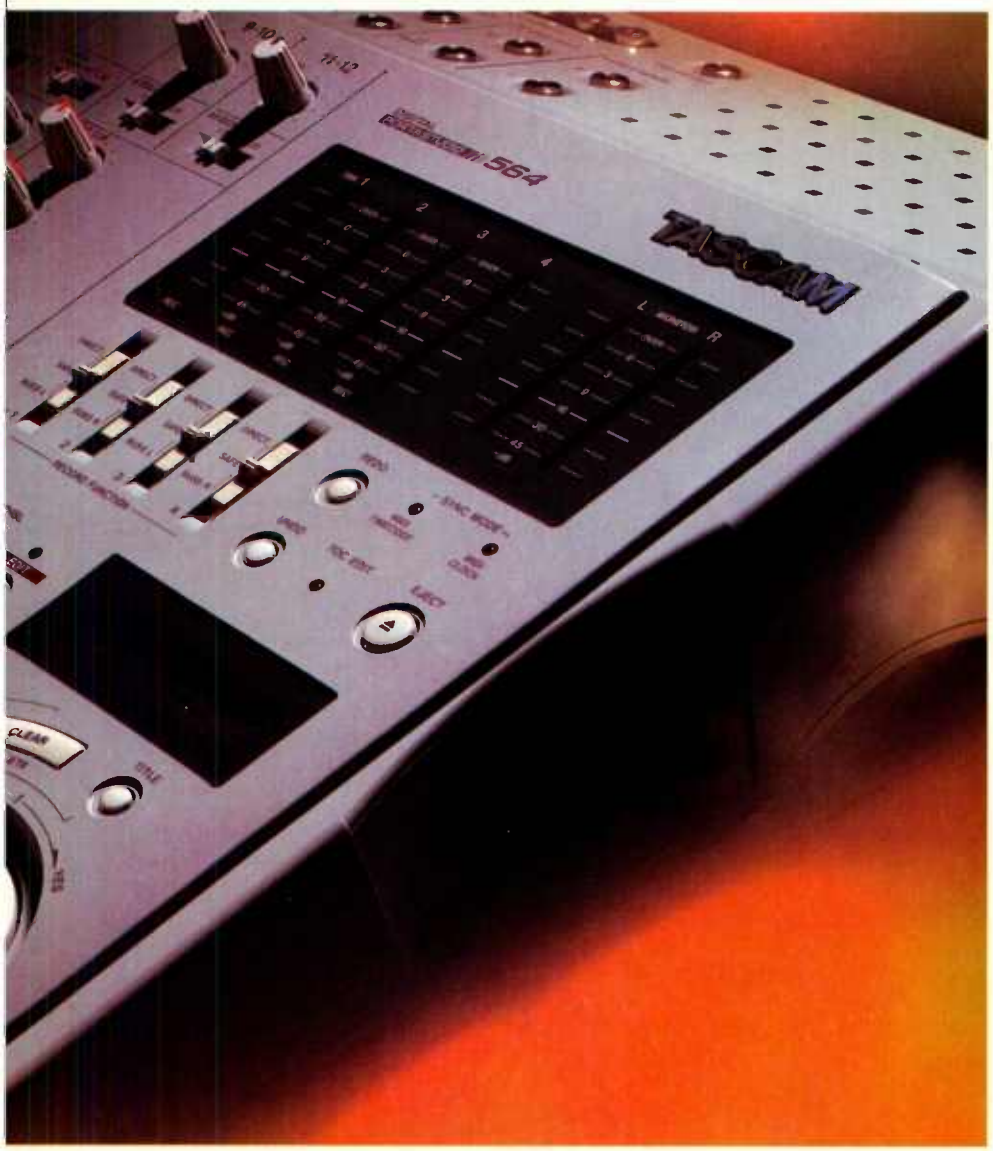
Imagine the perfect solo. Only the 564 gives you five takes per track to create it. With Auto Punch you can set frame accurate punch-in and out points, even do hands-free punches! To rehearse, just repeat between any two index markers for continuous playback. Only the 564 lets you choose from 0 to 9.9 seconds between repeats. You've got the licks. The 564 helps you make the most of them.

World Radio History

COMPARISON.



Instant gratification. It's the fastest!

The 564 leaves other MD multitracks in the dust. It's so fast, it doesn't even need a pause button. With the only transport exclusively designed for digital multitrack recording, it continuously loads data for lightning-fast index trimming and song arranging, plus smooth multiple-speed shuttling capability.

Flex your creativity with non-destructive editing

With the 564, you'll never lose your inspiration. You can always UNDO or REDO the previous edit with the touch of a button. Ping pong, overdub, or create multiple mixes of your song on a re-recordable disc you can stick in your pocket. The 564 even reminds you to save your original tracks. It's a complete digital project studio you can carry under your arm. And it's from the inventors of the original Portastudio.

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Ins and Outs: XLRs, MIDI and Digital

4 XLR ins. 4 mono ins. 4 stereo ins. Simultaneous use of 2 AUX sends. 2 insert points. 2-Track in. Up to 4 additional live inputs at mixdown with the exclusive Buss Direct System. Sync to your sequencer without wasting an audio track for Time Code. And the only MD multitrack that lets you digitally transfer your mix to DAT or CD-R via S/PDIF? You guessed it — the 564!

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EQ PRODUCT VIEWS

TILE ONE ON

Featuring 2-inch thick acoustical foam backed by 1/2-inch rigid fiberboard that will absorb sound within a room while blocking the transmission of sound through the ceiling, Acoustical Solutions Inc.'s AlphaTec Ceiling Tiles are 24" x 24" x 2-1/2" and are designed to drop into standard ceiling grids. AlphaTec Ceiling tiles have also been designed to adhere to an existing ceiling surface. Acoustical Solutions offers AlphaTec Ceiling Tiles in four surface patterns, as well as a smooth-surface tile. Tiles are available in white, grey, tan, and custom colors, and feature NRC .75, STC 21, and a Class 1 fire rating. For further information, contact Acoustical Solutions, 3603 Mayland Ct., Richmond, VA 23233. Tel: 800-782-5742. Web: www.acousticalsolutions.com. Circle EQ free lit. #101.

BACKING VOCALS IN A BOX

Smaller than 7 inches square and weighing only one pound, DigiTech's MIDI-free Vocalist Performer can provide up to two harmony vocals to accompany a vocal line, while also offering three reverb presets for different room ambiences. Hundreds of harmony styles can be created from the processor's 50 factory presets, each of which offers six possible variations. An optional accessory can allow the processor to be mounted on a mic stand for live applications, and DigiTech's optional FS-300 footswitch enables hands-free control of harmony bypass, A/B section switching, reverb on/off, or individual voice mutes. The unit provides a balanced XLR input, an unbalanced 1/4-inch TS jack (–10 dBv), and dual 1/4-inch outputs for either stereo or mono operation. For further details, contact DigiTech, 8760 South Sandy Pkwy., Sandy, UT 84070. Tel: 801-566-8800. Web: www.digitech.com. Circle EQ free lit. #102.

PATCH WORK

Project Patch Studio Kits from Signal Transport are complete "plug-and-play" studio wiring and patchbay systems, preconfigured to match the requirements of a particular combination of console and recording devices. Each Project Patch Studio Kit includes premium quality patchbays (either Project Patch bantam or Project Patch TRS 1/4-inch) plus all the necessary wiring and properly wired connectors for interfacing with consoles, recorders, and outboard signal processors. Project Patch and Project Patch TRS patchbays employ an exclusive rear connector and jumper system that allows the user to reconfigure patch points and to change patch point modes (normalled, mult) without heavy modifications. Prices for the Project Patch Studio Kits start at about $1500 for a simple 8-track system incorporating the 48-point Project Patch TRS patchbay. For more details, contact Signal Transport, 3219 Pierce Street, Richmond, CA 94804. Tel: 510-528-6039. Circle EQ free lit. #103.

WEDGE OUT

Alesis's Wedge Desktop Master Reverb with Impulse Audition is a powerful processing engine in a compact control unit. The Wedge ($499) offers several reverb varieties, including halls, plates, rooms, and several special application programs such as Virtual Stereo rooms, flexible gated reverbs, and effects designed for postproduction use. The unit also provides other effects such as delay, chorus, flange, rotary speaker simulation, autopanners, multieffects, and more. The Impulse Audition button emits a full spectrum audio pulse in order to allow adjustment of diffusion, decay, and reverberation parameters. The Wedge provides four 45 mm sliders to adjust effects in real time, and has balanced 1/4-inch TRS inputs and outputs and full MIDI implementation for automated modulation control and program backup. For more details, contact Alesis Corp., 3630 Holdrege Ave., Los Angeles, CA 90016. Tel: 310-841-2272. E-mail: alecorp@alesis1.usa.com. Circle EQ free lit. #104.

World Radio History

HARD (DISK) CHARGER

Fostex's new hard-drive based DMT-8VL digital multitrack recording and editing system offers eight tracks of 16–bit, 44.1 kHz uncompressed digital audio tracks and a full-featured analog mixing console in one convenient package. The unit also offers 18-bit, 128X oversampling A-to-D conversion, and 20–bit D-to-A converters. The mixing section of the DMT-8VL incorporates 2-band equalization on each of eight channels and two aux sends. Each channel features an input channel select switch, a long–throw 80-millimeter fader, and a stereo inline monitor section. The DMT-8VL also offers direct inputs and outputs, independent monitor outputs, as well as the in-depth editing functions associated with digital recording. The DMT-8VL features a retail price of $1295. For more information, contact Fostex, 15431 Blackburn Ave., Norwalk, CA 90650. Tel: 562-921-1112. Web: www.fostex.com. Circle EQ free lit. #105.

DRESSED TO COMPRESS

The ACP-2 stereo/compressor/limiter/gate from PreSonus provides two channels of compression with full control over compression threshold, ratio from 1:1 to 20:1, variable attack and release times, and switchable hard/soft knee. The ACP-2 offers an Auto mode that provides a fixed attack time and program-dependent release time for simple operation. A Link button allows for true stereo operation and each channel features an 8-segment LED meter that displays gain reduction to –28 dB. The compressor section also features sidechain inserts for de-essing, ducking, and other spectral processing. The gates on the ACP-2 include switchable fast/slow attack times and high-cut filters for frequency dependent gating. Gate key inputs are provided for external triggering and gate release time is variable from .02 seconds to a full 2 seconds. Gate range for expansion is from 0 to –60 dB. Inputs and outputs are 1/4-inch TRS balanced or unbalanced, and each channel has a selectable +4 dBu/–10 dBv switch. The ACP-2 is housed in a single rack space, features an all steel chasis, and boasts an internal power supply for wall-wart-free operation. The ACP-2 is available at an MSRP of $349.95. For more information, contact PreSonus Audio Electronics, P.O. Box 84008, Baton Rouge, LA 70884. Tel: 800-750-0323. Circle EQ free lit. #106.

LA STORY

LA Audio recently expanded its Millenium range to include the EQX2 dual 3-band parametric EQ, the MLX2 dual microphone/line preamplifier with DI input, and the MPX1 microphone processor. The GCX2 is a 1U dual-channel unit offering dual mono or "master slave" stereo gating and compression. The EQX2 can be configured as a mono 6-band unit, and offers variable frequency and 15 dB cut and boost. Each band has a variable Q and each channel is also equipped with a high-pass filter switch for the removal of subsonics. The MLX2 is designed around an ultra low-noise input device for line level and direct instrument connection. The MPX1 is a single channel processor designed for one-step processing of vocal or solo instruments. The unit combines a mic/line preamplifier with DI input, noise reduction, a four-mode auto-compressor, and equalizer in a 1U package. For more information, contact SCV London, 6–24 Southgate Road, London N1 3JJ, England. Tel: 0171-923 1892. Web: www.scvlondon.co.uk. Circle EQ free lit. #107.

World Radio History

HI HO SILVER

Celestion has launched its first low-cost, true-vintage-quality guitar speakers, the Silver Series, which is comprised of four models. The V12–80 ($90) is suitable for all playing styles, providing a clean, open midrange and "glassy" overall sound. The V12-60 ($99) is more "laid back and bluesy," featuring a smooth, warm sound. The V10-60 ($79) is versatile and loud, and provides a tone with a glassy, defined sound. Lastly, the V10-40 ($69) features a dynamic, responsive top end. For more details, contact Celestion Industries, KH America, Inc., 89 Doug Brown Way, Holliston, MA 01746. Tel: 508-429-3600. Circle EQ free lit. #108.

SMOOTH TUBE

Bellari's RP583 Studio Tube Compressor uses a variable threshold circuit with a fixed unity input gain. Each channel of the RP583 features controls for Output Level, Threshold, Ratio, Attack, and Release parameters. An individual Active switch engages the effect, and each channel has a switchable analog meter for reading input signal level, output signal level, and gain reduction. The unit also offers 1/4-inch unbalanced or XLR balanced jacks and a sidechain circuit with 1/4-inch inputs and outputs for direct detector access. It has an MSRP of $700. For more details, contact Rolls Corp., 5143 South Main Street, Salt Lake City, UT 84107. Tel: 801-263-9053. Web: www.xmission.com/~rollsrfx. Circle EQ free lit. #109.

Sound better than you ever imagined...

patented

104 Aphex Aural Exciter® with Big Bottom® - 2 channel

106 Aphex Easyrider® Compressor - 4 Channel

108 Aphex Easyrider® Compressor - 2 Channel

TUBESSENCE®

12AT7 - Used in 107 and 109

Contact Aphex for the full technical scoop.

104: Bigger, deeper, fuller bass. Extended, natural highs and greater presence. Get more sound from your system without increasing peaks. Individual tracks or an entire mix will 'jump' from the speakers.

105: The Logic Assist makes this gate the most accurate and easiest to use in the world - no false triggering, clicking or chattering. The proprietary Aphex VCA 1001 ensures total audio transparency.

106: Invisible. This automatic compressor is so transparent that some people think it isn't working! Effortlessly maintain perfect levels without having to constantly adjust ratio, attack, release and threshold.

107: The award winning, #1 selling Tubessence mic preamp is the perfect marriage of solid state and vacuum tube circuitry. Upgrade the sound of all your mics with uncolored detail, presence and warmth.

These products are covered by one or more of the following U.S. Patent numbers: 4150253, 5359665, 5334947, 5450034, 5424488, 5483600.

World Radio History

DIGITAL MIKING

Designed to operate using a standard 3-pin XLR–connector output in conjunction with Digital Phantom Powering (DPP: 6–10 V, 150 mA) and a standard AES/EBU output, the MCD 100 digital condenser microphone from beyerdynamic can be connected to a digital console or digital recording device via a DPP–device. The A/D conversion is done with a 22-bit processor in the microphone. Thanks to the MCD 100's digital architecture, it's possible to operate with cable lengths of 300 m (up to 500 m with a special cable) without any loss or degradation of the signal. The MDC offers a cardioid polar pattern and a frequency response of 20–20,000 Hz. For more details, contact beyerdynamic, 56 Central Avenue, Farmingdale, NY 11735. Tel: 516-293-3200. Circle EQ free lit. #110.

THE BIG DESK JOB

Middle Atlantic Products' has designed its new Mutli-Desk Pro System expressly for musicians and audio professionals. At the center of the Pro System is the MDP-79 Multi-Desk. The unit measures 79 inches wide by 32 inches deep in order to accommodate an array of pro gear including large mixing consoles and 88-note keyboards. A number of Multi-Desk Pro options promise to deliver added system versatility. A 13-space rolling rack (model MDP-R13) offers a depth of 32 inches and can be stored underneath the desk when space is tight, or it can be connected at its sides to produce a wider work surface. Two other rack options, including the MDP-SR24, which is a 24-space sloped studio rack that measures 19.5 inches on the top and 23 inches at the bottom, and the MDP-DR13 dual 13-space unit that can double as a producer's desk, are also available. Suggested retail prices for Multi-Desk Pro systems start at less that $1000. For more details, contact Middle Atlantic Products, Inc., North Corporate Dr., Riverdale, NJ 07457. Tel: 201-839-1011. Circle EQ free lit. #111.

...at a price you won't believe

107 Aphex Tubessence Mic PreAmp - 2 channel

109 Aphex Tubessence Parametric Equalizer

105 Aphex Logic Assist™ - 4 Channel Gate

Is there really a tube in there?

When Tubessence® was first introduced with the Model 107, some people had trouble believing that it was a real tube gain stage. Skeptics say, 'It's a tube simulator', or 'It's a starved-plate amplifier', or 'The tube's not in the audio path'.

The "Reflected Plate Amplifier" (US Patent #5450034) is a true vacuum tube circuit which has the desired characteristics without the heat, weight, fragility, sonic variability, short life and high frequency roll-off of conventional tube designs.

108: The Wave Dependent Compressor simultaneously controls average and peak levels for the hottest tracks possible without the artifacts of other compressors. Finally, an 'auto' compressor that sounds better.

109: Got enough EQ? Two channels of fully parametric, two band, tube EQ, great for mastering or touch up. Track needs major work? Hit a switch and it's a mono four band. Unparalleled sound and flexibility.

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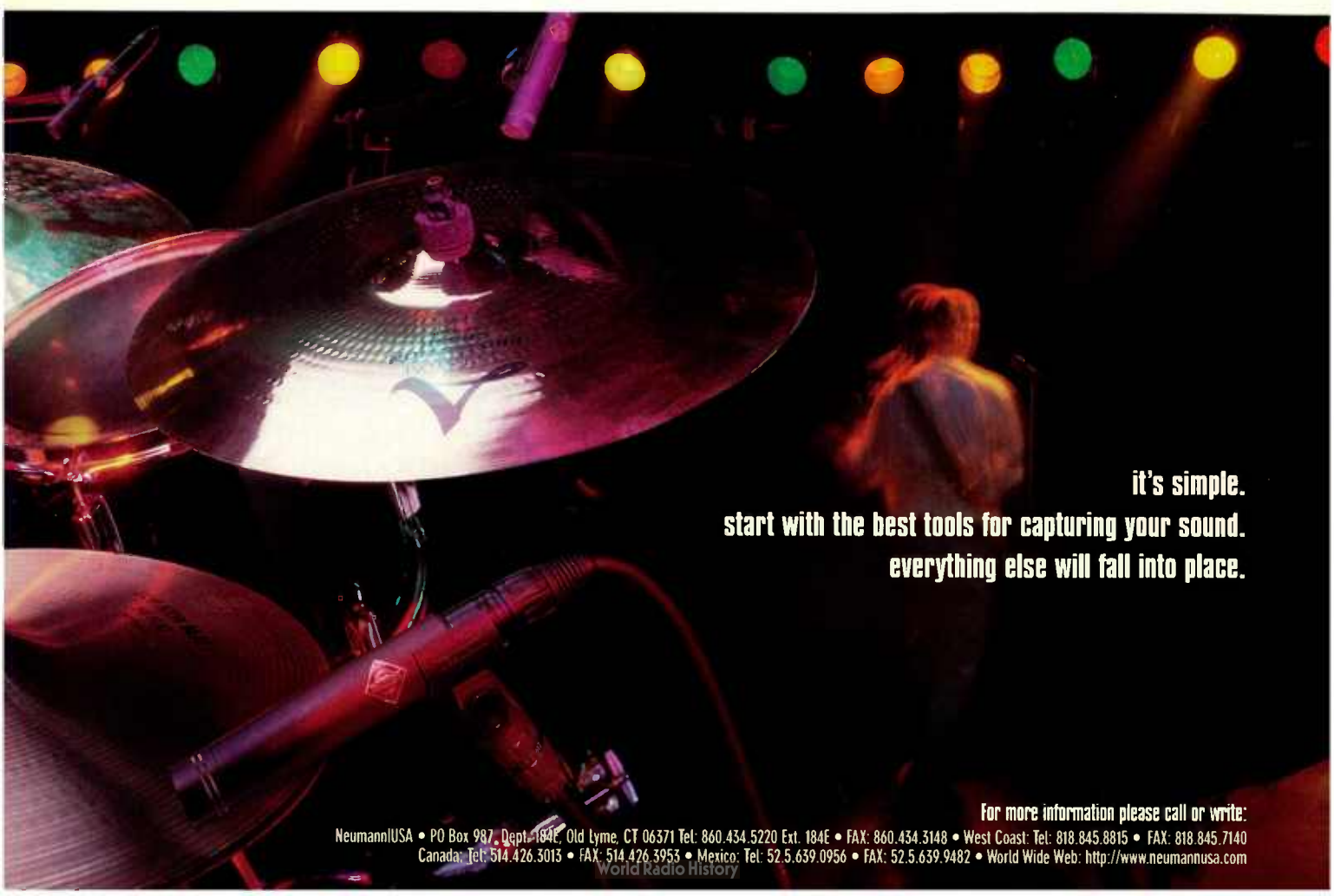
World Radio History

BG DEAL

The newly expanded BG Series of microphones from Shure is comprised of six cardioid models in total. The latest addition to the line is the BG6.1, which features an extended frequency response (80–15,000 Hz) and a high-output level. The BG Series mics are now utilizing neodymium magnet technology. Shure has also included dent-resistant grille, as well as a number of accessories including cables, gig bags, and stand adapters. Other models in the series include the BG 1.1, which was designed to be used with virtually any mixer or Portastudio™ and is operable between 80 and 12,000 Hz; the BG2.1 with its specially shaped frequency response of 70 to 13,000 Hz for live-sound applications; the BG3.1, which brings an added presence to vocals with a frequency response of 60 to 14,000 Hz; the BG4.1, which was designed for instrument use within studio environments; and the BG5.1 condenser mic, which features high sensitivity, wide dynamic range, and extended frequency response (70–16,000 Hz). Prices range from $83.33 to $305.56. For more details, contact Shure Brothers Inc., 222 Hartrey Avenue, Evanston, IL 60202. Tel: 1-800-25-SHURE. Circle EQ free lit. #112.

MORE WITH FOUR

Applied Research and Technology's Quadra/FX allows for the processing of four individual channels with totally separate effects. Featuring dual processors that utilize ART's proprietary VSLI ASIC chips, the Quadra/FX's algorithms include several different hall, chamber, plate, gated, reverse, and true stereo room and plate reverbs. The unit also offers delays, chorusing, flangers, tremolo and panning effects, pitch shifting, and precise combinations of multieffects. The Quadra/FX also has ART's exclusive MORE feature, which enables the user to enhance any program with "more" of just the right effect instantly with the push of a button. Price is $299. For further information, contact Applied Research and Technology, Inc., 215 Tremont Street, Rochester, NY 14608. Tel: 716-436-2720. Web: www.artroch.com. Circle EQ free lit. #113.



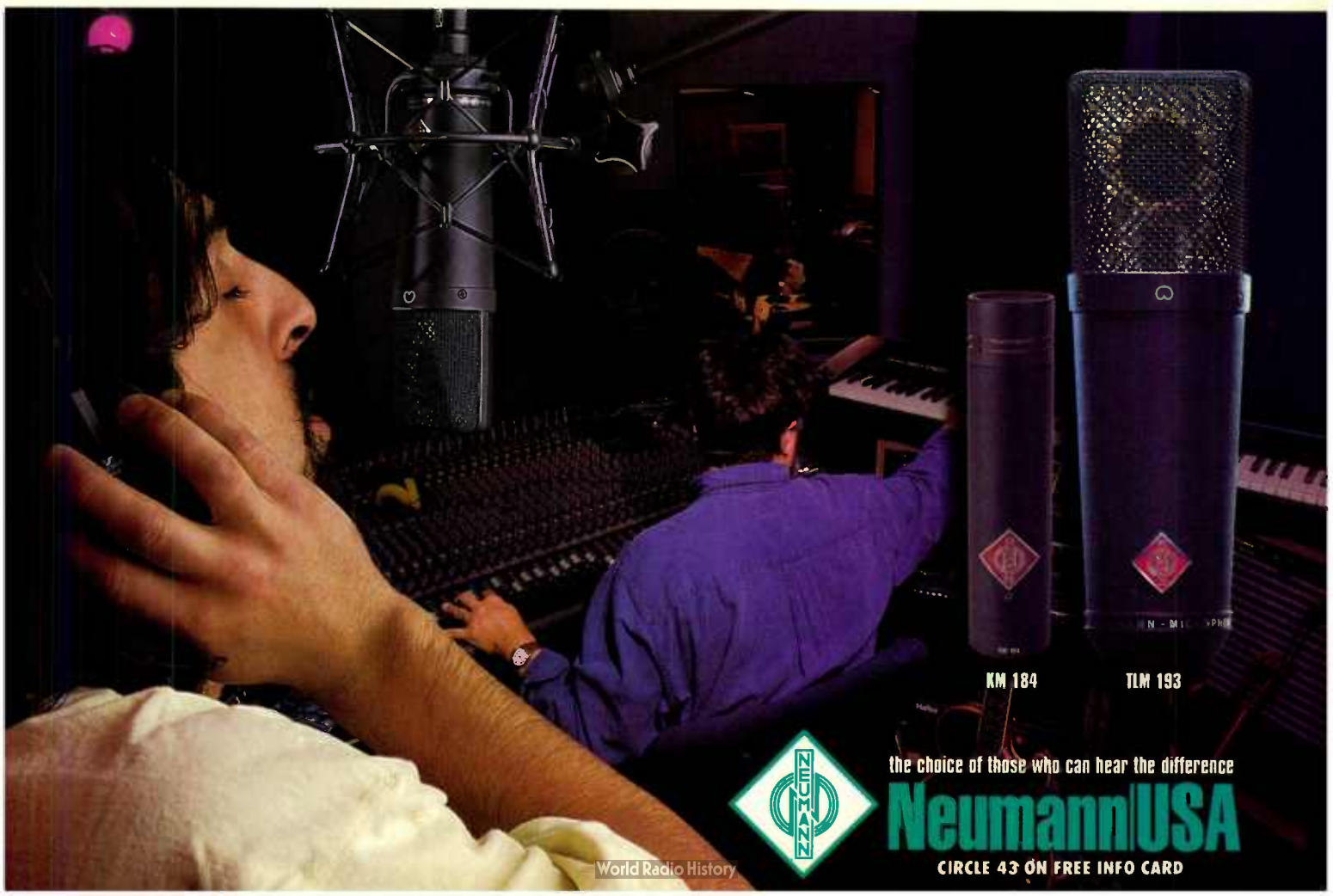
World Radio History

TALE O' THE TAPE

HHB has designed its new 45-minute S-VHS tape to provide ADAT users with a dependable, high-performance recording medium. HHB has manufactured and tested the tape specifically to withstand the wear and tear of a professional recording environment. According to HHB, the tape features a recording layer of ultra-fine Cobalt Ferric Oxide particles uniformly distributed to help reproduce a smooth magnetic surface while helping to deliver an enhanced high frequency response, low block error rates, and increased output levels. The cassettes are precision molded to ensure accurate handling of the tape and to minimize tape pack slack. For more details, contact HHB Communications, Inc., 43 Deerfield Road, Portland, ME 04101-1805. Tel: 207-773-2424. Circle EQ free lit. #114.

COMMAND CAPSULE

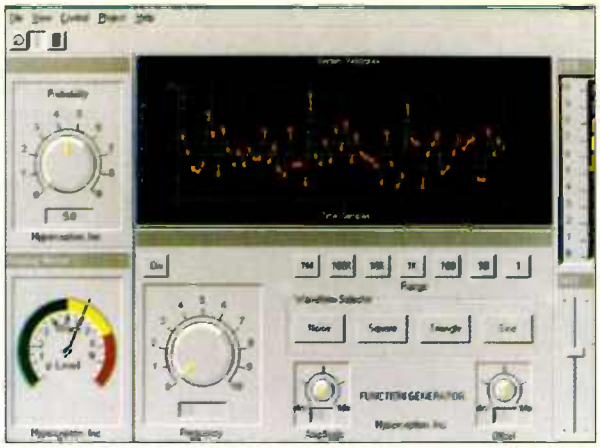
Neumann's newly designed AK 20 capsule for use with the KM 100 Miniature Microphone System can achieve the directional characteristic figure-8 with a single diaphragm. All of the soundfield components reach the 16 mm diaphragm directly without the internal path lengths of double diaphragm designs. The AK 20 capsule offers identical frequency response curves and identical response at 0 degrees and 180 degrees, solid low-frequency response, and an even directional characteristic, especially at high frequencies. For more details, contact Neumann/USA, P.O. Box 987, Old Lyme, CT 06371. Tel: 860-434-5220. Web: www.neumannusa.com. Circle EQ free lit. #115.



World Radio History

EQ STUDIO WARE

C'MON GET HAPPI

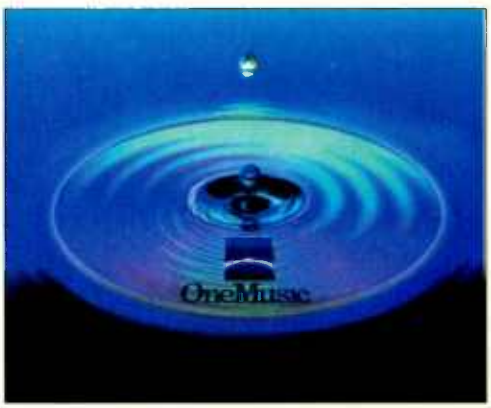


Hyperception's HAppl (Hyperception Application Interface) Wizard generates stand-alone Windows 95 and NT applications directly from visually designed, real-time DSP worksheets created in Hyperception's Block Diagram editor. The HAppl Wizard provides users with an executable version of their project. Within the visual design, user controls representing inputs, outputs, and tunable parameters are used to accomplish user I/O; objects such as knobs, sliders, keypads, meters, and displays are typical user controls. Once the project is designed graphically by the user, the worksheet is saved as a file, which is then used by HAppl to create the Windows application. Since the initial design is based on an open software architecture and utilizes a device independent DSP board driver, users may create a virtually limitless number of applications. HAppl is available from Hyperception at an MSRP of $1495. For more details, contact Hyperception, 9550 Skillman, LB 125, Dallas, TX 75243. Tel: 214-343-8525. Web: www.hyperception.com. Circle EQ free lit. #116.

SAIL INTO PORTMAN

MIDIMAN'S new Portman 4x4/S is a 4-in/4-out parallel port PC MIDI interface with SMPTE sync and 64 independent MIDI transmit and receive channels that can all operate simultaneously at full MIDI bandwidth. MIDIMAN has designed the Portman so that it can be used as a stand-alone patchbay when not connected to a PC. The Portman 4x4/S can read and write 24, 25, and 30 drop or nondrop frame LTC SMPTE formats. The unit also converts LTC to MIDI timecode (MTC) for sync'ing any MTC compatible sequencer to SMPTE. The MIDIMAN Portman 4x4/S plugs into the PC printer port and supports high speed bidirectional printer port modes, and is shipped with Windows MME-compliant multiclient drivers, remote control Windows software, and a parallel cable. Price is $279.95. For more details, contact MIDIMAN, 45 East St. Joseph Street, Arcadia, CA 91006. Tel: 818-445-2842. Circle EQ free lit. #117.

MAX TRAX



Liquid Trax, from OneMusic Company, allows users to "custom score" around a particular spot or visual with the help of an 8-track digital workstation. OneMusic will be offering an initial library of 200 high-quality albums featuring current tracks from established recording artists within a deep variety of music genres to complement its Liquid Trax application. Most of the songs available from OneMusic, which are distributed on CD by Firstcomm Music, are accompanied by submixes that are separated into three or four stereo pairs. Each stereo submix features a proprietary synchronization mark at the front of it. For more details, contact Firstcomm Music, 13747 Montfort Dr., Suite 220, Dallas, TX 75240. Tel: 888-ONE-MUSIC. Circle EQ free lit. #118.

PLUG IN WITH DBX

In a joint venture with AVID/Digidesign, dbx Professional Products has created the DC66 stereo compressor, limiter, and gate TDM plug-in, based on its 1066 compressor/limiter, for the Pro Tools System. Dual tri-color graphs at the top of the screen represent "below," "at," and "above" threshold (green, amber, and red, respectively) with movement in real time. The metering section of the DC66 offers computer rendered sliders and buttons which control gate, compressor, and limiting functions. The DC66 also offers such software specific applications as the ability to activate the plug-in's functions from any other track within the Pro Tools environment, as well as the ability to attenuate the response of the primary signal. The module also features dbx's PeakStopPlus, as well as selectable hard knee or OverEasy characteristics. The DC66 TDM plug-in carries an MSRP of $999.95. For further information, contact dbx Professional Products, 8760 South Sandy Parkway, Sandy, UT 84070. Tel: 801-568-7660. Circle EQ free lit. #119.

World Radio History

Do You Want The Original, A Copy Of The Original, Or Something Clearly Better?

MX12/4 High quality, medium quality and low quality mixers have a lot in common these days. They look alike and so do their ads. Success breeds imitators.

The look and the ad are easy to copy. Lots of our competitors are proving that everyday. Look around in this magazine and you'll see some disturbing similarities.

Yamaha has been among the most successful mixer manufacturers for years. We've had a lot of imitators through the years ourselves. It's hard to know which one to buy without looking inside. Remember, they all look alike and they're all trying to act alike.

But take heart. There are some differences you can hang your hat on. Look for the name Yamaha. Even if you don't know mixers, you know Yamaha is known for being "clearly better" in all we do.

If you do know mixers, you know that Yamaha supplies the largest touring sound companies with their world famous PM Series mixing consoles. The most demanding sound engineers in the world demand Yamaha's large PM consoles more than any other. Does this help us do small mixers better? You bet it does.

In the case of the new Yamaha MX 12/4, if you look closely, you can see some innovations that will save you money and make you look and sound better. Clearly better.

- $599.95 Suggested retail price
- 14 Inputs with 4 "real" buses at the other guy's 2 bus price range (After you buy your mixer, you'll have to buy a reverb and a graphic EQ, unless you bought something clearly better; The Yamaha MX 12/4.)
- An on-board digital reverb (No extra charge. Yamaha is world famous for its DSP technology.)
- An on-board 7-band graphic EQ (Again, no extra charge.)
- No Radio

When you cut corners you might get more than you bargained for. Like radio. Designing mixers with solid RF rejection is not easy. It's one of those "inside things" you can't see. We've been dealing with the most demanding customers in the world using mixers in the most demanding environments. We do it better than anyone.

If you're in the market for a 12x4x2 mixer and you can accept better quality and value than you expected for the money, the new Yamaha MX 12/4 offers you a clearly better choice.

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Call for more information.

YAMAHA®

SMART MIXING

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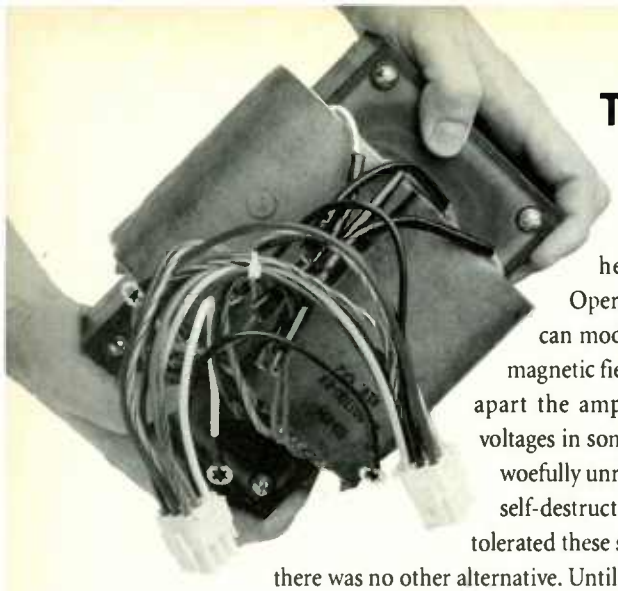
World Radio History

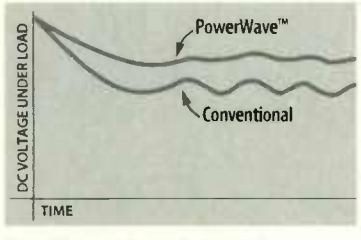


THE PAST...

High power amplifiers with old fashioned iron core transformers are dinosaurs. While effective at delivering raw power, these big, heavy, and slow devices have weaknesses. Operating at AC line frequency, the supply voltage can modulate the audio signal under clipping. Strong magnetic fields induce AC hum. Big transformers can tear apart the amp and racks on the road. Poorly regulated voltages in some popular high end brands cause them to be woefully unreliable and inclined to self-destruct. Audio engineers have tolerated these shortcomings because there was no other alternative. Until now...

...AND THE FUTURE

PowerLight™ amplifiers use patented PowerWave™ power supplies, the most efficient power supply available in audio. Operating at 114kHz, a one pound PowerWave™ transformer has more current capacity than a 50 pound conventional 60Hz transformer. Primary capacitors operating at a higher voltages more than double their energy storage. The result—a stiffer supply with more power and more energy storage for gut-wrenching bass. AC magnetic fields never enter amplifier circuitry—reducing hum to inaudible levels and increasing dynamic range. Reliability is increased because light weight prevents transit damage while the robust design and Intelligent Amplifier Protection™ keep the things working under conditions that would kill a conventional amp.



PowerWave sags less under load and has less AC ripple

Output Power in Watts per Channel

MODEL	8Ω*	4Ω*	2Ω**
PowerLight 1.0	200	325	500
PowerLight 1.4	300	500	700
PowerLight 1.8	400	650	900
PowerLight 2.0HV	650	1000	N/A
PowerLight 3.4	725	1150	1700
PowerLight 4.0	900	1400	2000

*20Hz-20kHz @ 0.1%THD **1kHz @ 1% THD

IN THE END, IT'S THE PEOPLE

No matter how good the gear, it's people that make the difference. We know your performance depends upon our peformance. When you buy a product from QSC you buy more than just a piece of equipment, you get our support and involvement. New PowerLight models and features have come from working directly with people like you. If our standard models don't meet your needs, our Technical Services Group can provide you with custom modifications. Need a question answered or got a problem? Get on the phone or the Web. It's like having your own engineering consulting group.

Contact QSC for more infomation...better yet, come by for a visit!

QSC's PowerLight Project Team *(clockwise from left):* ***Darrell Austin,*** *Technical Services Manager;* ***Pat Quilter,*** *Chief Technical Officer;* ***Robert Becker,*** *Design Engineer;* ***Greg McLagan,*** *Market Manager (Live Sound);* ***Doug Teulie,*** *Industrial Designer*

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"...excellent bass response... performance can exceed that of traditional amps, with the weight and energy savings as an added bonus."
Mix *Magazine*

"...the pure, high-quality, rich sound this amp provides is unmistakable."
Pro Audio Review *Magazine*

The new PL 2.0HV was designed for maximum power at 4ohms in a 2RU chassis, while the new PL 3.4 provides maximum power from a standard 120V, 15A line cord

ALL POWERLIGHT AMPS FEATURE:

- PowerWave™ Switching Technology
- Clip Limiter *(user defeatable)*
- Remote AC Power Control
- Data Port for Computer Control
- Variable Speed Fan(s)
- DC, Sub Audio, & Thermal Overload Protection
- Advanced Thermal Protection
- Patented Output Averaging™ Short Circuit Protection

"Zero defects, 450 shows"
Mike Southard
Southard Audio (Mt. Crawford, VA)

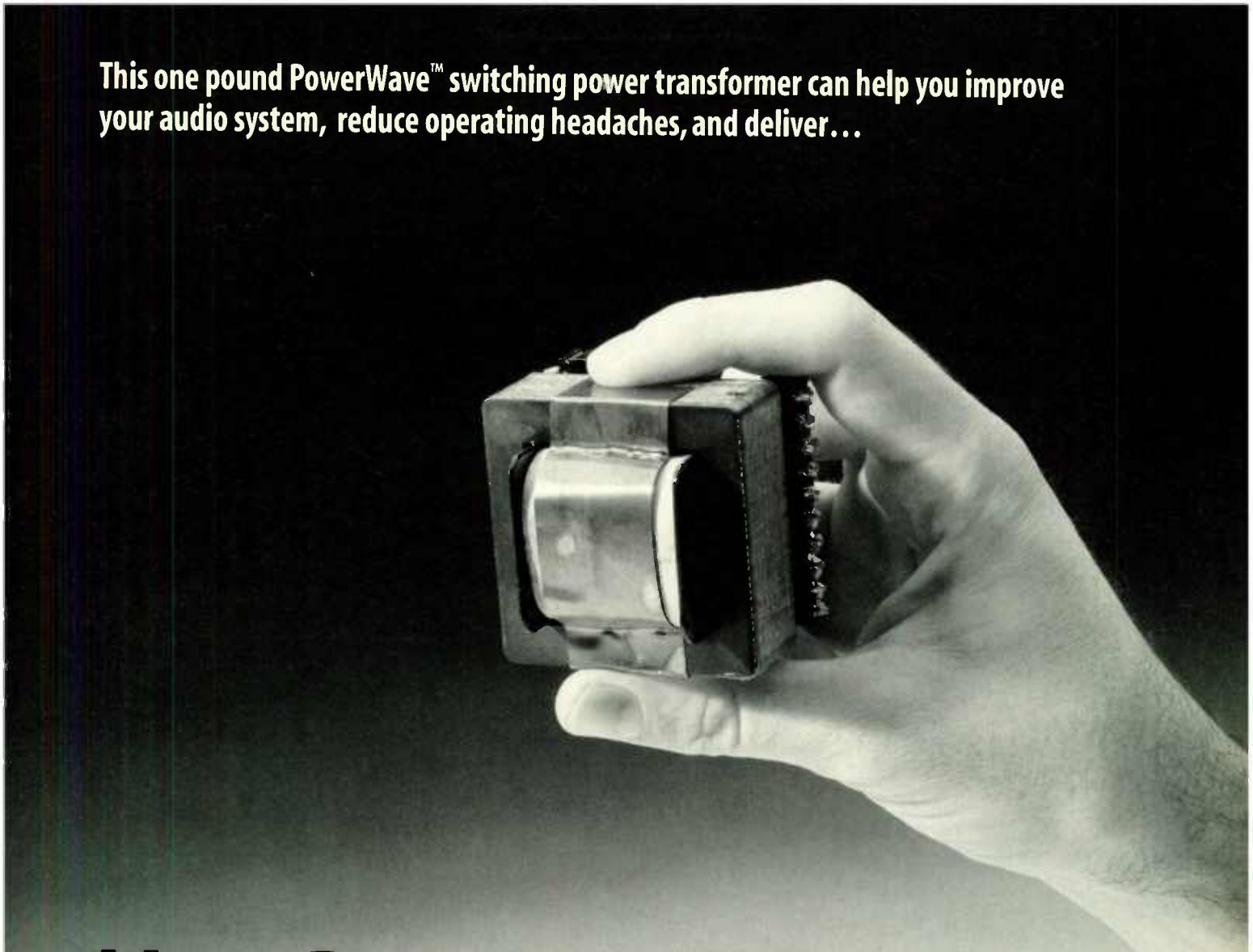
"I bought one ton of PowerLights and replaced 3 tons of conventional amps...you do the trucking math!"
Dave Cousins
Sound Arts (Winnepeg, Canada)

"...we feel that the best of all worlds has been created...light weight, sonic excellence."
Tom Smith
LD Systems (Houston, TX)

"Best sounding, most reliable amps on the road...hands down"
Dave Shadoan
Sound Image (Escondido, CA)

"...my choice for a long, long time..."
Jeff Lilly
Jason Sound (Vancouver, Canada)

This one pound PowerWave™ switching power transformer can help you improve your audio system, reduce operating headaches, and deliver...



More Bass, Less Noise and Fewer Problems

PowerLight amplifiers are the first lightweight amps to surpass conventional technology in both audio performance and reliability. Advanced PowerWave™ technology eliminates the bulky, heavy power transformers and their problems while improving audio. Large sound systems powered by PowerLight amplifiers are better sounding, more compact, lighter and more reliable than systems using the traditional solutions.

POWERLIGHT 8.0 COMING SOON

With thousands of shows logged all over the world, the PowerLight Series has built a tremendous following among demanding professionals. Now PowerLight amplifiers have been improved—with new models and increased 2 ohm power, the addition of defeatable Clip Limiters and a HD15 Dataport connector for QSControl compatibility. Check out PowerLights for yourself. Contact us for complete information—better yet, talk to someone who owns them. References gladly provided.

QSC™ AUDIO

Hear the Power of Technology™

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ss Rigs . Sound Reinforcement . Mobile DJ . Touring Sound . Studio Monitoring . Guita

World Radio History

Tucked Away (with Patti)

It may be small, but this studio is filled with good ideas on how to get clean sound

BY MARK SMOTROFF

STUDIO NAME: Binky Studio (named after their cat)
LOCATION: Menlo Park, California
KEY PEOPLE: Tuck Andress & Patti Cathcart with Adlai Alexander (assistant)
RECENT CREDITS: *Learning How to Fly* for Epic Records and *Winter Fire and Snow* for Atlantic Records. Tuck and Patti have five prior albums to their credit on the Windham Hill label.
CONSOLE: Three Mackie 1604's which are used only for monitoring. Tuck and Patti do not record any signals through these. They use a distributed monitoring system, one each for Tuck's and Patti's headphones and the third for control room playback.
MONITORS: Meyer HD1
HARDWARE: Binky Studio revolves around the Studio Technologies Studiocom (Model 50/51 Central controller and control console, a small MIDI-controlled device that routes signals to control monitoring through various consoles; Studio Technologies' headphone amps; Aphex 10/4 Interface (level matching amplifier); Industrial Acoustics custom-designed isolation booth; Future Sonics Ear Monitors; Re'an Patchbays with Mogami cables; individual critical cables are by Monster Cable.
SOFTWARE: For recording: Sonic Solutions workstation running on a Macintosh Quadra 650; four channels of GML A/D converters; four channels of Apogee D/A converters; Millenia Media HV3 mic preamps. For monitoring only: BSS Varicurve EQs [5]; DigiTech TSR 24 reverb (only for headphone monitoring); Drawmer DL 441 compressor/limiter; Meyer CP 10 EQ (for room EQ of HD1 monitors). Mixers and EQs are automated by the computer, using custom software that Tuck and Patti wrote themselves.
INSTRUMENTS: Tuck plays a 1953 Gibson L5 modified electronically with a single Bartolini pickup and a custom buffer preamp. He uses a similar guitar live.
SIGNAL PATH: Tuck and Patti, in creating their home studio, wanted to ensure the best possible sound quality. Accordingly, their studio is dedicated to tracking, not mixing, and employs an extremely tight signal path, something they consider critical to their sound.

"We took our last record, *Learning How to Fly*, to master with Bernie Grundman, regarded by many as the finest mastering engineer in the world," states Tuck. "He did absolutely no EQ or level adjustment while mastering, choosing instead to bypass his board and processing equipment. He told us that it was the first time in his 24-year history

continued on page 128

EASY ACCESS: The flip-down racks.

PHOTO BY STEVE JENNINGS

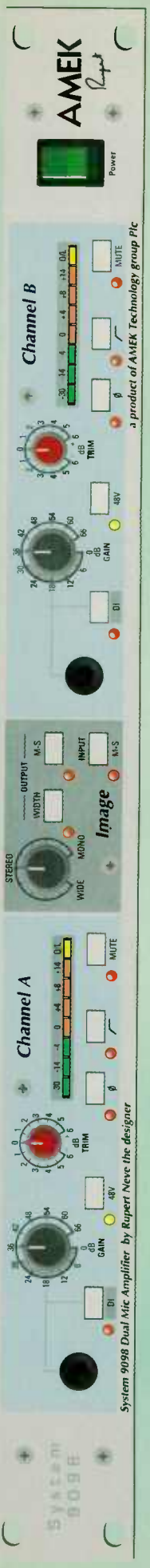
World Radio History

System 9098

Dual Mic Amplifier

by Rupert Neve the Designer

Rupert Awarded Technical GRAMMY® 1997



'The SYSTEM 9098 Dual Microphone Amplifier follows in the footsteps of the 9098 Console, the System 9098 Equalizer and the System 9098 RCMA Remote Control Microphone Amplifier, sharing many of the same features and impeccable clarity of sound quality. New features have been incorporated which considerably extend the field of usefulness.

'Although designated as a "Microphone" amplifier, the DMA will accept a full +25 dBu balanced signal without a pad, at unity gain. So it doubles as a Line Amplifier, which, of course, retains the processing power of the Stereo Matrix.

'The flexibility of the input circuits has also enabled use of the DMA as a Direct Injection Input. Industry standard single pole jacks have been used to provide unbalanced inputs at very high input impedance, well adapted to the requirements of high quality instruments.

'Dedicated STEREO inputs are a new feature. It is, perhaps, surprising that with the increasing popularity of outboard equipment there are very few units that specialise in the handling of stereo signals and none, I believe, which combine all the features of the SYSTEM 9098 Dual Microphone Amplifier. The possibility of differential pick-ups used in one of the classic stereo modes is intriguing.

'One of the questions I am asked is: "Why use a stereo microphone? I only need a few Stereo Modules just for stereo returns, synths etc. I can do all I need to with a Pan Pot on the MONO module".

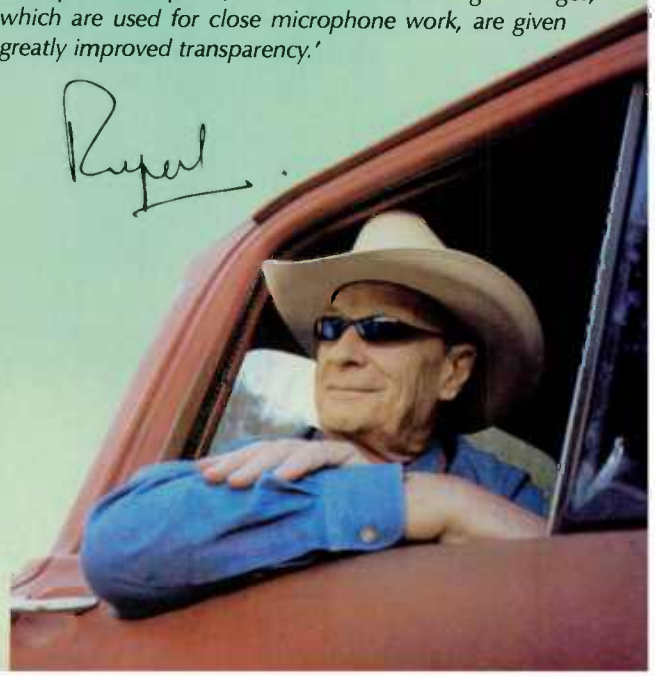
'The answer is that Panned Mono is produced using one microphone panned to Left and Right buses. If the soloist moves, both channels are affected in the same way and the image remains fixed at the panned position. A genuine stereo signal is produced with two microphones which are fed to Left and Right buses respectively. If the soloist moves the relative signals change in amplitude and phase causing the image to move also. A Stereo signal also contains ambience information which locates the soloist relative to his surroundings. With panned Mono, the ambience is fixed by the simple ratio of direct to ambient sound produced by the microphone/soloist positions. Panning cannot change this relationship.

'The SYSTEM 9098 DMA is equipped with comprehensive AB and MS (Main and Side) circuitry, with Width control, to facilitate stereo microphone recording of all types and can be used not only with voices but also any source from a drum kit through to a full orchestra.

'I use transformers for the DMA output stage because they are a sonically superior way to couple the signal to other equipment. They provide complete freedom from ground dependence which eliminates low level noise associated with common ground paths etc. The output transformers, which are designed integrally with their driving amplifier, handle the full +25 dBu output down to 24 Hz and +20 dBu down to well below 20Hz. The high frequency bandwidth extends to 200 kHz without self resonances.

'Low level signals from microphones have traditionally presented a problem. In the SYSTEM 9098 DMA we have achieved very low noise over a substantially wider dynamic range than anyone else.

'The significance of the mid gain low output noise, which is typically 5 to 10 dB better than any other microphone amplifier, is that these middle gain ranges, which are used for close microphone work, are given greatly improved transparency.'



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CIRCLE 89 ON FREE INFO CARD

World Radio History

Astatic TUG9D104

A look at this worthy HAM-radio survivor

MICROPHONE NAME: Astatic TUG9D104
FROM THE COLLECTION OF: Donald James/Donald James Voice Overs and Digital Audio Productions
PRICE: $130 (current manufacturer's suggested retail price)
TYPE OF MIC: Crystal
POLAR PATTERN: "Semi-directional"
FREQUENCY RESPONSE: 200 Hz to 20 kHz
OUTPUT LEVEL@1000 Hz: –20 dB into a 1 megaohm load, re: 1V/microbar
OUTPUT IMPEDANCE: 5000 ohms maximum
AMPLIFIER VOLTAGE GAIN: 26 dB
POWER REQUIREMENTS: Eveready 216 9-volt or equivalent
BATTERY DRAIN: 1.2 milliamps
TEMPERATURE RANGE: Approximately –30 degrees C to +45 degrees C, limited by crystal
WEIGHT: 2 pounds, 11 ounces
MIC NOTES: The Astatic TUG9D104 was designed mainly for use with radio transmitters and transceivers. It is actually the combination of a TUG9 desk stand and a D104 crystal mic element. The TUG9 was also available with ceramic and dynamic elements that could be instantly changed by removing the round head from the stem of the stand. Probably the most interesting aspect of this microphone is the built-in two-stage transistor amplifier. This takes the signal from the D104's crystal element and amplifies it for use directly into a radio transmitter, negating the need for a microphone preamplifier. Astatic introduced the D104 approximately 60 years ago, and it is still available today.
USER TIPS: Owner Donald James states: The mic was bought in the late '70s and used to talk to the world when I was an active HAM/amateur radio operator. These D104's are sort of like Neumann's in the two-way-radio world because of their signature sound (from the large capsule) and their durability. It's the one thing I kept after shelving the hobby, and I'm glad I did. Depending on proximity and compression, I get some interesting effects from this mic that challenge the EQ on my Mackie 1402 VLZ and my Lexicon PCM80. My experience with it is only for voice-overs. With the current trend of layering "full-bodied" tracks with "phone-sounding" ones, the D104 offers something a little extra special. EQ

PHOTO BY EDWARD COLVER

World Radio History

MPX1

Multi-FX That Work The Way You Expect

At the heart of the new MPX 1 is Lexicon's Multiple Processor FX technology featuring two independent microprocessors - the proprietary Lexichip for the world's best reverb and a separate DSP chip for additional effects. Unlike other multi-effects processors, there's never a sonic compromise in reverb programs with the MPX 1, even in the most complex multi-effects programs. But that's just the beginning.

Expect the convenience of multi-effects with the performance of individual effects processors. Effect Blocks include Pitch, Chorus, EQ, Delay, Modulation and Reverb, allowing you to configure up to five simultaneous stereo effects with total flexibility.

Access the MPX 1's potent architecture through a uniquely engineered "Interactive Front Panel" interface that literally guides you through any operation. Graphic displays make effect ordering and routing flexible and straightforward with the simple "drag-and-drop" approach employed in Lexicon's unique design.

Expect the flexibility to organize your programs easily with Library Sort, Search and Show, a powerful database function to help you get the right program fast. And with comprehensive connectivity via balanced XLR's, 1/4 inch analog, digital (S/PDIF) connectors and full MIDI functionality, you can configure your MPX 1 the way you like.

With the MPX 1, even the most complex tasks are accomplished as quickly as you can imagine them — like pushbutton access to individual effect bypass, mix and level controls, a "press and hold" Help system, and soft parameters for easy fine tuning of any program.

Expect a wealth of factory programs (200 of them) and 56 effects exquisitely crafted for world class production. The professional features and stunning sonic performance of the MPX 1 are designed for the recording and live sound engineer - as well as the musician and performer.

Check out the MPX 1 at your authorized Lexicon dealer. It's a new creative standard in multi-fx — and everything you expect.

— Balanced I/O with both 1/4" & XLR's; S/PDIF Digital I/O.

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Analog Devices
SHARC Music Rendering Engine

You may never actually see it, but this chip may change the way you create sounds

BY STEVE LA CERRA

Analog Devices might be more familiar to those who are into circuit development than to musicians and engineers, but its contributions to the audio world have been both numerous and significant (e.g., the OP275 operational amplifier). Its latest development is a real-time music synthesis engine known as Extended Csound. While Extended Csound will obviously appeal most to audio system designers, hard-core synthesists searching to push the envelope of new sounds will find that Extended Csound can also be used to its full capabilities when added on to a PC-based MIDI system. There are actually two elements involved in Analog Devices' new technology: a powerful library of music synthesis software and a high-performance media accelerator based upon Analog Devices' ADSP-2106x SHARC™ DSP.

First the software. Analog Devices has assembled a comprehensive library of more than 300 optimized music functions that are called "opcodes." These opcodes are software module tools used by the developer to implement virtual devices; they save time and effort that would normally be spent writing routines that would (for example) tell the DSP to generate a tone. Some of the more basic opcodes provided by Analog Devices create sampled waveform playback, oscillators, filters, mixers, and reverberators. Some of the more advanced ones include signal processing functions such as audio input harmonization, FFT-based phase vocoder signal reconstruction, and a string-pluck model. There are even other opcodes that perform MIDI routines such as performance sensing.

By mixing and matching different combinations of opcodes, a developer can emulate just about any algorithm created by a synthesizer or audio effects processor. It's important to remember that in most keyboards, synth modules or sound cards, the synthesis is limited

World Radio History

to one or two techniques; those techniques form the sonic signature of the unit. The Extended Csound technology is unique because it can provide any form of synthesis (including additive, subtractive, wavetable, waveguide, waveshaping, FM, LA granular, and physical modeling), as well as executing multiple synthesis techniques simultaneously. Depending upon the exact algorithms used, the system can generate up to 64 voices with comprehensive MIDI control.

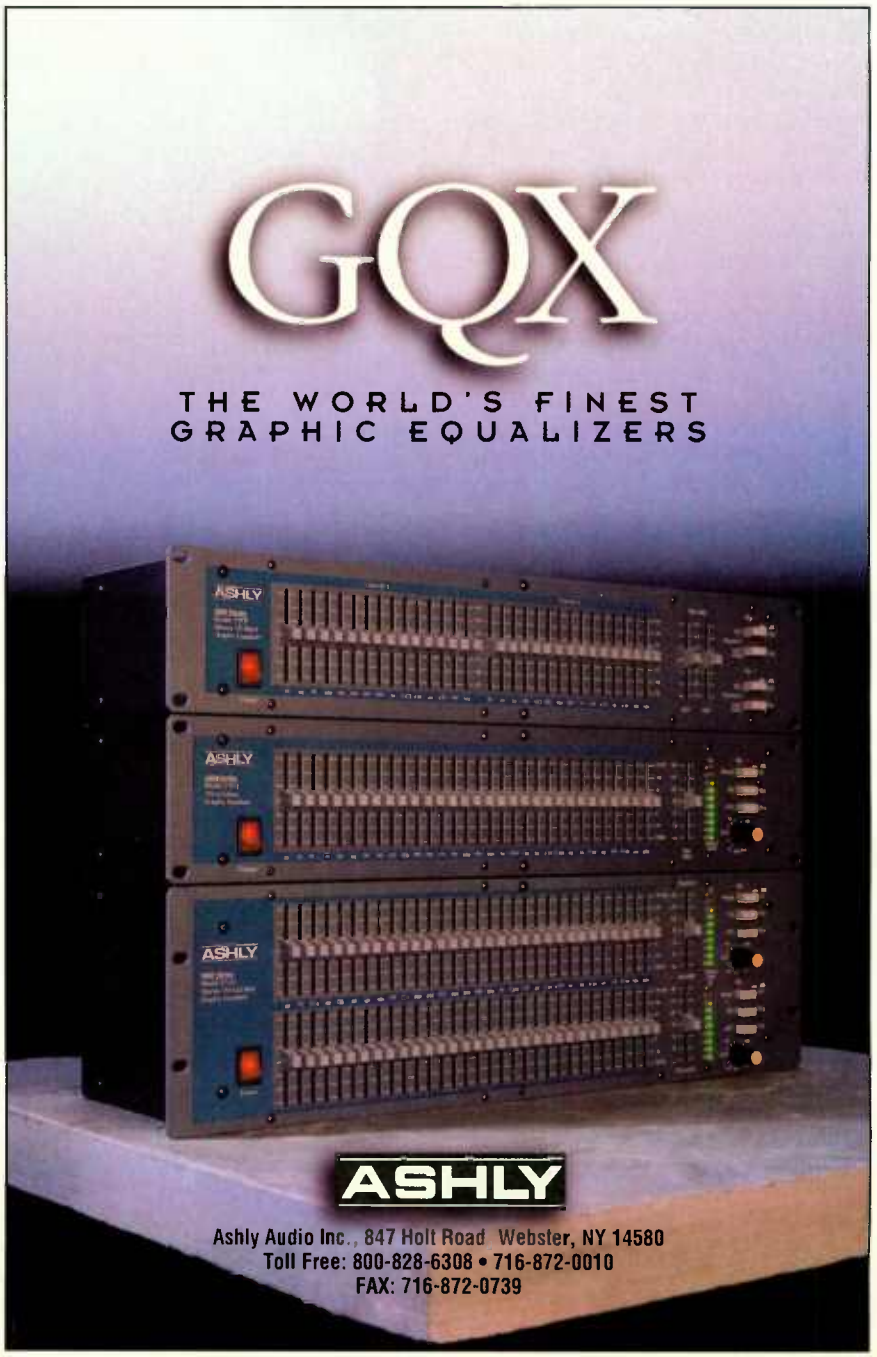
Even though the system is quite advanced, there are only two essential types of files that need to be input: an "orchestra" and a "score." The orchestra is a collection of functions such as tone generators and wavetables that either generate or modify a sound — sort of like an oscillator, but more complex. An instrument could be a synthesized instrument such as a guitar or woodwind, but can also be a "reverb instrument" or a "mixing instrument." While the orchestra tells the hardware what method of synthesis to use when generating sound, the "score" file tells the orchestra which instrument to play and at what pitch, amplitude, and duration. Synthesized music is realized by playing instruments in a predefined orchestra utilizing real-time input from a MIDI keyboard or other controller, live MIDI input from the host or other processor, or ASCII text score files. Effects such as reverb, delay, phasing, flanging, sound spatialization, time scaling, pitch shifting, and others can also be created by layering individual opcodes into signal processing network description files.

Once these files are built, the ADSP-2106x SHARC (Super HArvard ARchitecture Computer) digital signal processor comes into play as the hardware component of the system. As of this writing the ADSP-2106x is the industry's fastest floating-point DSP. For all you tweakheads out there, the ADSP-2106x integrates a 120 MFLOPS, 32-bit core with 25-nanosecond single-cycle instruction execution, has 1-, 2- or 4-Mbits of dual-ported SRAM and communications link ports, an independent I/O processor with 6 DMA channels with support for two serial ports and external port transfers, and a 240 MB-per-second transfer rate. In other words, it smokes.

It's a self-contained signal processing system on a single chip and eliminates multiple memory and I/O ICs. After the opcodes have been arranged into orchestra and score files (or into a signal processing network description for performing effects), the files are downloaded in real time onto the SHARC DSP — so basically you program the DSP to perform whatever it is that you are listening for. Now here's the really good news: the SHARC DSP is reprogrammable and can be configured to do more than just process audio. As an example, a developer could design a music video-on-demand system where music, modem data, and video algorithms can all run on the same SHARC DSP.

Analog Devices' Extended Csound will be available in April 1997 and promises to have a major impact on musical instrument and audio equipment OEMs.

For more information contact Analog Devices, Three Technology Way, Norwood, MA 02062. Tel: 800-262-5643. Web: www.analog.com. Circle EQ free lit. #120.



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Roland V-drums TD-10

Roland hopes to do for drums what its VG-8 did for guitars

BY STEVE LA CERRA

One of the more interesting products at this winter's NAMM show was Roland's new V-drums TD-10 electronic percussion sound module. Based upon Composite Object Sound Modeling (COSM), the V-drums TD-10 utilizes the same technology Roland developed for its VG-8 V-guitar system. Unlike most percussion sound modules that use sample playback to generate sound, COSM uses DSP technology to virtually reconstruct the elements involved in the "sound chain" — elements such as material and construction of the drum, microphone placement, reverberation characteristics of the room and (where applicable) amplification. When used in the VG-8, COSM produced some pretty amazing guitar tones and so it promises to be quite interesting for producing drum sounds as well.

Several hardware elements are combined to make up a V-drums system: there's the TD-10 sound module, and the PD-120 and PD-100 V-Pads (Roland's PD-7 and PD-9 pads may also be used to trigger the TD-10). Instead of the typical rack-mount box, Roland has designed the TD-10 into a console (with a backlit LCD, six sliders, and an alpha dial for data entry) that should make accessing the unit's functions easy. Included in the TD-10 are more than 600 drum and percussion sounds plus another 50 "melodic" instrument sounds, with 56-voice polyphony available.

Two slots are also built into the TD-10: the first is an internal wave expansion slot for accessing future additions to Roland's sound library, and the second is a memory card slot for data storage (such as user-written drum kits). Roland has designed the system software into flash ROM upgrades, which will be readily available. An internal sequencer holds up to 50 patterns and can record in three modes: tap sequence, phrase sequence, and real-time phrase recording. As you would expect from any sequencer or drum machine, a variable metronome (20 to 260 BPM) is available as a timing reference.

So what makes the V-drum TD-10 a standout from other "drum machines?" Certainly it's the COSM technology, and a brief look at the available editing parameters makes this clear — the TD-10 has edit functions far beyond what you'd normally expect. In "Instrument Edit" mode, the TD-10 offers four edit menus. One is called "Shell" and allows you to specify the depth and shell material from which the drum is constructed. Then there's "Head," which allows you to select the type of drum head and amount of tension applied to the head. From the "Muffle" menu you can add tape strips or virtual donut rings to the head to decrease the overtones produced by the drum, and (for snare drums) you can adjust the tension on the snares. While these adjustments are being made, the LCD screen shows a graphic representation of what is happening. Perhaps the most interesting editing functions are in "Studio Parameters," where you can select microphone type and position, room type, ambience level, and position of ambient microphones.

To complement the abilities of the TD-10, Roland has also introduced the PD-120 (12-inch diameter) and PD-100 (10-inch diameter) trigger pads that interface with the V-drums TD-10 via the rear-panel trigger inputs. These two pads function identically except for the fact that the PD-120 sends independent trigger signals from the head and the rim — which makes it extremely suitable for use as a snare-drum controller. You could use this feature to (for example) trigger a standard snare tone from the head and a sidestick or rimshot sound from the rim, providing more realistic variables.

Further, the V-drums system provides positional detection — it responds differently when struck in the center of the pad from when it is struck towards the edge of the pad (owners of Roland's PD-7 and PD-9 pads can also take advantage of this feature). Both pads feature a mesh-head designed by Roland in conjunction with Remo (one of the largest manufacturers of drum heads), and, when connected to the V-drums TD-10, the PD-120/100 can actually respond to brushes.

Roland's TD-10 V-drums percussion sound module will be available June 1997 at a list price of $1895. The V-Pads PD-120 and PD-100 will available in late spring of 1997 at suggested list prices of $445 and $395, respectively.

For more information, contact at Roland Corporation, 7200 Dominion Circle, Los Angeles, CA 90040. Tel: 213-685-5141. Circle EQ free lit. #121.

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Sound Engineer for Garbage, Veruca Salt, Patty Smyth

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Alan Miller
Sound Engineer for Bruce Hornsby, Alan Jackson

"The 4050 gives back exactly what you're putting into it."

Brad Madix
Sound Engineer for Def Leppard, Queensrÿche

These live-sound engineers have discovered the key for natural, true-to-life sound in concert. The AT4050 provides superior, uncompromising performance on guitar cabinets, drum overheads, backing vocals, piano and more.

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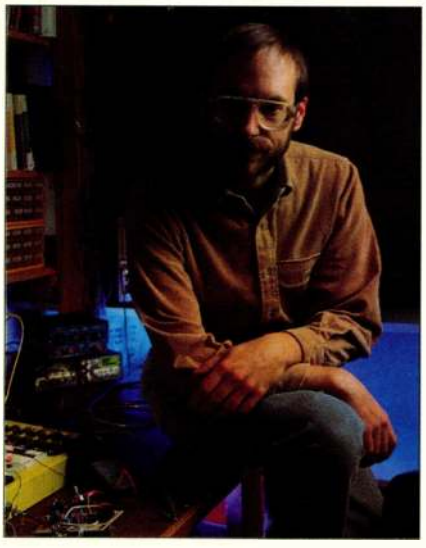
NAMM Trends



What the Winter NAMM really means for project studio owners

BY CRAIG ANDERTON

The Winter 1997 National Association of Music Merchants convention, that annual Anaheim-based orgy of gear introductions (or at least promises of gear that may appear someday, and possibly even resemble in some way the product being shown), is now a memory. The dust has settled, the expense reports submitted, and it's up to us to make some sense of what it all means — so here are some trends that stood out at the show.

ANALOG IS HISTORY

Reel-to-reel still has a niche, but for how much longer? Thanks to higher-quality converters and longer word lengths, digital can now sound really good. And with DVD's 96 kHz sample rate right around the corner, dissing digital will cease to make sense.

Furthermore, there are more ways to add analog tape-like distortion and grunge to otherwise clean digital sound. If you have an analog 8- or 16-track, don't sell it now; keep it maintained for 5–10 years, then sell it for big bucks to the collector's market.

Yet, as we pay our last respects to analog, consider this: 500 years from now, some archaeologists may dig up my house and find a collection of CDs, DATs, and vinyl records. I'd bet that the only medium they'll be able to recover anything from will be vinyl. Just a thought....

TAPE IS FADING

It looks like DAT's decade-plus career is entering its twilight, thanks mostly to the imminent arrival of rewritable CD-R media. With CD-R computer peripherals now costing about the same as a budget DAT, and media costs comparable to DAT tape, it makes little sense to archive to a format that was never intended for pro audio use. For me, what keeps DAT alive right now is convenience: it's a lot easier to reach over and press "record" than it is to boot up the computer and pray that my CD-R, SCSI bus, and all that other computer crapola is in a happy mood. Still, the handwriting is on the wall: DAT is about as good as it's going to get, but CD-R will only get better, faster, more convenient, and less expensive. Once you can buy a stand-alone (not computer-based) CD-R for under $1000 that accepts rewritable media, say good-bye to DAT.

It looks like DAT's decade-plus career is entering its twilight.

TUBE OR NOT TUBE?

Whether you're talking AxSys 212 , Peavey TransTube, etc., tube emulations are getting very, very good. Do they sound exactly like tubes? With critical listening, you can hear some differences, but it's probably not something that would show up in a mix, and the differences are inconsequential if you're playing live. But the best part is what tube emulators *don't* emulate: sound that changes over time, microphonics, mechanical fragility, difficulty in matching output pairs, and replacement costs. Purists may stick with tubes, but it's because they want to — not necessarily because they have to.

THE MAC IS BACK ... SORT OF

The best thing that ever happened to Mac loyalists was Apple's decision to replace the aging NuBus with PCI, the bus of choice for Pentium machines. Now that companies have to develop only one piece of hardware for both platforms, it's not that big a deal to come up with MacOS as well as Windows-compatible drivers; many of the PCI products at NAMM were bi-platform.

As much as I've grown to like Windows, I'm glad to see Apple reclaiming some of its music industry turf. After all, we need Apple to stay alive so that others can appropriate, and eventually commercialize, all their good ideas. Now if the company itself would just get its act together....

THE PC SOUND CARD EXPLOSION

If you're a Windows fan, you have more ways than ever to get audio (analog or digital) into and out of your PC. Twenty-bit analog, AES/EBU and S/PDIF, ADAT/TDIF interfaces, multiple inputs and outputs, ISA or PCI bus, 96-voice synthesizers — what's your pleasure? This was the show where the PC went absolutely over the top. Event Electronics, Aardvark, Frontier Design, Emagic, Metalithic, TerraTec, Sonorus, Ubi Soft, Turtle Beach, and others all had boards with mind-boggling capabilities. (Although, of course, being a NAMM show, only a few were actually shipping.) Just remember that in a couple years all of these will be obsolete when Firewire (IEEE 1394) [*see story on page 60*] hits the big time, but until then, enjoy the wealth of interfacing options at close to bargain-basement prices.

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The Logic System:

Logic Audio – The Pros choice. Feature rich 960ppq real-timer Sequencer. Professional Scoring & Printing. Unlimited Virtual Mixers with full automation. Up to 24 tracks of digital audio with intense offline and real-time DSP editing.

Logic Audio Discovery – Entry level price with a professional feature set. 960ppq real-time sequencer with surprising scoring and printing. Simplified MIDI environment with virtual mixers and automation. Even real-time DSP.

Audiowerk8 – Complete Digital Audio Recording Solution. 2 in, 8 out, S/P-DIF I/O, PCI busmaster digital audio card & VMR control surface software for MAC or PC.

Unitor8 – 8 X 8, single rack space, Cross platform MIDI interface. Stack up to 8 for a maximum of 1024 MIDI Channels. Read/write SMPTE for LTC/VITC .

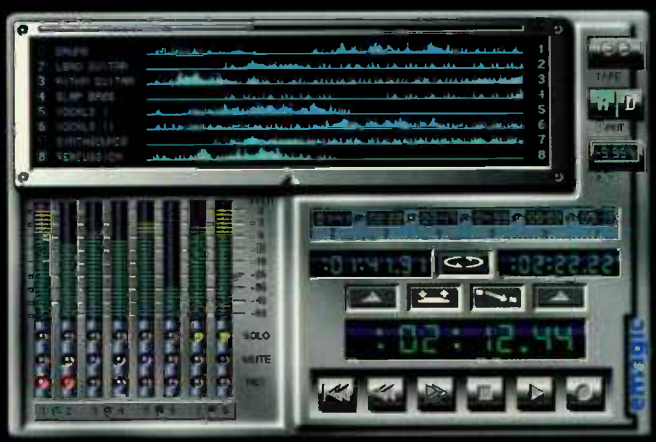
Logic – The MIDI Masterpiece. The most integrated 960ppq real-time sequencer to date. Professional scoring and printing and a totally user definable interface. Unlimited virtual mixers and editors. Full automation, full SYSEX support and more.

MicroLogic – The Beginners Dream. The Perfect introduction into the world of real-time 960ppq MIDI sequencing with surprising scoring and printing. Full GM and GS support included will full automation. A great value.

SoundDiver – The Ultimate in Synthesis Patch Management. Universal Editor/Librarian for Mac or Windows 95.

Got a computer? Start recording.

Digital audio recording is as easy as tape. Introducing Audiowerk8, Emagic's cross platform, PCI busmaster digital audio recording card. With 8 discrete outputs, stereo inputs and digital I/O, Audiowerk8 ships with VMR, the "Virtual Multitrack Recorder". Software so transparent, the manual is optional.



Audiowerk8 and VMR gets you up and running with a complete plug and play digital audio recording solution. It makes hard-disk recording as easy to use as tape.

The VMR control surface is simply a virtual representation of an 8 track linear tape deck. Just like any multitrack, VMR lets you record an instrument on any track, punch in on the fly, mix with a traditional mixer, add outboard effects and your done.

- Playback of 8 tracks while recording two further tracks.
- Practically unlimited number of alternative tracks.
- Seamless cycle and punch in/out on the fly.
- Soft scrolling wave form display.
- Up to 24 position memories, set & recall on the fly.
- 8 discrete outputs and stereo digital I/O with Audiowerk8.

Upgrade to Logic Audio Discovery or Logic Audio for increased track potential, DSP and Automation. Logic Audio can support multiple AW8 cards and can even be used in tandem with any other supported audio soundcard, simultaneously. Audiowerk8 with VMR erases the boundaries between linear tape and modern digital audio recording. The Choice is Simple. MSRP $ 799.

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SIGNAL PROCESSORS: BYE-BYE HARDWARE

When Peavey introduced their MediaMatrix a few years ago (a "virtual sound system" with sound cards and a PC, where you "assembled" the system on-screen using virtual patch cords), Hartley Peavey said that "I may be making all my hardware boxes obsolete, but it's better than the competition making them obsolete." He called that one right: the hot signal processing action these days is in software, not rack mounts. Sure, Lexicon, DigiTech, ART, and Peavey all had cool boxes with real knobs and switches, but signal processing is going virtual.

A few of these are stand-alone systems, like the DSP•FX system, but more likely the DSP is built into hard-disk recording systems or MIDI+Digital Audio software. That's right — once you've recorded your track, you can tweak, transpose, reverb, EQ, delay, phase, flange, resonate, disgustify, or whatever without leaving the confines of your computer. Rack-mount boxes? Who needs 'em — except, of course, for live performance.

TECHNO: THE NEXT BIG THING?

After some false starts, it seems record companies have figured out that four-on-the-floor kick drum patterns with cool samples can be fun (besides, techno and dance music have been huge worldwide for years, so it's somewhat of a proven commodity). Certainly a lot of products support the techno way of thinking — Quasimidi Rave-O-Lution 309, Propellerhead's Virtual TB-303/TR-808 software, Twiddly Bits Techno Disks, etc. Will techno take off? Maybe this is the year.

SYNTHESIZERS AS COMMODITY ITEMS

Synthesizers used to be big, special boxes that commanded respect and flattened your wallet. Today's tone modules are tiny, cheap, and sound absolutely amazing. The Alesis Nanosynth series is unbelievable — exceptional horsepower for the price of a middle-grade guitar. And let's not forget Korg's NS5R or Yamaha's MU90R, both of which offer stunning sound quality and functionality.

High-end synths now give you digital power with the fatness (and resonant filters) of analog, great keyboard feel, sequencing, expandability, cool sounds, and much more. Case in point: Roland's JP-8000 and the Yamaha AN1x, which offer unheard of performance and sound quality for what a so-so synth would have cost only a few years ago. The bottom line: synthesizers are getting cost-effective to the point of absurdity.

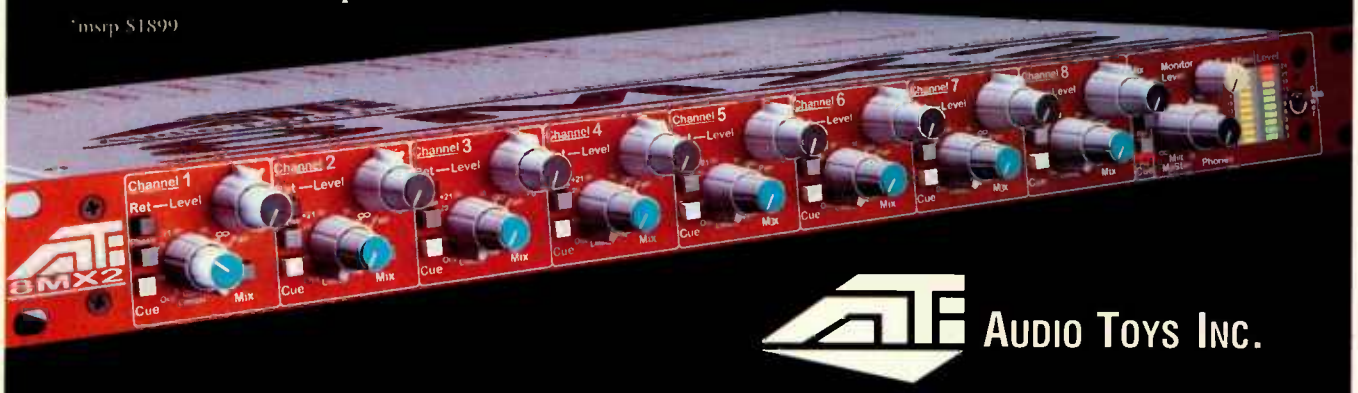
So it was quite a show. Technology is changing faster than people's ability to absorb it, anything digital you buy will be worth half what you paid for it before the bill shows up on your credit card, and faking it has reached new heights — there's a vaporware binge hitting the industry. Fascinating, yet perilous, times lie ahead in an era of technology overload. For the antidote, repeat the following over and over again: "Writing good music is all that really matters."

Craig Anderton is a monophonic synthesizer with a three-octave range, pitch bend, vibrato, and several gigabytes of on-board memory. He responds to both pressure and velocity.

TWO WILL GET YOU EIGHT

This math only works with the new 8MX2 Preamp/Mixer from ATI, the folks who brought you PARAGON. Not only do you get 8 of the best sounding mic-preamplifiers available, you get 8 adjustable peak limiters and a versatile 8x2 mixer with metering. All of this power in a single rack space, and for under $2000.* Hard to believe? Ask your local ATI dealer for a demonstration and you'll see how all this adds up.

*msrp $1899



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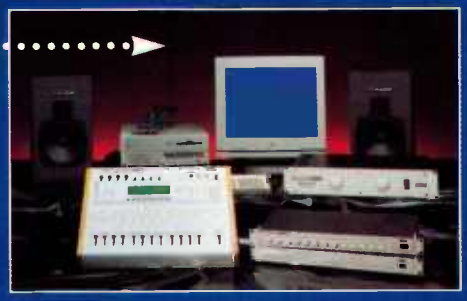
The 168RC is the first truly affordable, fully digital, 8 bus recording console. Use it with your ADAT or other digital recorder equipped with the ADAT optical interface to create the best sounding recordings you've ever made.

168RC Digital Recording Console

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



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

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

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

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

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

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

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

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

SoundLink DRS Digital Recording Systems

Affordable, fully integrated digital recording
Down to a System.

KORG

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CIRCLE 47 ON FREE INFO CARD

Jingles All The Way: Madison Ave. Strikes Back

PHOTO BY JIM HERRINGTON

We now pause for a song from the sponsor — or There's no such thing as easy money

BY AL KOOPER

Recently a compatriot of mine called me with an unusual job offer — for me, anyway. It seems a high-powered ad agency and client wanted to hire me to score a TV commercial that would run during the Academy Awards. As they knew of no commercials that I had done (I hadn't done any), they were hoping my friend could talk me into doing it. I asked for an excessive amount of money to try and nip it right in the bud. They accepted my offer, and before you can say: "I've never indulged in this kinda thing before...," a videotape was delivered to my backdoor with said commercial on it. I took it in the living room and slipped it in my VCR and the annoying sound of SMPTE code filled the room. Damn! I needed that special VCR that reads separate channels for this tape. It was in the back of some closet behind a great deal of boxes. I finally rescued it, took it down to my project studio, and plugged it in. The commercial unfurled before my eyes.

Now I saw why they wanted *me*. They had used a track off one of my albums, as part of the dummy score for the ad! So all I had to do was imitate myself and ape two other dummy tracks they had in there, and a great sum of money would soon be mine. My friend called me back to clarify this point. I was to do a *demo* of my score and then the "real" session would be in New York City with real musicians in front of the agency and the client a month later — *if* they liked my demo. *One always likes to audition at age 53.*

Ahhhhh — how hard can it be? It's 60 seconds of music. It's Friday morning and they want it on Wednesday morning. That gives me 'til Tuesday night to FedEx it. Piece of cake.

I sit down to begin work and I can't access any of my synths in my sequencer program. I look over at my MIDI patchbay and it's dead. I check the plug. I change the plug. I take the plug and use it to power another device. It works fine. The brain of my entire studio is stone cold dead, and it's Friday.

I sit down and write the commercial. It doesn't seem difficult to me. I have previously scored a weekly TV drama series, and 60 seconds of music is comparatively simple.

I get on the phone and call every MIDI pal I have in Nashville. Either no one has my brand MIDI brain, or they're using it and can't spare it. I call the local music stores. No store in the Nashville area has one of these puppies in stock. I call the rental places. No one has one for rent. I call my jingle pal back to tell him of my plight. By now it's after five — so much for Friday. Now I have to deal with Saturday.

He commiserates and can't believe there is no duplicate unit in all of Nashville. There isn't.

First thing Saturday morning, I call a store in NYC I have done business with virtually all of my life. *They* have one, but they can't get it to me before *Tuesday*. I call my friend back and he begins to search for a place that will freight it out that night. Meanwhile, I get back on the phone and try all the repair places. It seems that the manufacturer of said MIDI brain asks the repair places to send the unit back to them when it goes dead like this. The

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Lose 50 Pounds of Ugly Flitecase...

SRC™ Flight Case mixers are better and lighter

Using advanced technology and integrating the mixer into the case carves pounds out of the mixer and ten times that out of the flight case. Check out the SRC™ 4026FC and SRC™ 4026FC Flight Case mixers for the better idea.

The Peavey Differences

In a world of "me, too" products, Peavey brings something truly new to the table. In our 30 plus years of satisfying the needs of working musicians like yourself, we've learned the difference between useful features and fluff.

The Little Details

Little things can make a big difference when mixing sound. Little things like meters and inserts on the subs. "I don't care what the hyperscope specs are, I want only Little on my first mix-bus!" Little things like assign capability on all 4 stereo returns. These and a bunch more add up to make a big difference in the real world, where the mixer meets the music.

Super Channels

Need to pad an input, or fix a phase cancellation on a drum mix? Why pay thousands of dollars for features that you don't need on every channel? Uhh! Peavey gives you pad and polarity on two "Super Channels™". It's just common sense. Let's see how long it takes them to copy this.

Handles

At 45 lbs. for the SRC™ 4026FC and 60 lbs. for the SRC™ 4034FC, one handle is all you need. We give you three for convenience.

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repair places don't even have a schematic to look at! My friend calls back with a courier service that *will* pick it up today, *but* they need $250 at the point of origin. I am desperate now. I call the music store in NYC and not only do I have to ask them the favor of "borrowing" the unit for a few days, but also for them to front out $250 to the courier service for me! The owner says, "Only for you, Al. You owe me big time!"

The problem seems solved. It is now 4:45 PM NYC time. The courier is informed they have til 6 PM — when the store closes — to pick up the item. At 5:45 they call the store back and tell them they can't get there by 6, but they *will* pick up and deliver on Sunday. Unfortunately, the store is closed on Sunday.

So now the plan is to pick it up on *Monday* morning at 9 AM and have it on my Tennessee doorstep by 1:30 PM. My deadline is still Tuesday at 5 PM.

Miraculously, they pick it up at 9 AM. But I don't get it until 40 phone calls later at 9 PM! I am furious, $250 poorer, and have less than 24 hours to do this thing. I hook up the new unit and it works (insert chorus of "Hallelujahs" here)! I sit down and write the commercial. It doesn't seem difficult to me. I have previously scored a weekly TV drama series, and 60 seconds of music is comparatively simple.

I ship off the tape to the agency.

The next day my friend calls back: "They *hated* it, Al..."

We both start laughing. They paid $1500 for the demo, most of which I spent on tech guys, phone calls, and couriers. I asked my friend why they hated it.

"It didn't sound like the usual commercial fare. The reason they hired you is they didn't want it to sound like the usual commercial fare. I don't have the answers, Al."

I do. The answers are: NO, NO and NO!

See ya next issue when I am back to what passes for normal in my life.

Al Kooper is a very famous solo artist and session player (on projects such as Bob Dylan's* Highway 61, *for one). You should be very impressed that we got him to write a monthly column for us.

World Radio History

Sound Forge Heats Up With ActiveMovie

Sound Forge 4.0, the award-winning digital sound editor for Windows, now supports ActiveMovie audio plug-ins. Sonic Foundry has selected ActiveMovie (a component of Microsoft's Interactive Media technology) as the foundation for the Sound Forge plug-in architecture. ActiveMovie plug-ins will be supported by a variety of audio software companies including Sonic Foundry and Waves.

Sound Forge also supports the ActiveX Streaming Format (ASF) – the new audio and video Internet and intranet streaming standard used by Microsoft's NetShow On-Demand.

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World Radio History

Robert Moog

PHOTO BY ED FREEMAN

Find out what's the next wave for this synthesizer pioneer

BY MR. BONZAI

MR. BONZAI: Which came first, the music or the musician?

MOOG: My mother gave me piano lessons when I was a kid. By the time I was eight I could play the likes of Beethoven, Chopin, and Rachmaninoff. But I never liked it. I was always much happier hanging out with my father in his hobby shop. So I guess I was a musician well before I understood or enjoyed music.

Who were your heroes when you were a teenager?

Leon Theremin; Laurens Hammond (inventor of the Hammond Organ); Winston Koch (inventor of the first Baldwin Organ). In fact, I read everything about electronic musical instruments that I could get my hands on. I still have some of the very early Hammond service manuals that they were kind enough to send me. Also, my father was a hero of mine because he could make anything.

If you could go back in time before the birth of recording, what would you like to hear?

Well, it would be a groove to hear what Moses heard when he was up there on Mount Sinai.

What are you up to now?

I'm the Grand Pooh-Bah of Big Briar. We build Theremins and other neat electronic music gear.

What's the connection between what you're doing now and the "golden age" of the Moog Synthesizer?

I guess the biggest connection is that we're still into analog. You know, the "golden age" of analog came to an end only because digital FM synthesis hit the streets. It's not like everything that could be done with analog had actually been done. There's still a bunch of stuff that I'd like to try.

The glorious Moog name—how can upstart companies rip off your name?

The Moog name went along with my old company, which went defunct a few years after I left it. As far as the United States Trademark Office is concerned, the "glorious Moog name" was abandoned, and is now available for re-registration. My position is that I have the exclusive right to use the Moog name because it is my name, I am well known by musicians, and Moog products are strongly identified with me. My application to re-register the Moog name as a trademark will take a year or two to go through the Trademark Office. Until then, I am opposing the use of my name by other companies.

What's your next project?

We're getting ready to launch our state-of-the-art MIDI Theremin this coming summer.

Do we really need a MIDI Theremin?

Why Mr. B, that's the same kind of question

SUSPECT: Robert "Bob" Moog (pronounced as in Larry, Curly and Moe + g)

BIRTHPLACE: New York City

ANCESTRY: German/Polish

CREDENTIALS: BS Physics, BS Electrical Engineering, PhD Engineering Physics

OCCUPATION: Grand Pooh-Bah of Big Briar

INVENTIONS: Early analog synthesizers embraced by New Wave of rock and roll

FIRST COMMERCIAL SYNTHESIZER: 1964

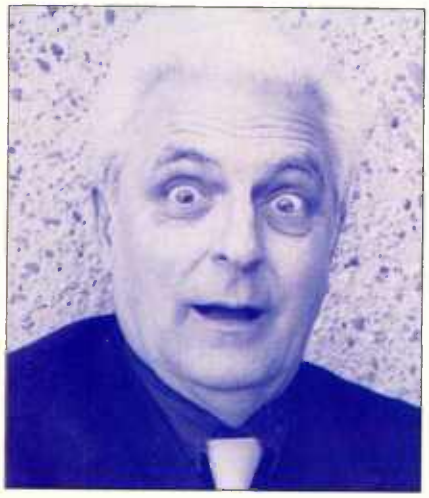
RESIDENCE: Asheville, North Carolina (mountainous western region)

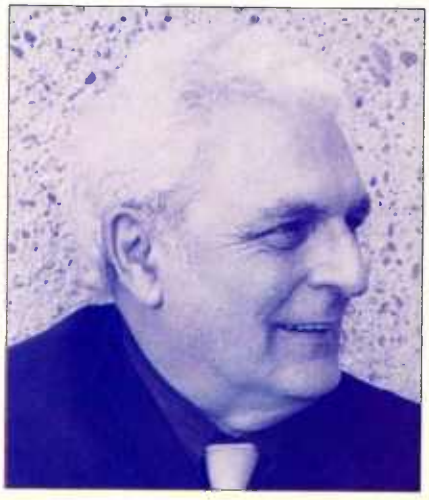
VEHICLE: 1985 Toyota Tercel station wagon, artfully dented and rusted

DIET: Eats and drinks everything

PECULIAR HABITS: Enjoys startling local residents with New York invective

INTERROGATION: Face-to-face, telephone, encrypted E-mail





PHOTOS BY MR. BONZAI

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that they asked about synthesizers back in the mid-'60s. Fact is, our MIDI Theremin will be an important resource for anyone who wants to work with continuous pitch and volume changes. For instance, imagine doing a MIDI recording of a Theremin performance, and then being able to carefully edit the pitch variations or reshape the envelopes.

Are you going to re-introduce the Minimoog?

It could happen. If we do, we'll preserve the "Classic Minimoog Sound" while adding some new features.

What are your long-term inventive plans?

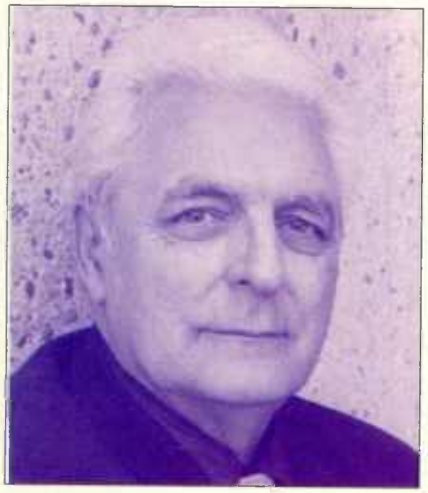
Just to keep at it until my brain shuts down.

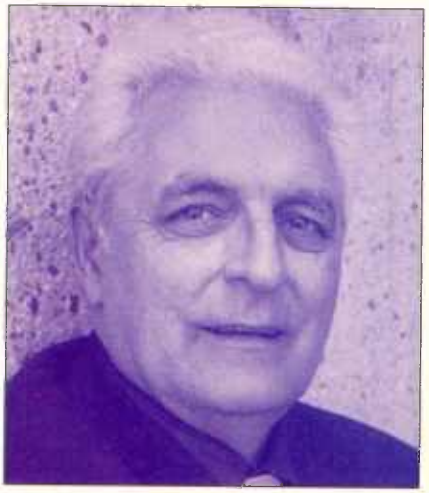
What do you make of the current popularity of the old analog shit in this, the digital age?

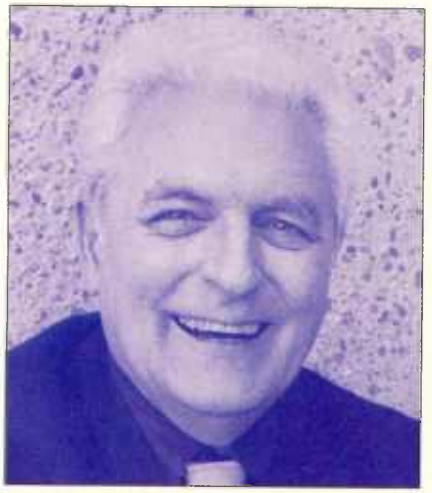
Hey, it sounds good and it's easy to play. That's always been true. It's just that musicians have been temporarily distracted by a bunch of fancy digital whizbangs for the past 15 years or so. Now they're understanding that nice round knobs and truly continuously changing waveforms are *good*.

Do you know any interesting business tricks?

I received the New York State Small Businessman of the Year Award in 1970 at exactly the time that I was losing control of my old company, so I know how to do that.







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What old proverb do you really dislike?
"Possession is nine-tenths of the law." Think about it. It means that I am entitled, at some level, to keep anything I take, whether or not I'm entitled to it, and whether or not I use force or deception. It's unethical, to say the least. And it's probably what's behind the various "upstart companies" appropriating the Moog name for their own purposes.

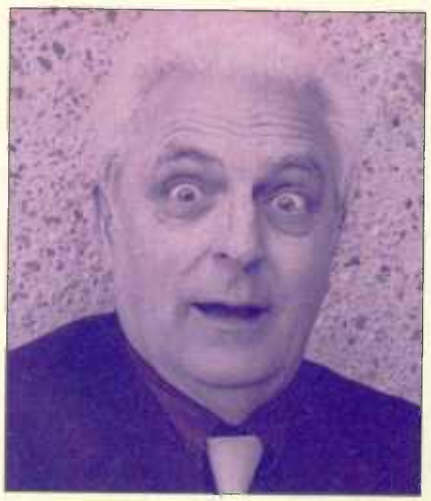
What music would you like played at your funeral?
In Steve Martin's documentary, *Theremin — An Electronic Odyssey*, there's a particularly moving sequence in which Theremin virtuosa Clara Rockmore plays Ravel's "Kaddish" from beginning to end. ("Kaddish" is a traditional Jewish prayer.) It would be very nice to have that played at my funeral.

What animal do you identify with?
Ferdinand the Bull. He's the main character in a Spanish children's story that I was particularly fond of. Ferdinand liked to sit peacefully under a big cork tree and smell the flowers. His handlers overestimated his ferocity and sent him to the city to be in a bullfight. Once in the ring, Ferdinand sat down and smelled the ladies' flowers, so there was no bullfight. They took him back to his cork tree where he lived out his life in peace. Now you know.

Are you happy with the way things are going in your life?
Oh, yeah! I'm working with a group of people who know how to be productive and get along with each other. Our business is developing in small, manageable steps, and our customers seem to enjoy doing business with us. On the personal side, my children are all leading productive lives and Ileana Grams, a philosophy professor at UNC/Asheville and my wife of one year, takes professional pride in being reasonable and seeing other people's point of view. Sure I'm happy!

OK, what's the biggest mistake of your life?
Look, I'm an experimenter, an inventor. I'm always out there at the fringe, looking for new, unpredictable things to make and do. In retrospect, it seems that most of what I've done have been mistakes of one sort or another. But what's the alternative for me? If I took a job as an industrial physicist instead of starting a synthesizer business, I might have been better off financially than I am today. Or maybe I would have been fired for being too oddball, and had a nervous breakdown. Who knows? For me, the point is that everything that I've gotten into, mistakes as well as successes, I chose to get into. And every mistake that I've made has rippled through my life, influencing other things that I've done. Without my "biggest mistake," whatever that might be, my life might have turned out to be so different that I wouldn't even recognize it. Besides, I'm a happy person at this point in my life, mistakes and all — so how bad could my biggest mistake be?

Mr. Bonzai wonders: Are human beings analog or digital?



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It's Too Funky in Here!

A look at the recording of James Brown's classic '70s funk

BY BOB BOTH

James Brown's legendary career began in 1956 with "Please, Please, Please" and has spanned four decades with over 50 top ten hits, including 17 number ones and over 60 albums. The early 1970s saw James Brown reach new heights with many career firsts, including his first double studio album, "Get On the Good Foot" (1972), his first motion picture soundtrack, "Black Caesar" (1973), and three #1 hits in a row, "The Payback," "My Thang," and "Papa Don't Take No Mess" (1974). "The Payback" single and album were both certified gold records — another first for Brown.

Until recently, much of Brown's '70s output had been out of print. In the past couple of years Polygram Records has been issuing many of these albums on CD for the first time. Harry Weinger of Polygram's catalog development has done a great job of breathing new life into these classic records by making them available to past fans and a new generation of listeners. Let's take a closer look at the studio recording techniques used for some of these classic records.

My office at James Brown Enterprises was located in the Polydor Record complex, at 1700 Broadway in New York City. I handled all of the recording and production work for Brown and his roster of artists, including Fred Wesley & The J.B.'s, Lyn Collins, Maceo Parker, and others, from 1972 through 1976. When Brown had an idea he wanted to record, he would call me to set up a session. I would book studio time and coordinate the sessions with band director Fred Wesley or arranger Dave Matthews and then inform Brown of the date, time, and studio. If Brown got a hot idea while he was on tour, I would book a studio in the area of the next concert, fly out and do the session, then return to New York to finish the work. We did sessions at Criteria Studios in Miami, Wally Heider Recording in San Francisco, and International Recording in his home town Augusta, Georgia. But for the majority of the recording sessions Brown would come to New York City.

PHOTO BY MICHAEL OCHS ARCHIVES

HE FEELS GOOD: James Brown circa 1970 — the hardest working man in recording?

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***Alex Marcou - Abbey Road Studios** (House recording engineer) - "The VI-1 makes hard sounding digital sound like cosy , rounded analogue - a joy to listen to. The control that the EQs, Pre Amps & Compressors give is excellent."*

***Andy Jackson - Pink Floyd** (Sound engineer) - "All the lead vocals on the "Division Bell" album mix were run through the EQ-1 . I certainly prefer the EQ-1 to other Valve Equalisers for vocals. The new EQ-2 is probably the best all-round EQ I've ever used."*

***Chris Porter** (Producer - Take That) - "I bought one of the first EQ-1s and I've enjoyed using it immensely. It gives a unique quality to the vocals in particular - Take That's 'Back For Good' is a typical example of the EQ-1 adding depth and presence to a vocal track."*

***Tom Lord-Alge** (Dual Grammy Award Winning Engineer) - "The Indigo 2011 EQ has given me the ability to EQ with clarity, rather than just tone. I find it to be very musical. Any problem sound I have come across. I patch in the 2011 and it allows me to add depth and clarity."*

***Stephen Croes** (Producer, Arranger, Engineer - Fleetwood Mac, Kenny Loggins, Steve Wonder) - "The Indigo 2011 EQ and 2021 Compressor are exceptional - both responsive and flexible. I can stomp on or be subtle, hype a sound or just detail it. These are real tools for any level of music production."*

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C-1 Dual Valve Compressor — $1,795

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TWAIN TRACKS: Bob Both sits in Twain Recording (1996)

I GOT THE FEELING

James Brown was not interested in the technical aspects of recording, and left all of that in my hands. Once while recording he turned to me from the studio and said, "Watch me, don't worry about the meters, if I burn them out I'll buy you new ones." The feeling was what he cared about. He wanted to be sure I was in the groove so I could capture it on tape. I learned to work quickly and record everything, so when that spark of magic happened, I was sure to have it on tape.

On one session Brown said, "We're just gonna run it down, you don't have to record this." I rolled the tape anyway. After they finished playing a smoking hot rehearsal Brown said, "Too bad we weren't recording that mutha." I came on the talkback and said, "I got it on tape." He came running into the control room and said, "Bob you're a recording fool. You'll record anything, and I'm glad you do." We used that version as the final take.

TWO DIFFERENT WORLDS

James Brown would record in two different ways, and I would use different techniques and studios for each. Sometimes he would record with his touring band, The J.B.'s. These sessions were very spontaneous, as there would be no music written out. The band would jam on a groove and Brown would lead them through a head arrangement. These sessions were usually recorded totally live in the studio with an occasional overdub added later.

In total contrast to this informal method, other times Brown would have his band director, Fred Wesley, or arranger Dave Matthews write out charts. Then we would hire some of New York's' finest session players to record the songs. On these sessions I would record the rhythm section first, then overdub the horns, strings, and other parts. Brown would rarely attend these sessions, usually he would be on tour while I was in New York recording. When I was finished recording the tracks, I would do a rough mix, cut a reference disc, and send it to Brown. He would work out his vocal part, call me to arrange a session, and fly into town to cut the vocals and then return to the tour while I worked on the mixdowns.

My two studios of choice for recording in New York were A&R Recording and Sound Ideas Studios. I would use each one for different types of sessions. I liked to do the "live sessions" at A&R and the "studio band sessions" at Sound Ideas, although I would do the sessions at either studio if I couldn't book the room I wanted for the session.

THE LIVE IN THE STUDIO SESSIONS

A&R Recording, which was partly owned by Phil Ramone, had two larger studios (A1 and A2), a mix room, and a disc-cutting room. Two smaller rooms (R1 and R2) were located at a separate location. The studios weren't much to look at, but they had great acoustics. Three of the studios, A1, A2, and R2, had old custom-designed consoles that had large radio-style knobs for faders, large VU meters, and no built-in equalizers. Each control room had a large patchbay that literally took up one wall.

If you needed EQ, each room had several Pultec EQH-2 and Lang PEQ-4 equalizers that you could patch in. There was also a roll-around rack that had six or eight Neve 1073 EQs in it. Each room also had some Teletronix LA-2 and Universal Audio 1176 compressors. The monitor speakers were Altec 604's. The 16-track 2-inch recorders were Ampex MM-1000's. The 2- and 4-track machines were Ampex 351 and 440's. Studio R1 had an old Neve series 80 console. It was big and gray with black faders and EQ knobs. I use to affectionately refer to it as the battleship. This was one of my favorite rooms at A&R for recording James Brown and The J.B.'s "live in the studio."

The band for these recordings usually consisted of John "Jabo" Starks or John Morgan (drums), Jimmy Nolan and Hearlon "Cheese" Martin (guitars), Fred Thomas or Charles Sherrell (bass), Johnny Griggs (congas), Russell Crimes (trumpet), Maceo Parker and Jimmy Parker (alto sax), St. Clair Pickney (tenor sax), Fred Wesley (trombone), Charles Sherrell (clavinet), and James Brown (vocals, piano, organ). A&R's Studio R1 had a raised platform (see fig. 1) where I would set up the drums, two guitars, and bass. We would use the studio drum set.

The guitars would play through Fender Deluxe Reverbs miked with Shure SM57's. The bass was recorded through a Countryman direct box with a slight amount of compression to even out the low notes. An Ampeg B-15 amp was used in the studio for monitor. The clavinet would run direct with a Fender amp in the room, also for monitor. I would put the congas in one of the two isolation booths. The horn section would be seated in a semi-circle at the far side of the room with the mics off axis (cardioid pattern) to the rhythm section and Brown's vocal to minimize leakage.

The mics would be placed so that the horn players could both play and sing into them, as Brown often had the horn section chant lines. No music stands are used on these head sessions, which made it easier to position the mics. No compression was used on the horns. I would have Brown stand in the center of the studio with a Neumann U87, on a large boom stand, set to the cardioid pattern with the 10 dB pad on. From this center position, Brown could easily direct the band and cue me in the control room. The back of the mic would face the band, and since Brown had a very powerful voice, I could keep the preamp gain low so leakage wasn't a problem.

I would use a compressor set to a 4:1 ratio with the threshold set to just catch any sudden peaks. I would always record the vocal flat with no EQ. Brown would sometimes have me set up a piano or organ on these sessions. At some point during the jam he might stop singing and walk

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over to the piano or organ to take a solo. He might call Fred or Maceo over to take a horn solo on his mic. You just had to pay attention and ride the faders.

We rarely punched in or rerecorded the vocals on these live sessions. We might overdub background vocals or additional percussion on occasion, but we usually didn't change anything on the original tracks. Since I might have to work on the recordings at different studios, I always recorded at 15 ips with no noise reduction to ensure compatibility. At this time, not all machines could run at 30 ips, and one studio might have Dolby noise reduction while another had dbx.

Some of these jams went on pretty long — even at 15 ips the tape would occasionally run out before the song was over. I would have to do a fade during the mix at the point where the tape ran out. We would rarely do multiple takes on these sessions. We might have a few false starts and then one complete take, so editing together several takes wasn't an option. These sessions usually started at 10 PM and could last until 5 AM with Brown recording four or five songs.

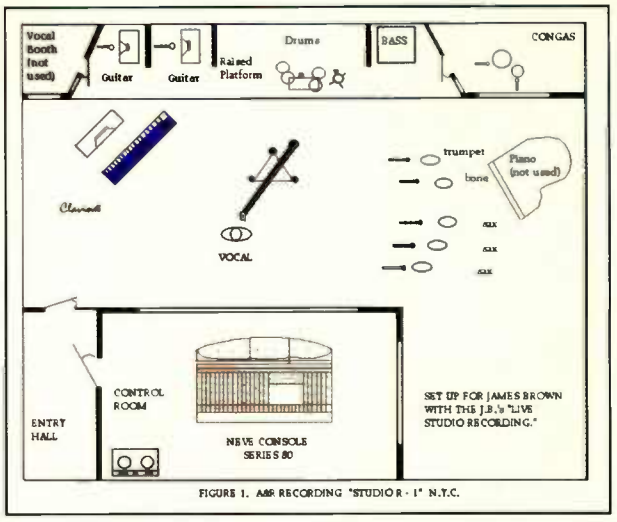

FIGURE 1. A&R RECORDING "STUDIO C - 1" N.Y.C.

He would always want me to do a rough mix before leaving so he could get an acetate cut as soon as possible.

THE STUDIO BAND SESSIONS

Sound Ideas Studios was comprised of two studios. Studio C was the larger studio on the ground floor. It was here in June of 1975 that I would record the only 24-track session that I did with James Brown. Studio A was a smaller 16-track studio on the third floor. It was a much deader sounding room with a psychedelic decor of multicolored velvet shapes on the walls. The main part of the studio had shag carpeting on the floor. There was a smaller live area with a wooden floor at the far right end of the studio. I would often record the horns and percussion overdubs in this area.

BOB BOTH: TWAIN KEEP'S A ROLLIN'

Bob Both began his collaboration with James Brown in 1972, when, at the age of 19, he was working as an A&R assistant at Polydor Records. Proving that location does indeed mean everything, Both was given an office two door's down from Brown's. Brown was informed by management that he could have Both put his releases through production, which Brown found convenient because Bob's office was just down the hall.

Three years later, while still working with James Brown, Bob built a studio in his home in West Milford, New Jersey and named it Twain Recording. After Both left James Brown, business at his studio started picking up. Twain Recording was getting busy when Motown Records offered Both a position in its Los Angeles studios as head rhythm section engineer. "They offered to fly me out to check out the studios. I would have to relocate to L.A. I had only moved into my house about eight months earlier and my studio was just starting to take off. Even though I hadn't planned on running a commercial studio from my house, I decided to stay in NJ and turned Motown down to run Twain Recording," says Both. Twain Recording has since evolved into one of New Jersey's most respected studios.

Both has been operating Twain Recording for 20 years and currently offers both 16-/24-track 2-inch analog and 16-track ADAT digital recording. He has a mix of digital gear and vintage equipment and is available for engineering and/or production work on all styles of music projects at his studio or any other studio. You can contact him at Twain Recording, 18 Hiawatha Pass, West Milford, NJ 07480. Tel: 201-697-7540.

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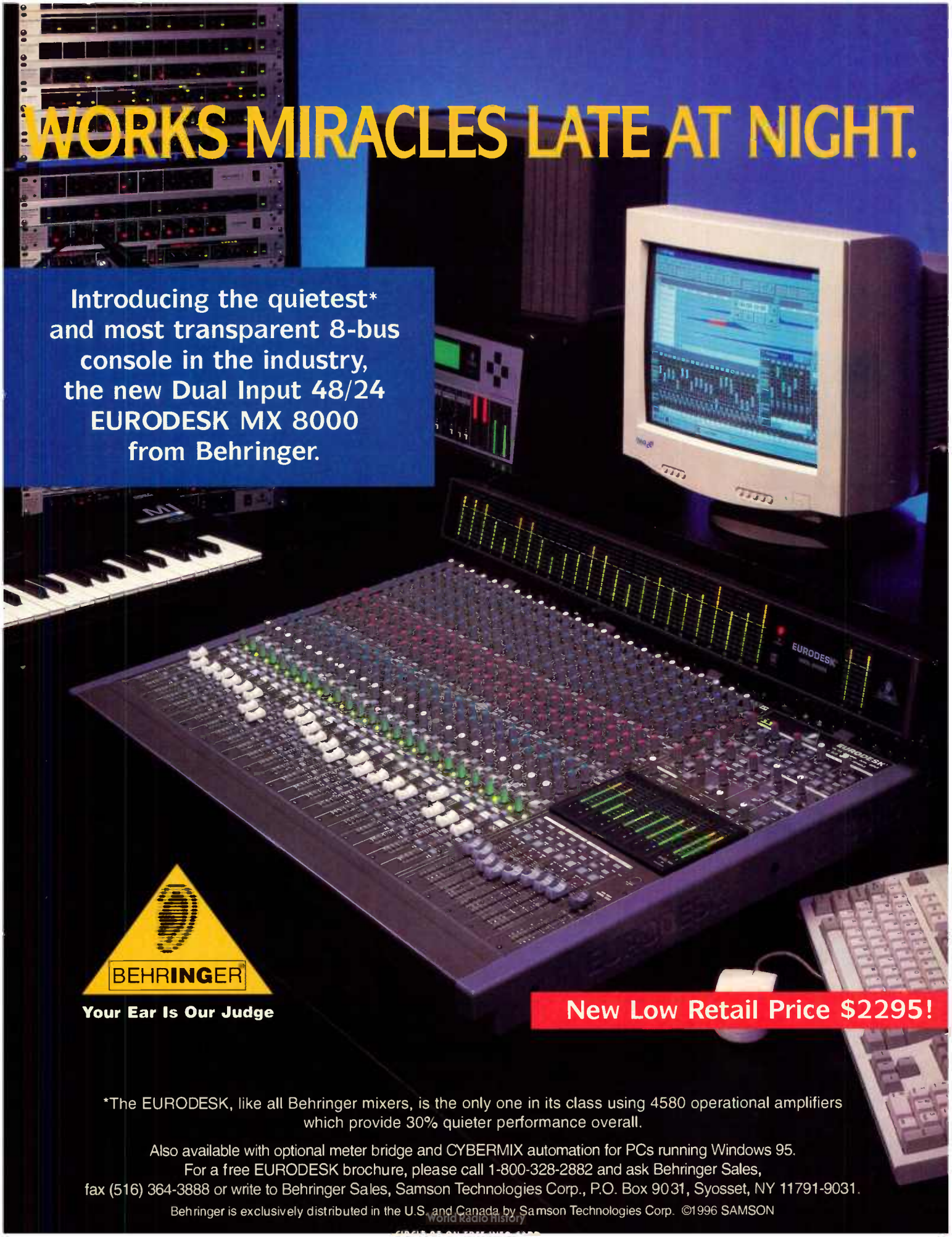

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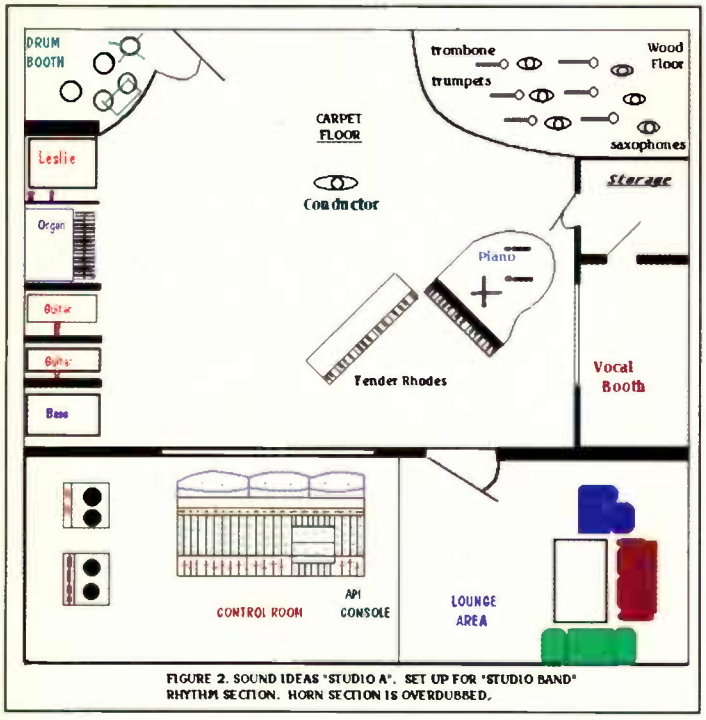

FIGURE 2. SOUND IDEAS "STUDIO A". SET UP FOR "STUDIO BAND" RHYTHM SECTION. HORN SECTION IS OVERDUBBED.

Studio A also had a drum booth with a roof that you could open up to let the drum sound breathe a little more. There was a vocal booth on the right side of the studio that was raised up three steps so that it overlooked the main studio. The control room featured an API 24 input 8-bus console with 512 mic preamps and 550 equalizers. This became my favorite console to mix on.

The first sessions I did here were done on an Autotech 16-track machine. Later they replaced it with an MCI JH-16. The 2- and 4-track machines were Scully 280's. The monitor speakers were Altec 604's and JBL 99's. I used the JBLs most of the time. The outboard gear consisted of four dbx 160's and two UREI LA-3A compressors, a pair of Valley People Gain Brains, two Kepexs, a Countryman phase shifter, an Eventide Omnipressor, and an early version of the Eventide digital delay. I would record most of the "studio band" sessions in this studio.

The studio band usually consisted of a combination of the following players, which depended on who was available and the playing style needed: Will Lee, Wilbur Bascomb or Gordon Edwards (bass); Joe Beck, John Tropea, and Cornell Dupree (guitar); Jimmy Madison, Steve Gadd, and Chris Parker (drums); Richard Tee, Leon Pendarvis, and Don Grolnick (keyboards); David Sanborn and Joe Farrell (trumpets); Tom Malone and Michael Gibson (trombone); and Sue Evans and Ralph McDonald (percussion). Also, additional french horns, woodwinds and a string section were used on some tracks.

On the studio band sessions I would record the rhythm section first (see fig. 2). Dave Matthews or Fred Wesley would conduct the band from the center of the studio. All of the parts were written out. The guitar, bass amps and organ Leslie speaker were baffled off along the left wall. The drums were in the booth, with the roof open slightly. Each drum was miked separately, plus a pair of overheads. I would record the bass drum and snare on their own tracks and mix all of the toms and cymbals to one mono drum track.

I couldn't usually spare more than three tracks for the drums, so to be consistent I never recorded the drums in stereo on any of James Brown's records. The mono drum mix helped give the drums that in-your-face sound that became a James Brown trademark. There wasn't much stereo tom and cymbal work going on in these tracks anyway. The acoustic piano was placed on the right side of the studio with the open lid facing away from the rest of the band. It was miked with a pair of AKG 451's in an X/Y pattern over the hammers for a bright sound. If I wanted a warmer sound, I would use a pair of Neumann U87's spaced three feet apart further in the piano. The Fender Rhodes electric piano was placed right next to the acoustic piano for fast changeovers. The electric piano was recorded direct from the preamp outputs on the stereo speaker cabinet.

We would record three songs in a three hour session. The sessions usually started at about 11 AM and were scheduled so that we could overdub the horns right after the rhythm section was finished. We would allow an hour of time in between sessions so that I could change over the studio setup, then we were off and running again.

NO MYSTERY

I found that by mixing recordings done by many different engineers early in my career, I was able to pick up the things I liked from each of their styles. When I took over all of Brown's recording, I rolled all of this into my own style. Whenever I went into a studio that I hadn't used before I would tell the house assistant to setup the room the way it was normally used. I would go into the room and listen to what it sounded like. Then I would listen in the control room and make any changes in instrument placement or microphone selection based on that.

There were no trick miking techniques, special equipment, or technical gimmicks used to make these classic recordings. It started with a good song and a great performance. The recording was like a photograph that captured and preserved that performance for others to enjoy. Music is created for the pleasure of the performers and listeners. It is there to evoke emotion. With all of the equipment available today, it should be easier to make great recordings, yet so much of the feeling seems to get lost in the circuitry. Technology is just a tool you use, it should neither interfere with or become the main focus of the creative process. If you start with a good sound source and an inspired performance you will get a good recording.

Go out into the studio and listen to the sound of the band in the room, hear it from the musician's perspective. Get the sounds right at the source. When it sounds good in the room you can make it sound good on tape. It doesn't matter what style of music it is, good is good. Your ears are your guide. Use the technology available to enhance your talent, do not let it become your crutch. Music is about feelings. EQ

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Trumpet:	RCA 77 or Sennheiser 421
Trombone:	Neumann U49 or Sennheiser 441
Saxophones:	Neumann U87 or AKG 414
Vocal:	Neumann U87 or U49
Clavinet:	Direct Box
Congas:	Neumann KM84
Electric Piano:	Direct Box
Acoustic Piano:	AKG 451 or Neumann U87
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World Radio History

C'mon Baby, Light My Firewire

If you transfer digital audio and/or video from point A to point B, read this story

BY BOB MOSES

ILLUSTRATION BY MIKE BROWNE

There's a new audio distribution medium that has nothing to do with tape, CDs, or your local Tower Records; and it's something you probably already own — the personal computer. Whether listening to game soundtracks, loading in a movie, checking out an enhanced CD, or downloading audio clips from the Internet, audio isn't just an add-on, but an essential part of the computing experience. Now Microsoft is working to establish a new spec for personal computers (including audio) called SIPC, for Simply Interactive PC. Supporters so far include Compaq, Hewlett-Packard, Adaptec, Gateway 2000, Toshiba, and Intel — when you put that much clout together, something is bound to happen.

SIPC has two important ramifications for the *EQ* reader. First, if PCs become the focus of electronic entertainment in the future, someone is going to have to create a lot of audio content (and with technologies like DVD on the way, as well as increasing interest in Internet audio, this seems certain anyway). Second, the multichannel interconnect bus specified for SIPC, IEEE 1394, can handle a huge amount of digital audio — along with digital video and control signals. If this sounds tailor-made for the studio (commercial or project), you're right.

Until now, the Sony/Philips Digital Interchange Format (S/PDIF) and AES/EBU standards have provided the only common solution for digital audio transfer. However, these are both closely tied to the original CD-Audio format and transfer only a single stereo audio stream between two devices. Additional audio channels require multiple cables, adding significant cost and complexity; and the asynchronous nature of S/PDIF and AES/EBU complicates the task of synchronizing multiple interfaces.

Moreover, the number of devices in a typical digital audio system has grown from a single CD player to a distributed architecture of computer-based devices such as signal processors, mixers, synthesizers, digital tape decks, and much more. The bottom line: S/PDIF and AES/EBU just don't cut it any more, but help is on the way.

ENTER FIREWIRE

Firewire, officially called IEEE 1394 (or "1394" for short), was originally invented and named by Apple Computer in 1986. Today, 1394 has been adopted by over 60 consumer electronics and computer companies and hailed as the interconnect of choice for multimedia systems. It has several features that make it well-suited to digital transfers in the studio:

- Supports the data formats and bandwidth of multichannel audio standards (Dolby Pro Logic, AC-3, DTS, MPEG-II, DVD)
- Carries digital video and control protocols, in addition to audio, in the same cable to reduce wiring and complexity
- Guarantees synchronization between video and audio, even after processing
- High data rates (98.304 Mbit/s, 196.608 Mbit/s, and 393.216 Mbit/s; communications among devices with different data rates occurs automatically at the highest rate supported by the lower rate devices)
- Is widely adopted in the computer and A/V industries
- Cohesively integrates all types of A/V and computer devices (PCs, DVD, musical instruments, DSS, cable modems, surround sound processors, amplifiers, speakers, disk drives, digital camcorders, personal digital assistants, gaming platforms, and so on)
- Supports a multivendor, modular system where even technophobes can add or remove devices easily

IEEE 1394 is also cost-effective, reliable, and standardized by an international standards body. It's not vaporware, and is shipping in volume today on products such as the Sony DCR-VX1000 and DCR-VX700 camcorders. Many companies have announced plans to introduce a variety of products sporting 1394 interfaces in the near future. Apple will ship Macintosh computers with 1394 on the motherboard in 1997, and a number of PC OEMs (such as Compaq and Texas Instruments) have announced plans to provide 1394 support in upcoming models. Microsoft is adding 1394 drivers to Memphis (the next release of Windows). NEC has announced a fiber-optic-based home network system using 1394, and Yamaha is developing a revolutionary digital music and audio system called "mLAN" built around 1394. The list goes on and on.

The 1394 connector was originally created for the Nintendo Gameboy, and has proven to be reliable in the harshest environment of all: the hands of children. The cable, less than 1/4-inch in diameter, is very

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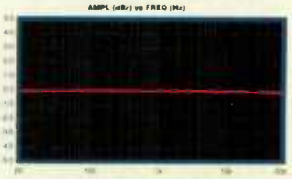

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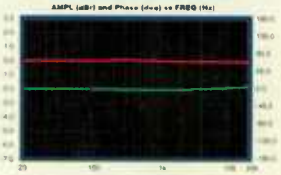

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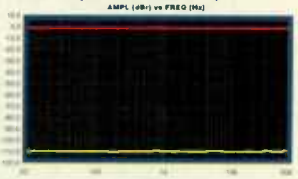

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flexible and durable. Two variants of this connector/cable have been standardized. One has six conductors — four for carrying data and two for power (8 to 40 VDC at up to 1.5 amps). The other has only the four data conductors, and is intended for miniature battery-powered devices. Regarding maximum cable length, the most common 1394 cable contains 28-gauge wires and can run up to 14 feet. Twenty-four-gauge cables can run 45 feet, and several fiber optic technologies allow 1394 to run nearly 300 feet.

You can hook up a 1394 system as a daisy chain, tree, star, or a combination of these. The 1394 standard specifies that two devices should not have more than 16 cable hops between them (using normal cables). Up to 63 devices can connect to one bus, and you can interconnect up to 1023 busses to create a very large network with over 64,000 devices. Each node may have up to 256 terabytes (!) of memory addressable over the 1394 bus. A fair bus access mechanism guarantees all nodes equal access to the bus.

During system initialization, each node on a 1394 bus automatically does bus initialization and device identification (the user doesn't even know it's happening). The system requires no master controller — therefore there's no bottleneck for communications, or a single point of system failure should the master be turned off (or crash). Owing to 1394's support of "hot plugging," new devices may be added to the network simply by plugging them in, regardless of whether power is on or off.

The fact that 1394 is being used today, and is expected to be used a lot more in the future, bodes well for the audio industry. Although combining existing protocols like S/PDIF for audio transfer and MIDI for control have worked passably well, both are showing their age when it comes to handling the tremendous resource demands of modern digital systems. Best of all, since this is a consumer-oriented protocol, 1394 is affordable and nowhere near as touchy as something like SCSI. If 1394 permeates the consumer market, studios will essentially get a free ride on the technology...not a bad deal at all.

Bob Moses was the senior digital audio engineer at Rane for 9 years before becoming chief engineer at PAVO. During his life as a digital audio engineer, he has designed CD players, studio recording equipment, home theater equipment, about 30 MIDI devices, musical toilets, a digital trampoline, — and he's even wired his dog to a MIDI controller.

ASYNCHRONOUS VS. ISOCHRONOUS

1394 supports two primary means of transferring data: asynchronous and isochronous. Isochronous streams are transmitted with guaranteed bandwidth and on-time delivery. Isochronous transmission allows a multitude of audio and video streams to be transmitted through the system. 1394 supports up to 64 independent isochronous "channels," each of which could contain a number of logical audio or video channels (limited only by bandwidth). In a multimedia system, a single isochronous channel could carry a 5.1 channel surround sound audio signal and an uncompressed digital video signal.

Asynchronous transfers can take place any time the bus is free of isochronous traffic. The protocol guarantees that at least 20 percent of the bus time is reserved for asynchronous data transfers. —Craig Anderton

GETTING REAL

During AES, PAVO demonstrated "Papaya," its second 1394 audio product (the first was used in Bill Gates' keynote address at WinHEC 96, which marked the premiere public demonstration of a 1394 audio system). The Papaya development/evaluation board is a member of PAVO's Amazon 1394 technology family, which provides a complete digital audio solution for 1394. PAVO software engineers are working closely with Microsoft to create the 1394 drivers for the upcoming release of the Memphis (Windows 9X) operating system, and Papaya will likely be the reference to which all future 1394 audio devices interface to the PC. PAVO has also developed a way to implement 1394 as a multichannel digital interconnect for multimedia systems; this technology is slated for introduction later this year.

—Craig Anderton

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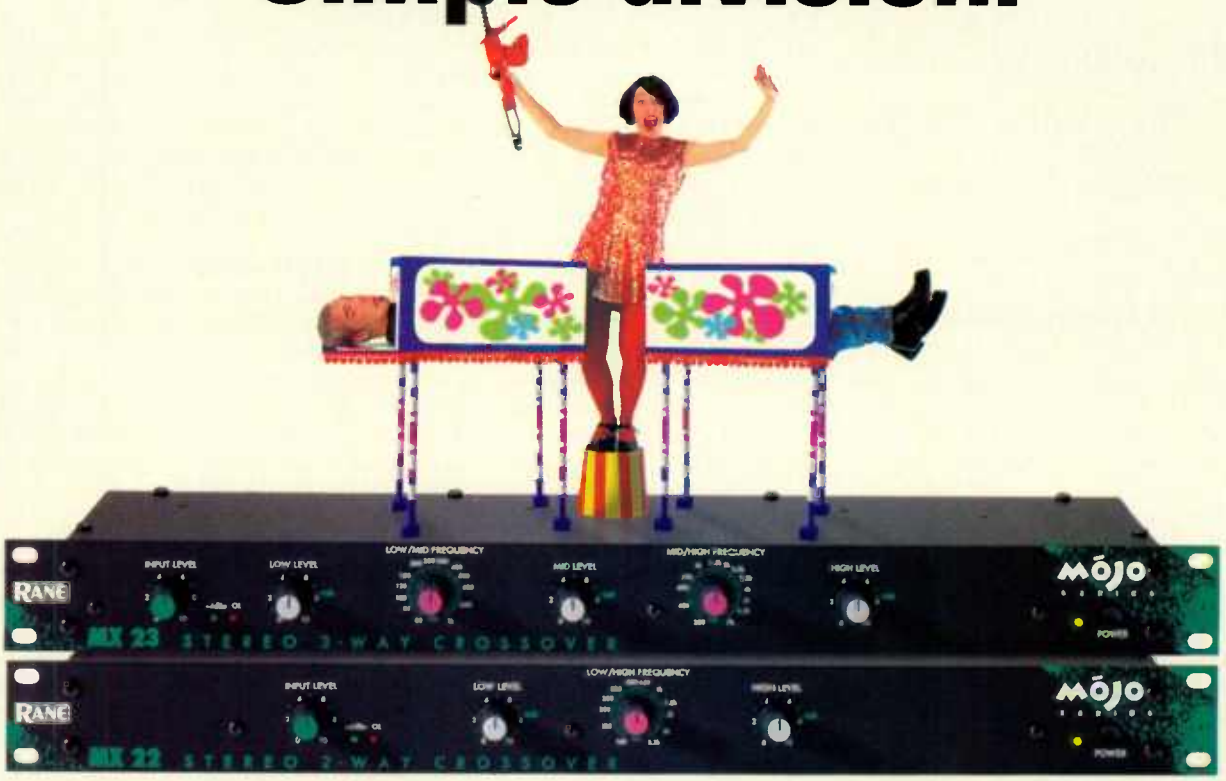

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Miking in the Project Studio Age

Microphone solutions for those without deep pockets or plentiful closet space

BY DAVID MILES HUBER

Sometime, throughout your experiences reading, talking with other engineers, or just plain techno-osmosis, you've may have heard the phrase: "The microphone is a tool of the trade, and there's a right tool for every job." Over the years, this phrase has helped to advance the general misconception that you need to have a bizillion mics in your treasure chest in order to obtain a credible sound. Well, I feel that this particular viewpoint was probably started by some studio or person that already had a pile of mics and wanted to boost his/her image.

When you get right down to it, who in the Project Age of the '90s has the bucks to buy every killer tube mic that hits the market, or the invested time to search out that elusive vintage mic that just went on sale in Prague? So, what's the alternative?

MAKING CHOICES

The flip side of the "different mic for every pickup application" is one that I've subscribed to for a long time: "the mic or set of mics for a wide range of applications." I'm sure most of you, perhaps out of economic necessity, have been subscribing to this ideology for years. It's simple. You settle upon a specific mic (most likely, but not necessarily, a condenser mic) that best suites your individual taste, then you beg, borrow, or rent a pair to put them though their paces. Ask yourself two basic questions: "Do they work well in a wide range of pickup applications?" and "Are they good enough to use as a main stereo pair?" If the answer is, "I love 'em!," then you've found your sonic partners. If not, then keep moving on to the next pair until you've met your match. It's probably a good idea to settle upon the highest quality mics that you can muster up. Notice that I didn't say "that you can afford..." Quality and bucks spent don't always go hand-in-hand. There are an awful lot of good mic choices out there that you don't have to hock your first born for.

Generally, a second and, if you really want, a third pair of mics (generally of different manufacture and sound quality) couldn't hurt, but the name of the project mic game is to make your choices based on general versatility, as well as quality.

BREATHE DEEPLY

When it comes to miking almost any instrument, there's an old wives' tale that has grown out of the studio techniques of the '70s: "In order to get acceptable separation along with a good sound pickup, you have to stick the mic down the instrument's or vocalist's throat." Well, this is all well and good if that's the sound that you want, but...

When miking an instrument at extremely close distances, it's important to keep in mind that you're zooming in on a *specific* part of the instrument's sound-generating surface and are by no means picking up its overall tonal

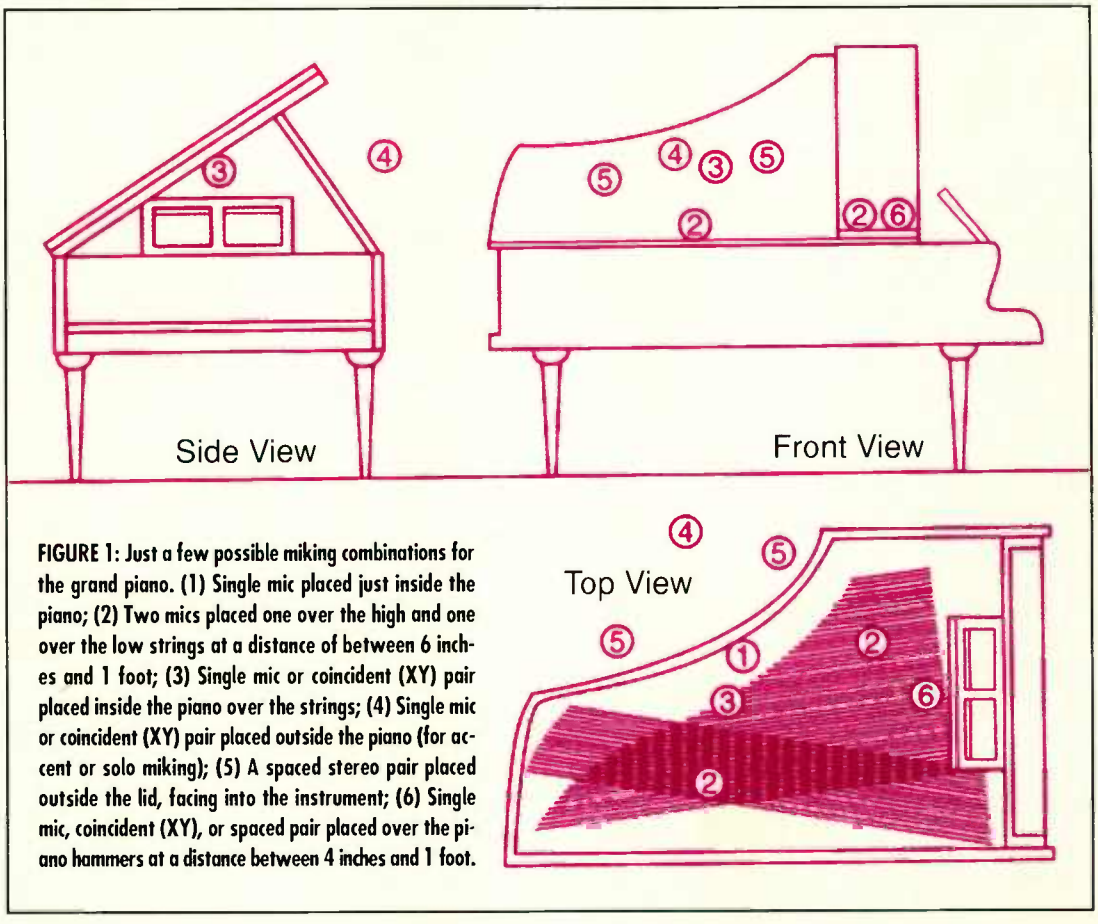

FIGURE 1: Just a few possible miking combinations for the grand piano. (1) Single mic placed just inside the piano; (2) Two mics placed one over the high and one over the low strings at a distance of between 6 inches and 1 foot; (3) Single mic or coincident (XY) pair placed inside the piano over the strings; (4) Single mic or coincident (XY) pair placed outside the piano (for accent or solo miking); (5) A spaced stereo pair placed outside the lid, facing into the instrument; (6) Single mic, coincident (XY), or spaced pair placed over the piano hammers at a distance between 4 inches and 1 foot.

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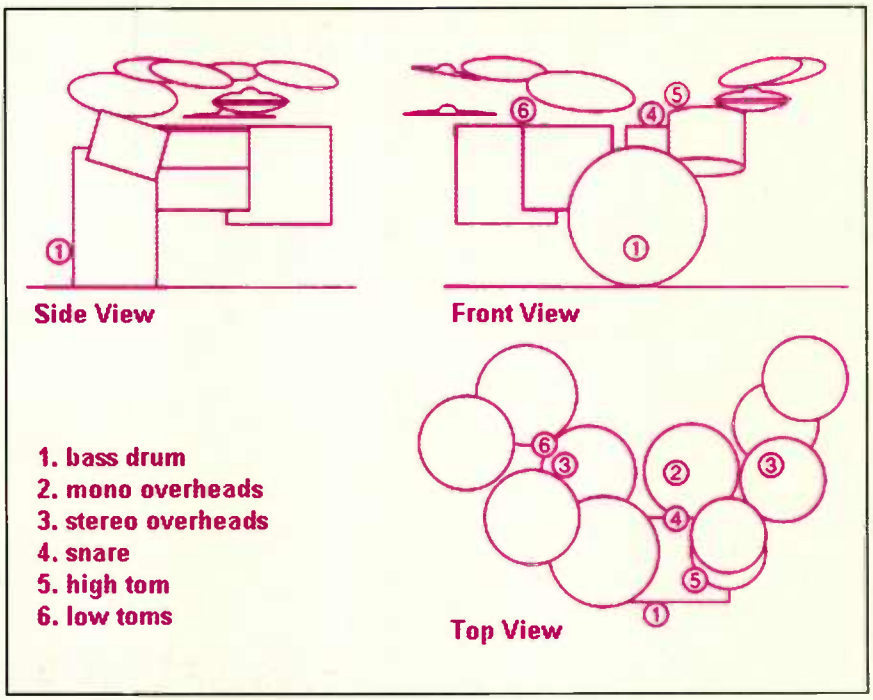

FIGURE 2: Typical mic placements for a live drum kit. (1) kick drum; (2) mono overhead or stereo XY position; (3) stereo overheads; (4) snare; (5) hi tom(s); (6) lo tom(s).

balance. Don't get me wrong, close mic placement isn't a bad thing, it's just not the only game in town.

Close miking, for instance, comes in handy when you want to accentuate the percussive attack of a piano track by placing the mic(s) near the hammers, or the bass of an acoustic guitar by favoring its f-hole. Let's just remember there's another way — one that has been used by professionals for years. This being the concept of pulling the microphone back from the instrument, so as to allow the instrument space to "breathe." This, of course, means placing sufficient distance between the mic and the source (instrument/vocal), so that the instrument's overall tonal balance is equally picked up.

So what is this magic distance? Well, that's up to you. You might want to mic a guitar at a distance that ranges anywhere from 6 inches to 3 feet. The basic concept here is to not be afraid of backing off, Jack. Yes, you might pick up more of the room, but this may add a degree of controlled spaciousness to the sound. If you're overdubbing to tape or hard disk, you'll find that separation won't be an issue, and even though it's important to keep instruments on separate tracks during a multitrack session, extreme separation at the cost of capturing an instrument's basic sound isn't always worth it. In short, semi-distant miking techniques can help to make most instrument tracks blossom into a full sound that's often surprising.

SOME TIPS

Always keep in mind where an instrument's sound is actually coming from and then make your choices accordingly. For example:

• Not all of a flute's sound comes from its head joint. In fact, much of the tone emanates from the keys over the instrument's entire length. This also holds true for most of the woodwind instruments. For example, much of a saxophone's sound comes not from the bell (as one might expect) but from its keys.

• Most of the sound doesn't emanate from the f-hole of an acoustic guitar, violin, or most string instruments. In fact, the f-hole acts as a bass port. That's right folks, it's a bass resonator! Therefore, placing a mic right in front of this port will often yield a boomy sound that's far from ideal. Again, it's best to back off, and preferably be off-axis to the f-hole.

• The piano is an immensely complex instrument, one whose sound can

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change a great deal over the course of its surface. Fig. 1 can help you in choosing the best, possible placement, using both close and semi-distant techniques.

What about drums, you ask? Well, this is the miking question of all miking questions. However, it's not really that big of a deal (unless you want it to be). Drum miking (fig. 2) can range from being relatively simple (using one mic on the kick, one on the snare and one, or a stereo pair, overhead) to quite complex (where each drum in the kit has its own mic). The choices are totally up to you, as well as what is called for by the project.

THE OMNI'S BUM RAP

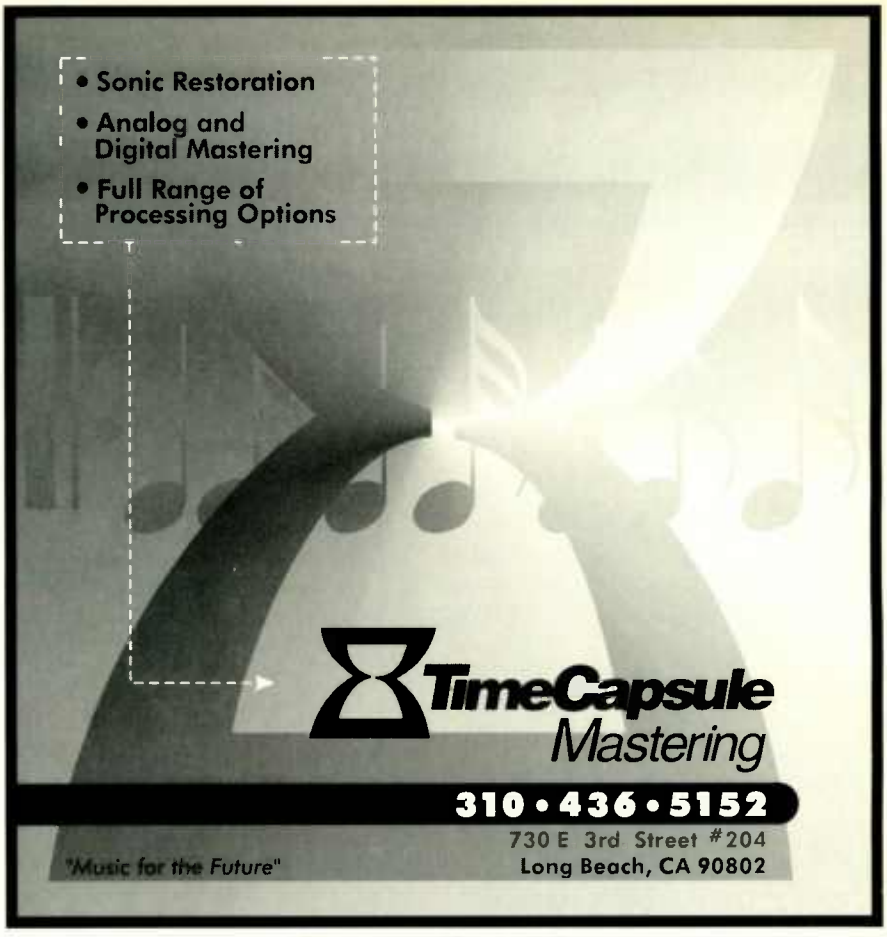
One last rumor I'd like to shoot down is the idea that omnidirectional mics (or omni polar pattern settings) are bad news. Wrong! Again, it depends upon your situation. What, for example, do you do when a vocalist's mic is popping and the proximity effect (a bass boost that comes from working a cardioid mic too closely) is a problem? Well, you could reach for your handy-dandy popper stopper and roll off the bass EQ, or...you could simply switch the mic to its omni setting. It takes a grunting rhino to make an omni pop, and, as I hinted, proximity effect is part and parcel of the cardioid pickup pattern.

In addition, when an omni is chosen in a semi-distant miking situation, a greater portion of the instrument and room surroundings are picked up; again giving you another tool to pull out of your miking toybox.

BASICALLY...

So, what's the moral here? Don't be intimidated by microphones, instruments, players, or other engineer's opinions. Take your time, experiment, and listen to where the sound's coming from and then make your own placement decisions. Your artistic opinions are as valid as the next person's. Develop your own miking style with the tools that you have. It's a very simple concept.

Special thanks to Trigger (Dave Hines) and to the folks at Focal Press for letting me use a few figures from my book, Modern Recording Techniques.



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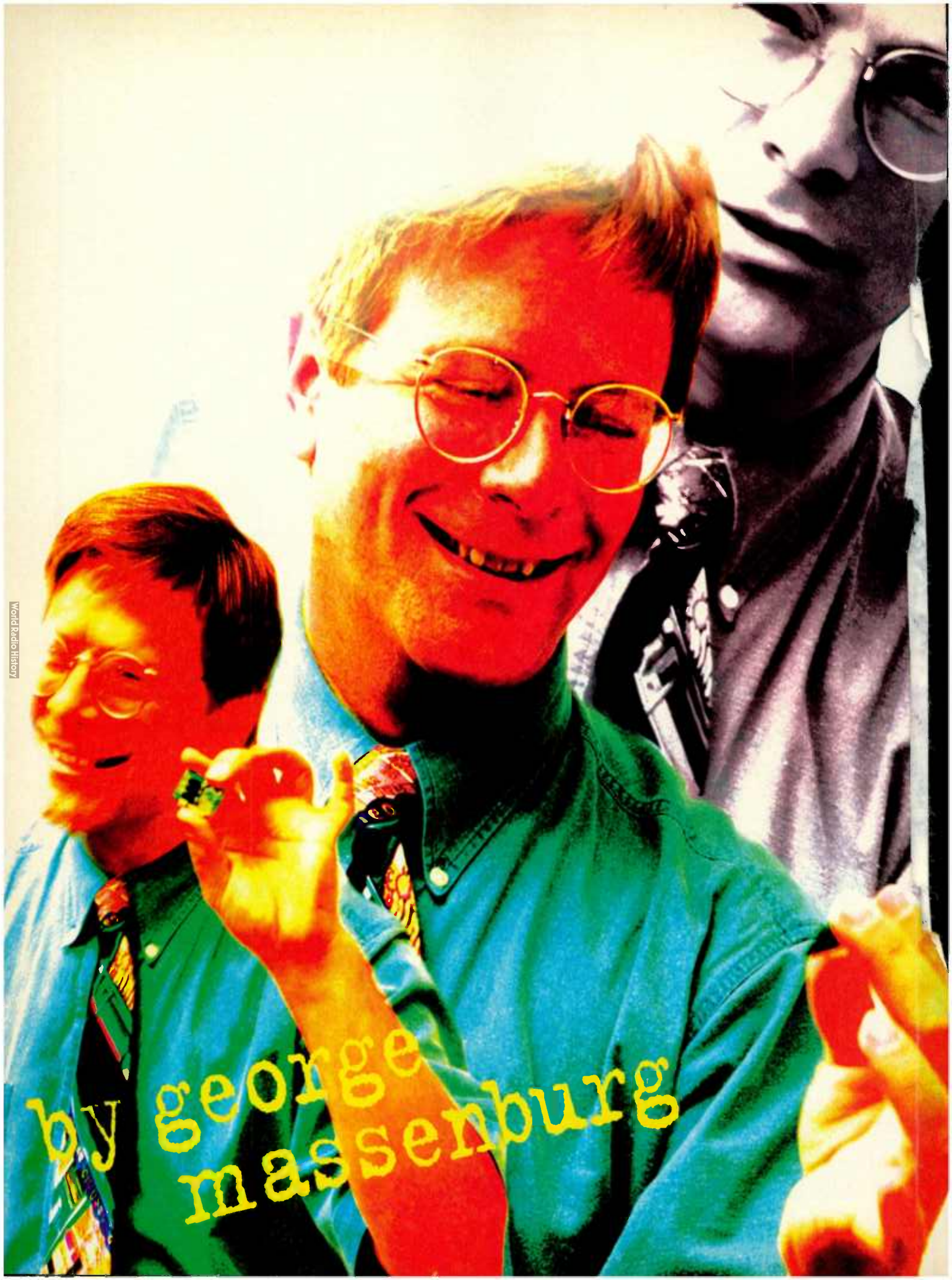

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TR
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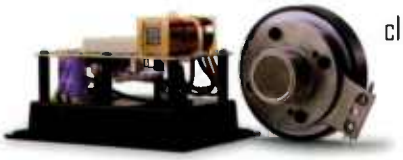
JBL BECAUSE IT'S THE MUSIC THAT MATTERS JBL

At JBL, our intention was to give you more than just adequate sound at a good price, it was to offer you jaw-to-the-floor sound at a great value.

Introducing the new TR Series by JBL. Loudspeakers that put out awesome sound levels without changing the character of the sound. Energy efficient speakers that turn power into sound not waste. Cool looking speakers that look like you had to sell your soul to buy them. Dynamically designed speakers that are virtually impossible to blow. They're speakers for the way you play. No matter how loud.

Play as hard as you like. You're protected.

When it comes to performing, what the artist fears most is their system sounding muddy, distorted or just plain bad, or worst of all, blowing a speaker. Which is why JBL included SonicGuard™ Protection Circuitry in the crossover of all the TR Series speakers. Unlike limiters that tend to squash the unique characteristics of a sound, SonicGuard™ built-in circuitry protects the high frequency driver while still maintaining the snap of the snare or the impact of the bass drum or the clarity of the vocals. And compared to other built-in protection devices that turn the tweeter off and on causing a sound like a choking pit-bull, SonicGuard™ Circuitry is inaudible. While you perform, it does its job without being heard. When currents reach a threatening level, the crossover unit quietly maintains a safe level of power to the speaker. It protects without ever compromising your sound.



And since the SonicGuard™Circuitry perfectly matches the capability of the TR series speakers, they're nearly impossible to blow.

Speakers that thrive on merciless torture.

It actually would be tough to put these speakers through more hell than we did. To get a power rating for a speaker, the industry standard tests require running a speaker at full throttle for 2 to 8 hours. Well, that seemed a little whimpy for JBL. So instead, we ran our speakers at full throttle for 300 hours. It was pure, merciless torture. And they shined.

As far as other physical torture, these speakers are built for travel and to take any abuse a roadie can dole out. Sturdy textured covering, reinforced metal corners and a recessed terminal cup are a few key features that make the TR Series speakers exceptionally road worthy.

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JBL compression driver is built to add clarity.

The JBL compression driver is made with a pure titanium diaphragm. Being light weight yet rigid, Titanium maintains the true characteristics of sounds while adding crispness & clarity.

TR 125

The TR 125 is a front-loaded two-way loudspeaker with a 15" LF driver and a JBL compression driver. Being front-loaded, this speaker is built to a size, weight and balance that is more manageable to transport.

TR 225

The TR 225 is a two-way loudspeaker with 2-15" LF drivers and a JBL compression driver. By incorporating different low-pass filters in each of the LF drivers, the TR 225 offers a smoother performance through the crossover region. Adapted from technology originally used in the classic UREI 813 studio monitors, it greatly improves the power response of the speaker.

The TR 126 is a horn-loaded two-way loudspeaker with a 15" LF driver and JBL compression driver. With directional wings on both sides, it delivers sound with extra punch while also directing more of the low frequency sound to your audience.

TR 126

The TR 105 is a two-way stage monitor with a 15" LF driver and JBL compression driver. It can be used horizontally as a stage monitor, upright as a stage speaker or mounted on a pole as a raised sound reinforcement speaker. With a well-controlled coverage pattern and 45 degree operational angle, the TR 105 directs more sound to the performer and reduces annoying feedback.

TR 105

All speakers in the TR Series are built with a plastic baffle that integrates an HF constant directivity horn and bass ports. The plastic baffle allows for a larger horn in the cabinet. The advantage here is that a larger horn controls a greater range of frequencies. This in turn, results in an even sound throughout the entire listening area.

The baffle design adds to even sound.

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TR SERIES SPECIFICATIONS

	TRI05	TRI25	TRI26	TR225
Frequency Range(-10dB from rated sensitivity):	60 Hz - 16 kHz	55 Hz - 16 kHz	50 Hz - 16 kHz	50 Hz - 16 kHz
Power Capacity: (Continuous Pink Noise EIA RS426A, 8 hrs):	225 Watts	225 Watts	225 Watts	450 Watts
(Peak Pink Noise)	900 Watts	900 Watts	900 Watts	1800 Watts
Nominal Impedance	8 Ω	8 Ω	8 Ω	4 Ω
Sensitivity: 1W, 1m	99 dB	99 dB	100 dB	102 dB
Nominal Dispersion	90°H x 45°V	90°H x 45°V	90°H x 45°V	90°H x 45°V
LF Driver:	1 x 380mm (15 in)	1 x 380mm (15 in)	1 x 380mm (15 in)	2 x 380mm (15 in)
HF Driver:	Pure Titanium Diaphragm Compression Driver, liquid-cooled	Pure Titanium Diaphragm Compression Driver, liquid-cooled	Pure Titanium Diaphragm Compression Driver, liquid-cooled	Pure Titanium Diaphragm Compression Driver, liquid-cooled
Horn:	Optimized Aperture™	Optimized Aperture™	Optimized Aperture™	Optimized Aperture™
Dimensions: H x W x D	*Floor Monitor Position* 445 x 750 x 440 mm 17½ x 29½ x 17¼ in			
	Stage Speaker Position 750 x 460 x 390 mm 29½ x 18 x 15 ¼ in	750 x 460 x 370 mm 29½ x 18 x 14½ in	880 x 680 x 465 mm 34½ x 26¾ x 18¼ in	1145 x 460 x 370 mm 45 x 18 x 14½ in
Net Weight:	22.7 kg (50 lb)	27.2 kg (60 lb)	45.9 kg (101 lb)	40.9 kg (90 lb)
Shipping Weight:	24.1 kg (53 lb)	28.6 kg (63 lb)	47.2 kg (104 lb)	42.7 kg (94 lb)

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INVEST IN JBL TECHNOLOGY

Years of experience went into making the TR Series. It was our goal to make a more affordable JBL speaker, not a cheap one. Which is why you'll find a combination of features in the TR Series that you won't find in other speakers at this price. Features brought over from JBL's high-end concert touring and live performance systems.

For instance, each TR loudspeaker houses a liquid-cooled JBL high frequency compression driver made with a pure titanium diaphragm and JBL's patented diamond surround that delivers crisp highs and increased system clarity. And for even sound throughout your entire listening area, the TR Series is designed with JBL's "Optimized Aperture™" horn which was first used in our popular concert touring systems.

And while the woofers in most systems in this price range have a 2" voice coil, the TR Series comes with a 2 1/2" edgewound voice coil for greater power handling capabilities. JBL pioneered the use of the flattened wire, called "edgewound", in voice coils to give speakers greater output sensitivity (AKA more sound per watt). What's more, the output sensitivity in the TR speakers is further enhanced with a hefty-sized magnet.

To insure balanced sound, the TR Series utilizes a crossover network that is engineered to survive years of road use and offer outstanding acoustic performance. A special "multiple-slope" crossover design for the TR225's dual woofer, delivers extra low-frequency punch while simultaneously reducing unwanted interference between the drivers. And for added convenience, all models have multiple input connectors that allow you to "loop through" to additional cabinets without the need of additional "home run" cables to the amplifier.

So just by looking at the price, you may not believe that the TR Series is actually a JBL. But take a listen. It's loud. It's clear. It's consistent. It's JBL.

The new TR Series speakers are made for the way you play.

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Turn it ON

Turn it UP

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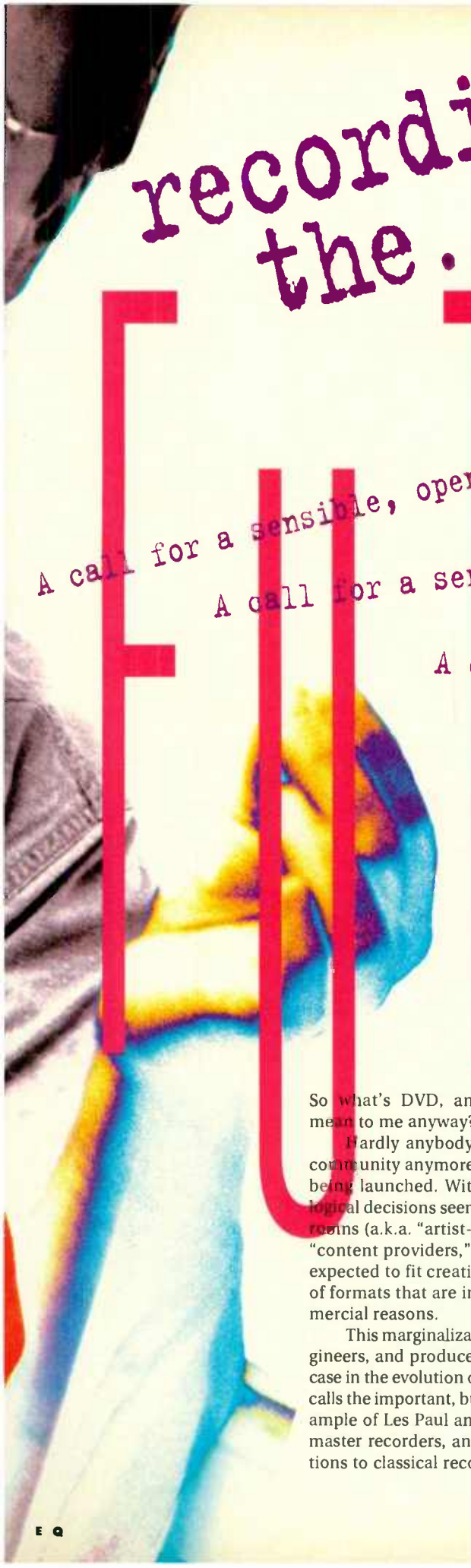

recording the... FUTURE

A call for a sensible, open-ended, advanced audio standard for DVD

A call for a sensible, open-ended, advanced audio standar

A call for a sensible, open-ended, advanced

So what's DVD, and what does a standard mean to me anyway?

Hardly anybody thinks about the creative community anymore when a new technology is being launched. With few exceptions, technological decisions seem now to be made in boardrooms (a.k.a. "artist-free zones") and artists, or "content providers," as we are now known, are expected to fit creatively within the constraints of formats that are introduced for strictly commercial reasons.

This marginalization of recording artists, engineers, and producers has not always been the case in the evolution of audio technology. One recalls the important, but suspiciously oft-cited, example of Les Paul and his promotion of 8-track master recorders, and the audiophile contributions to classical recordings by some great conductors — Leopold Stokowski, Herbert von Karajan, and Erich Leinsdorf come quickly to mind. Not to mention the importance that producers like Walt Disney placed on improving sound reproduction for film for purely artistic reasons. But recent trends have headed elsewhere. And to many, the darkest moment in audio technology was the introduction of the digital compact disc (CD), mostly for reasons of compromised sound.

Audio may, however, be about to embark in a new direction, built upon a new technology called DVD. This so-called Digital Versatile Disc is a higher-density permutation of the CD, and it promises to be the first true digital multimedia format able to satisfy the desire of video entertainment producers to replace the VHS videocassette, the computer and video-game community's need for a much-higher-capacity CD-ROM, and the (by

PHOTOS BY ED FREEMAN

World Radio History

comparison much smaller) audio community's interest in tagging along for a number of reasons.

The specification of an audio standard for DVD is a subject of great frustration for audio professionals, recording engineers and producers, and musicians; market-battered men and women who are spending a great deal of time and megabytes of e-mail in discussions that seem to meander from the arcane to the pointless. I think it's time that those of us who make our living on the creative side of audio come to some sort of an agreement among ourselves as to what this new format could offer us all, and then concentrate on getting the attention of standards-writers. Will we be able to agree on anything? Maybe — maybe not. But if we can agree what *not* to agree on, I submit that a flexible specification is the obvious next step.

For those who may have missed the news, DVD is being pitched, and is currently primarily specified, as the next great video format. It looks a lot like a CD or CD-ROM, but it has far greater capacity — almost 5 GB of data compared to the 700-odd MB of the CD — and a much higher data rate, and can hold a full-length data-compressed, digitized movie on a single side. Hollywood is hoping that DVD will bring more customers back to the video store to buy rather than rent their movies and also that this new format will deal a comeuppance to the now-powerful cable companies. Japan is hoping that DVD will lead more buyers back to their consumer electronics stores. And, in the meantime, Silicon Valley already has start-ups designing and manufacturing silicon hardware and multi-gigabyte applications on DVD-ROM's are close at hand. Where does that seemingly dwindling cadre of recording engineers and producers fit into this?

Simply put, we have an opportunity to utilize the DVD as a medium for a new generation of recorded sound. But, first...

What are the major issues within an Advanced Audio Standard?

- Digital Sampling Rate
- Digital Word Resolution (number of linear bits)
- Digital Data Compression (or rather, bit-rate reduction; from "lossless" coding schemes to those which selectively corrupt data, such as "perceptual encoding," et al.)
- Number of channels
- Compatibility (especially backwards compatibility with the current compact disc)
- Intellectual Property Protection (Copyright issues)[1]

DIGITAL AUDIO, AGAIN?

First, it should be pointed out that our universe is probably more "linear" and "continuous" than not. There are few examples of "digital-like" things in nature, with some possible exceptions: the protein "bits" in DNA that make up the genetic code, and quantum effects at a subatomic scale. It is more a world full of ambiguities and chaos, but rich in fine detail and *continuity*. It is not an "analog" world, either.[2] May I submit that *nothing* in nature closely resembles our current digital coding of sound.

But, ignoring the sentiment of some "golden ears" that digital should just go away (and, mind you, sales of 33 1/3 most-often-black polyvinyl-chloride record albums are up in the past two years, especially in Japan), many see some of the benefits of digital media, and very few can ignore that it is already virtually impossible to circumvent digital conversion at some point in getting sound to the public (except for the LP!). We are well-advised to seek out better digital. Unfortunately, there is currently no consensus as to exactly which digital format is optimum — there is even disagreement among us over how to weigh the factors within the constituent issues. There are even a few among us expressing satisfaction with the current 44.1 kHz, 16-bit format of the digital compact disc.

Some 16 years ago, at its introduction, the CD was touted in the pages of *Billboard* as "...[embodying] perfect sound, forever!" Did we ever *really* believe that? Many of us listening to the first CDs on early players had, at best, mixed feelings. The sound of many of these first CDs was cold, "flat," hard-edged, and thoroughly foreign. The first digital recordings that most of us made seemed to suggest that everything about working with digital was in many ways different than working with analog — that few, if any, of the analog recording tools upon which we had come to depend were anything but obsolete.[3] Not only that, the methods that we had to measure the new gear weren't explaining problems that we could identify.[4] Well, folks, it wasn't perfect and it didn't last forever. It's ready to be eclipsed, technologically. And if there's a lesson here, it is, "Standards in our time tend to have unambiguously rock-solid, brick-wall limits."

NONE OF IT MAY MATTER TO MUSIC, ANYWAY...

As we approach possibilities of DVD, I think we have to separate the consumer audiophile from those of us who make recordings for a living. Record producers, recording engineers, and some recording artists would like to believe that all consumers and all A&R executives appreciate better sound. But as producers and recording engineers, it is important for us to remember that while we perceive our job as pushing the envelope of the business, we

1. This issue is quite important, but I'm going to avoid getting into it here. An understanding of the variables within the first five issues is fundamentally important to the development, enhancement, and/or improvement of digital audio.
2. The word "analogue" is defined as "meaning", the word "analog" may be closer to the word "analogous," meaning, among other things, "like" or "equivalent."
3. As it turns out, we shouldn't have worried so much. Many pieces of analog processing gear are enjoying a rebirth, as well as extraordinary resale prices, in the '90s.
4. For example, the Total Harmonic Distortion measurements of truly vile and execrable digital gear is invariably good, or at least as good as the analog gear we were comparing it to.

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Are you ready ?

Does your console have the capability to mix for today's 5.1 and 7.1 Surround Sound formats?

The addition of **Dolby Digital™, Universal DTS™, Sony SDDS™** and **DVD** production requirements to the existing LCRS, stereo, and mono formats are all new reasons for checking out the latest development from Euphonix.

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Hyper-Surround provides creative mixing features for any or all surround sound formats, and even **multiple formats at the same time!** While other consoles claim to be multi-format or surround sound capable, they typically provide mixing for a single LCRS, 5.1, or 7.1 format at one time, with only basic positioning control.

Euphonix provides **advanced panning from every channel** with front pan, rear pan, surround, focus™, and divergence while maintaining the same image positioning across simultaneous formats. The innovative Euphonix focus™ control improves on traditional divergence panning by adding a degree of image placement that to date hasn't been possible:

Maximum focus™ gives pinpoint localization for still sounds.

Minimum focus™ optimizes localization for moving sounds without decreasing the panning range (unlike a divergence control).

Lead the pack in surround mixing with a CS2000F. Be prepared for any of today's or tomorrow's formats with a flexible, software based mixing console that is ready for any new standard that comes along.

Listen to the CS2000's premium audio quality, and test drive Hyper-Surround at a one of the many Euphonix-equipped studios or sales offices worldwide.

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must realize that it is most assuredly not the main business.

In fact, most of us have learned the hard way that "high fidelity" has very little to do with selling records. In his keen and perceptive article in the November 24, 1996 issue of the *New York Times*, Lawrence B. Johnson states, "Some would insist that it is not so much the sonicly veiled voice as the music itself that stirs the imagination." He concludes, "...no recording can match the real thing: live music. I [have to] remind myself what just one violin sounds like played in my living room by a real fiddler. Or a piano under the hands of a real pianist."

On the other hand, he accepts that, "By extending the scope of bass and treble, hi-fi reproduction can also better define harmonic structure; similarly, increasing the audible range from very soft to very loud affords...a more lifelike experience. Sheer visceral intensity can be an important part of the musical message."

Changes in the technology of audio reproduction and recording have always had an impact on the nature of the music being made. When we move from one format to another, popular music makes note of and often takes advantage of those changes. Content providers (we used to be called record producers) usually figured out what fit within the technical constraints when we moved from 78's to 45's, and when we originally moved between wax and 78's. The music always moves to fill the space. Of course, the music also changes with the evolution of the production standards. Remember how much recording changed moving from 8-track to 24-track, and so on, not to mention moving from vinyl to CD? With DVD, we will move yet again, and I believe we will move to a more ambient recording environment.[5] This could have a profound impact on popular music as we now know it.

PRACTICAL ISSUES ABOUND

What if a DVD audio standard required a double-sided disc? That would certainly get the attention of the record manufacturers — they'd have to rethink where to put the darn label.[6] And what about compatibility with existing CD players? Engineers, producers and artists may be excited by DVD's possibilities, but at the same time it may leave the record labels cold.

DVD audio technology is being challenged by the realities of selling records,

5. Not necessarily ambient in the sense of the "ambient" style of music — more the sense of a real room, a sense of place
6. One must remember that the data on the side, or sides, of the medium require optical transparency. Transparent inks are a passibility, I guess. DayGlo inks are out. It has been suggested that the "label" could be "embossed" into the metalizer such that it had a sort of "silver on silver" look that doesn't affect the reflectivity

A DVD PRIMER

By Bobby Owsinski

For those of you who've not been exposed to DVD yet, here's a primer to get you up to speed. And for those of you who know a little about this new format but have questions (and there are lots), hopefully the answers will follow.

What Exactly Is DVD?

DVD is the next version of the CD. Although DVD doesn't officially stand for anything, it is used frequently to refer to either "Digital Video Disc" or "Digital Versatile Disc." Essentially, DVD is a CD on steroids. It contains anywhere from 7 times to 26 times more storage space. DVD's increased capacity is a result of three things. First, shrinking the microscopic pits that encode the digital 1's and 0's. Second, making an additional layer of pits available. And third, making a double-sided disc possible. This gives us a disc with the following four capacity levels:

- Single-layer DVD: 4.7 GB of data
- Dual-layer DVD: 8.54 GB
- Double-sided, single-layer DVD: 9.4 GB
- Double-sided, dual-layer DVD: 17 GB

There are five variations of DVD, with each variant described in its own "book," as noted below:

• **DVD-ROM (Book A)** is a high-capacity data storage medium similar to CD-ROM. Because DVDs spin 3 times faster than a CD and because the data is read faster by virtue of the smaller pits, the DVD-ROM has the equivalent data transfer of about a 10X CD-ROM drive. Because DVD-ROM drives will read the older CD-ROMs, many drive manufacturers have announced that they will discontinue CD-ROM drives in favor of DVD-ROM drives within the next two years. Some computer manufacturers have announced the availability of DVD-ROM drives already.

• **DVD-Video (Book B)** was designed specifically to deliver linear motion picture content. This is one of the areas where DVD shines. A single-sided, single-layered DVD is capable of holding about 130 minutes of broadcast-quality (500 lines resolution), MPEG-2 encoded video (which is supposed to be sufficient to hold 95 percent of the movies made), along with eight digital audio streams and up to 32 graphics channels for subtitles and menus. The format also provides for a fairly sophisticated copy-protection method to prevent piracy, which may or may not be used according to the discretion of the producer.

The eight audio channels can be encoded for surround sound using either the Dolby AC-3 or MPEG-2 data-compression schemes (more on this later) or can use the standard Linear PCM (LPCM) that we're presently accustomed to (as used in all DAT machines and DAWs). Also of particular interest to us audio types is that the LPCM audio is specified to utilize either a 48 or 96 kHz sample rate with a word length of up to 24 bits!

The DVD Video spec describes not only the disc and the data format, but also the playback system. The advantages to a system specification are evident in the fact that over 600 million CD audio players have been sold along with 10 billion discs, and they are all interchangeable.

• **DVD-Audio (Book C),** which is sometimes known as DAD (Digital Audio Disc), was designed for audio-only uses (similar to CD-Audio). The DVD-A spec is currently incomplete since the DVD Consortium has decided to seek additional input from the music industry before defining the DVD-Audio format. In late 1995, an International Steering Committee, comprised of representatives from record companies from around the world, began a review of the DVD technology in order to complete the DVD-A spec. Although much progress has been made, no firm timetable currently exists for the completion of the process.

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The concerns of the record companies can be broken out into three major areas:

1. The levels of copy protection and how they're implemented in an effort to decrease piracy.

2. Forward and backward compatibility so that DVDs will play in current CD players and vice-versa.

3. Audio issues regarding sample rate and bit depth.

Other issues such as the implementation of video, graphics, and other data, conditional access, and packaging are also being addressed.

If the final specification includes features or formats not present in the current DVD specification (as looks to be the case), then first-generation DVD players may not be able to play DVD-Audio discs. Remember that the audio portion of DVD-Video spec is not in question. It's the DVD-Audio disc that's the new format.

- **DVD-R (Book D)** permits one time recording of data and is similar to CD-R.
- **DVD-RAM (Book E)** is a variation of DVD-R that is erasable and recordable many times.

Standards for DVD-R and DVD-RAM are complete. DVD-R and DVD-RAM discs are supposed to be readable by all DVD-ROM drives and DVD-Video players, but first-generation DVD drives and players may not be able to read recordable discs.

Who Owns DVD?

Although no single company "owns" DVD, there is a consortium of companies — Hitachi, JVC, Matsushita, Mitsubishi, Philips, Pioneer, Sony, Thomson, Time Warner, and Toshiba — that controls its licensing. DVD is primarily the work of Toshiba, Philips, and Sony. There were originally two standards for DVD: The MMCD format was backed by Sony and Philips, while the competing SD format was backed by Toshiba, Time Warner, and others. A group of computer companies led by IBM insisted that the DVD proponents agree on a single standard, which was announced in September of 1995, narrowly avoiding a confusing and costly repeat of the VHS vs. BetaMax videotape battle (or the quadraphonic sound battle of the 1970s).

With The Good Comes The Bad

Well, nothing's perfect. And in the case of DVD-Video, there're some serious issues that, in the least, will cause some inconveniences.

Multiple Formats: Just as in video tapes, the video portion for the U.S. must use the NTSC broadcast standard while the European version will be PAL. And if that isn't enough, the audio encoding will use Dolby AC-3 for the U.S. and MPEG-2 for Europe (since the latter is currently the more widely used of the two in Europe). This means that DVD-Vs will not automatically be compatible from country to country unless someone comes out with a player that can do format conversion and decode both MPEG-2 and AC-3.

Regional Codes: One of the more interesting (and potentially frustrating) points with DVD-V is the provision for regional codes, which were included mostly at the behest of the major film studios. Regional codes breaks the world market out into 6 regions, which are: North America; Europe; Japan; Australia and Far East (except Japan); Africa and Middle East; and Central and South America.

A DVD-V with a regional code intended for Japan will not play on a DVD player with an American regional code, even if all the audio and video formats are correct. The reason for the regional codes is that movies are not simultaneously released worldwide but rather in stages. The regional codes are yet another way for the film studios to try to eliminate unauthorized imports and premature release. Once a DVD movie has achieved worldwide release, it could be re-released without regional encoding.

Regional codes do not apply to DVD-ROMs or DVD-ROM drives, and it's too early to tell if regional codes will apply to DVD-Audio.

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the limitations of today's production tools, and our creative inexperience to prove its relevance. Imagine if we as an industry debuted the future of audio technology and everybody yawned? So we may have to take *reality* into account.

SAMPLE RATE AND WORD WIDTH

About ten years ago, in the middle of the digital dark ages, I had the pleasure to spend some time with Dr. Roger Lagadec who, at that time, was director of Sony's AP Division with responsibility for professional digital audio products. As he began to drive me from Shinjuku (in downtown Tokyo) to Atsugi (in Kanagawa, about an hour and a half's drive away), I mentioned that it would be nice to see some audio products use a significantly higher sampling rate. For the remainder of the trip I endured lecture, discourse, and a lot of griping about how irresponsible it was to so lightly conclude that such a fundamental change in technology was a priority; Sony's, and almost everyone else's world, was (and, in large part, still is) built on 44.1/48 kHz, and the impact of and ramifications to making this sort of change is intimidating.

There are no issues more likely to spur discussion to violence than where to draw the line for digital word width and even more so for sample rates. The costs involved in retooling for the latter are, to say the least, significant. Worse, there is little hard scientific data (and seemingly only anecdotal empirical data) in psychoacoustics to support the usefulness of signals beyond 18 kHz and resolutions in the 20+ bit range.

Even so, as I mentioned before, many of us welcome the opportunity to go beyond the 44.1 kHz/16-bit world of CDs. Many of us have, by now, heard the benefits of increasing resolution (most often 18- to 20-bit A/D and D/A conversion at conventional rates), as well as listening to increased sample rate (Allen Sides and I owned and used Mitsubishi X86HS 96 kHz/16-bit machines). We like what we hear — most often we hear improvements in a sense of space and depth, or more "air."

As an engineer who has lived in front of the monitors for a great many years, I often spend a lot of time with a *full-range sound*, in the sense of a wide dynamic range as well as a wide frequency response (when I'm working analog), for the weeks, months, or years that I have lived with a given project. And I can only add that I am more often disappointed than not with

7. Even when I do use a digital multitrack, I am listening to a mix of many 16-bit (and, now, sometimes wider) channels.

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what comes back from CD replicating facilities. Worse, it's dawning on me that even as the possibility of a much better digital product format comes closer, the format of my digital archives (fixed like almost everyone else's at 44.1 to 48 kHz, 16- to 19-bit) severely limits their usefulness. Why, oh why, haven't we digital-format producers been archiving our masters at some much higher standard than our release media?

Assuming that I do want to put out more life-like recordings (and I've had a pretty fair response to the recordings that I've made over the years), let me tell you that I've never heard the recorded sound of a solo violin or a trumpet with a Harmon mute come close to an original performance. And, look, I've heard the arguments about single-variable tests and questions about elements of the signal chain other than the converters. I don't buy it.[8] During the often-strident arguments about the contribution (or lack of same) of so-called out-of-band high-frequency components, I feel like I'm hearing a lot of, "Pay no attention to the man behind the curtain."

WARNING! PERSONAL OPINIONS FOLLOW. FLAME OFF!

I recently mixed a record that came off analog multitrack tape; it was the first time I've worked from an analog tape master to an analog tape mix in a long time.[9] The artist and producer[10] preferred to record that way, and I was working just as an engineer, but I learned a lot from the experience. It was really nice hearing a real hihat again after 15 or 16 years. It actually sounds pretty good. C'mon guys. We know that digital is predisposed to harshness — it is not the same listening experience as we came to know in our hearts with analog (ignoring for the sake of argument there are certain attractive quantum improvements in noise elimination and media integrity). Digital harshness and starkness are okay if what you want is a provocative and irritating (stimulating?) sound, but that is not the record that I'm going to put on for a spiritual experience; I'm more likely to put on one of Doug Sax's acoustic music CDs, or Gabe Wiener's early music CDs, or a Peter Gabriel disc these days. I want something that I can feel safe with. Doug's and other's fine work and great efforts notwithstanding, I love the lace and filigree of a virtuoso performance and I do not believe that 16-bit/44.1 kHz is best in

8. Spectral analysis utilizing wide-response microphones and analyzers has shown that there's significant energy beyond 20 kHz. James Bayk, resident pianist at Cal Tech, showed me the spectra of a trumpet with a Harmon mute — its harmonic at about 50 kHz was as "loud" as its fundamental, and it detailed a response to about 100 kHz!
9. About 15 years.
10. Journey and the talented Kevin Shirley, respectively.

(continued from previous page)

Premastering — Another Production Step: An additional stage of preparation known as Premastering is required during the preparation of any version of commercial DVD, and it becomes a very critical stage in DVD production because of the use of digital compression. During this stage, video and audio must be digitally encoded, menus and control information have to be authored, then it all has to be multiplexed into a single data stream and finally encoded. This is a time-consuming and artful process that can mean the difference between broadcast quality or marginal quality. At the present time, there are no industry standards to ensure quality encoding and production.

CD-Rs May Not Be Compatible: Although DVD drives are supposed to be backward compatible to play CDs, CD-Rs may not be recognized by some DVD players because the dye used in CD-Rs doesn't reflect the laser beam. This may be rectified by either a dual-laser DVD-ROM drive (like Pioneer is introducing) or a new CD-R2 blank that will work with both.

Also, DVD-R can't be used for mastering DVD since it has a capacity of only 3.9 GB while a full-fledged single-sided, single-layered DVD has a capacity of up to 4.7 GB. And while it might seem like a nice dream to be able to record your favorite TV show directly onto a DVD just like with your VCR, keep in mind that both the audio and video for DVD can't be recorded real time and have to be encoded first using a very time-consuming and expensive process.

DVD-RAM: Not What You Think It Is: What seems to be a natural may not be the lock that everyone expects due to the fact that a recorded DVD-RAM disc may only be able to playback on a DVD-RAM player/recorder. The erasable DVD-RAM may not hit the market for at least a couple of years, by which time either some new or existing technology (like magneto optical) might do the same thing cheaper and better.

DVD: When And How Much?

DVD was supposed to have been available to the consumer for Christmas '96, but was delayed until the copy protection and regional codes scheme were agreed upon. With that now being cleared up, expect to see both DVD-V and DVD-ROM hit the stores in the States sometime very soon (they've been available in Japan since November). DVD-Video players are expected to initially cost in the $600 to $1800 range, but that price is expected to drop to current VCR prices within a few years. DVD-V discs are expected to be priced between $25 and $30. Expect DVD-ROM drives to start in the $400 to $500 range with prices quickly dropping to current CD-ROM levels.

How Will DVD Affect The Audio Recording Studio?

Simply put, DVD in any form means more business because more audio services than ever will be required. For DVD-A, there'll be a rush to remix catalogs in surround, make multiple mixes in surround and Red Book audio for new material, and include additional material like music videos and liner notes.

Lots of prep will be required for DVD-Video. Multiple multitrack audio mixes may be needed. Dialog may need to be translated into several languages and caption graphics made. Interactive features will have to be designed and programmed. New content, special edits, parental control versions, interviews, background information elements, in addition to the mechanics of MPEG-2 encoding, disc authoring and mastering, must be produced and added to movie discs.

And with the increased opportunities will come the inevitable commensurate equipment demands as we invest in DVD players and drives, multiple speaker and amplifier chains for surround playback, 96 kHz/24-bit digital equipment, consoles with surround panning and monitoring, and MPEG-2 and AC-3 encoders.

We are on the brink of a brand new communications world with DVD being the single most significant part, and the one soonest to market that will impact anyone involved with audio.

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Not all loudspeakers or speaker components are created equal; different filters are required so that each component will combine smoothly with the next complementary device in the system. To achieve this smooth response, Linkwitz-Riley, Butterworth, and Bessel filters are incorporated into the CEX 5 and can be selected independently for asymmetrical set-up.

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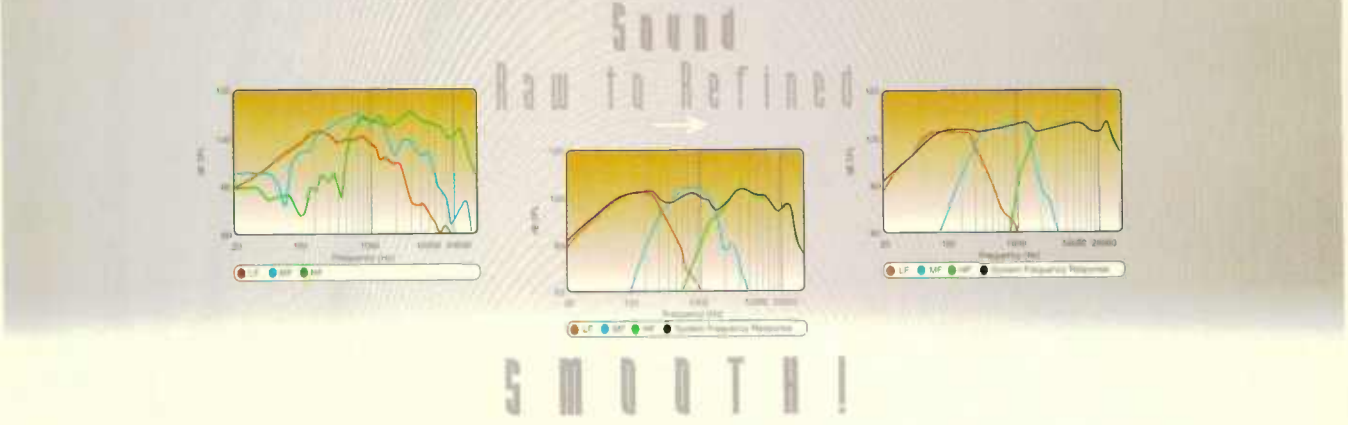

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delivering that — although knowledgeable engineering and optimum conversion can make a big difference.

Like pioneers of yore in our industry, I would prefer to experiment on my own, thank you very much. And the first thing that I'm going to do when I have cobbled together enough advanced technology is to try it for myself and hear how it feels.

And that technology is becoming more accessible to us. We have a box from Prism that allows us to record 6 channels of 20-bit data (albeit at 44.1 kHz) on a DA-88. Sonic Solutions is said to be shipping 96 kHz software for their workstations (and they are committed to wide words). And the newest Nagra D records 96 kHz with 21-bit resolution.[11]

END OF OPINION. FLAME ON

There are several sample rate/resolution options before us. One could, in fact, hold 44.1 kHz sampling and improve the resolution to 20 or 24 bits. One could hold the resolution at 16 bits and increase sampling rate (although increasing word width comes "cheaper" than increasing sample rate). There is interest in an "intermediary" 64 kHz sample rate.[12]

Gabe Wiener puts the issue thusly: "The ultrasonics issue as I see it is this: (a) We know there's stuff above 20k. (b) We know that the 96 kHz converters sound better than the 48 kHz converters. (c) We don't know if they sound better because (1) having a brickwall filter, oversampled or otherwise, at 22 kHz is just not a healthy thing to have, or else (2) the filtering ipso facto isn't doing the damage, but the missing ultrasonics are. The big mystery is: Does 96k sound better because the wider bandwidth makes filtering easier? Or because it reproduces more harmonics? Or both?" In any case, we seem to be slouching towards a 96 kHz (88.2 kHz) 24-bit. The ARA[13] and others back this direction.

A completely different format, the high-bit-rate single-bit stream (two so-called bitstream coding methods from both Sony[14] and Philips) are departures from so-called PCM. One real advantage of the Sony direct-stream digital, or DSD, approach is that it is rather straightforward, and often trivial, not only in converting to analog, but also in converting to other common digital data rates from the original single-bit stream.[15] With that in mind, there are some problems, notably the significant reduction in data storage efficiency.

In any case, there are real questions regarding what is audible and what is an excessive, wasteful use of bandwidth. Clearly, we need more substantive testing and evaluation, but, again, flexible standards for the medium would do much to facilitate comparative analysis.

COMPRESSION OR BIT-RATE REDUCTION

Data compression is a wild card. All current data compression schemes that cannot be classified as "lossless" modify, or corrupt, program material in some way. Lossless compression methods in digital audio are identical to data compression techniques in computers — you retrieve data identical to before the "compression" process. I

11. Albeit with a 17-bit noise floor.
12. Michael Gerzon, no less, was said to have been attracted to 64 kHz.
13. International Association for Multichannel Music (Tomlinson Holman and John Eargle, et. al.)
14. One-bit Delta-Sigma code, 64X oversampled, 7th order filter.
15. It is not trivial to convert 96k to 44.1 kHz, for example. Suspicions from critical listeners abound.

GEORGE MASSENBURG: A RESUME

• George Y. Massenburg was born in Baltimore, Maryland and raised between there and Macon, GA. Keenly interested in music, electronics, and sound recording at an early age, he was working part-time both in the recording studio and in an electronics laboratory at 15 years of age.

• As a sophomore majoring in electrical engineering at Johns Hopkins University, he left and never returned.

• He designed, authored and presented the 1972 AES paper on the parametric equalizer and is regularly published in professional journals and trade magazines worldwide.

• He was chief engineer of Europa Sonar Studios in Paris, France in 1973 and 1974, and also did freelance engineering and equipment design in Europe during those years.

• He chartered an electronics company, GML, Inc., in 1982 to produce equipment as needed for specific recording applications. Some early ideas' time had come — notably that of "Parametric Equalization," but also seminal features of third and fourth generation automation systems for recording studios. More recently introduced devices, such as the GML Dynamic Gain Controller, have been in development, on and off, for 20 years. Currently the company manufacturers this, as well as the GML Automation System, the High Resolution Topology line-level mixing console, and the GML Microphone Preamplifier. GML also consults and provides independent design for several major audio electronics manufacturers.

• Individually or collaboratively, he has participated in over 200 record albums during the past 30 years.

• He has designed, built, and managed several recording studios, notably ITI Studios in Huntsville, MD and The Complex in Los Angeles. He has, in addition, contributed acoustical and architectural designs to many others, including Skywalker Sound and The Site in Marin County.

• He is currently Adjunct Professor of Recording Arts and Sciences at McGill University in Montreal, Quebec, Canada and visiting lecturer at UCLA and USC in Los Angeles, California and MTSU in Murfreesboro, Tennessee.

• He has been working to qualify extended resolution and bandwidth as a goal of modern professional digital recording standards work, and has worked unceasingly to improve analog-digital-analog analysis and conversion methods. He and GML, Inc. are currently researching extended automated work-surfaces, high-resolution graphical interfaces, extensible network automation for audio production environments, and automation data interchange standards.

• He has most recently produced records for Madeleine Peyroux, Randy Newman, Lyle Lovett, Aaron Neville, Michael Ruff, and Linda Ronstadt. He has been nominated many times for the nonclassical engineering Grammy, for Record Of The Year in several years, and has won the Grammy for Best Engineered Nonclassical in 1990, (for Linda Ronstadt's, Cry Like A Rainstorm, Howl Like the Wind), the Academy of Country Music Record Of The Year for 1988 (for "The Trio"), and both the *Mix* Magazine Producer and Engineer Of The Year Awards for 1989 (for Little Feat), and Engineer Of The Year Award for 1991 (for Linda Ronstadt), and 1992 (for Lyle Lovett).

• He currently has homes in Sherman Oaks, CA, and Williamson County, TN.

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don't like "lossy" compression[16], and I personally don't know of an audio pro who dares to admit that they *prefer* the sound of data-compressed digital music. But bandwidth and capacity do not come cheaply, and data compression is certainly something we have to live with.

Currently, the data compression scheme that has been designated for the audio channel on video DVDs is Dolby AC-3. Dolby has tremendous clout and they always seem to be there when standards are being decided. However, I would hate to see Dolby walk away with more standards because AC-3 is insupportable as a high-fidelity standard. Dolby has walked away with some real trophies, such as an audio standard for HDTV.[17] I grant Dolby the right to be one of a number of encoding formats for DVD, but I will oppose their right to be the "only" format, especially as time and opportunity brings more and better innovations to the field.

There are no issues more likely to spur discussion to violence than where to draw the line for digital word width and even more so for sample rates.

There are several alternatives that are clamoring for consideration. The Acoustic Renaissance for Audio proposal[18] for 24-bit/96 kHz/5-channel audio, for instance, limits itself to only lossless compression. There are certainly degrees of audibility in "lossy" compression; DTS, Philips, JVC, and Pioneer all present alternatives, they sound different, and producers should be able to choose the most appropriate method for their purpose.

Unfortunately, the DVD standards that are being discussed do not allow for the variable-bit-rate encoding of the audio stream (perceptual coding methods invariably utilize a constant-rate stream), thereby making lossless coding (with its unpredictable bit rate) very difficult to utilize efficiently. One would therefore hope that variable-bit-rate encoding of the audio stream find its way into a specification.

MULTICHANNEL AUDIO IN THE NEW MILLENNIUM

It has been proposed that the greatest single commercial aspect of an audio-only DVD is multichannel audio. Here are some reasons:

• Multichannel sound is right in line with the evolving marriage of video and audio. Already, there are reportedly 25 *million*[19] ProLogic-licensed units in place. There are in excess of 100,000 home THX units as well. It's easy to imagine a ready (perhaps even hungry) market for multichannel music.

• For strictly commercial reasons, multichannel sound will be appreciated to a proportionately higher degree by the "average" consumer. I suspect that the vast majority of the population will have trouble identifying the difference between 16-bit versus 18- or 20- or 24-bit conversion. But boy, doesn't everybody hear the difference between mono and stereo? And one can't help but be impressed with the differences between stereo and 5-channel.

• Multichannel audio gives record producers a completely new "color" to put on our palette. It is by no means yet clear what stories are there to tell in a three-dimensional audio space, but there are certainly new possibilities.

What about the disaster of Quad, you may be asking? Is the music business about to replay the biggest commercial flop in the history of audio, only now in DVD digital? I think not. Quad failed for basically two reasons: (1) there was no sturdy multichannel medium[20] (very little hardware and not only format incompatibilities, but any number of really bad solutions such as matrixing systems), and (2) the software never matured — evolved practices never had a chance to happen. An uninformed industry had leapt forward only to gradually learn that there were major drawbacks of matrixed Quad. The industry became nervous and further investment was withdrawn.

With DVD, the dream is to establish a single, compatible format. And, during the course of the 20 years since Quad crashed and burned, the technologies and techniques for creating multichannel audio have evolved considerably. The tools for multichannel recording are certainly available. One real limitation is that up to now there has been little demand for multichannel audio recordings. And, as a result, outside the film and video suites, very few music studios are now equipped for multichannel recording. It's simply not trivial to record and mix 5-channel music in a 2-channel room.

Fortunately, once the demand arrives, the move toward multichannel music studios will happen rather quickly, since the tools already exist. Multichannel storage will be solved by the same storage devices that have fostered the project studio: the modular 8-track multitracks, as well as nonlinear hard-disk and optical-based systems. The additional technology we'll need is a way to move signals around. You could do this within the current construct of regular consoles, but it's pretty hard to pan three channels with a 2-channel panner. Until music rooms begin getting requests to do music for video, they don't need to address this issue of multichannel panning.

There have already been several noble experiments. Pink Floyd's tours, "The Wall" and subsequent tours, for example, explored the ability to tell meaningful musical tales in the front and back as well as side to side. James Guthrie has struggled with Q-Sound to capture some of these spatial ideas in 2-channel recordings. Although many of the tools aren't quite there for the journeyman producer to really explore the medium, they will undoubtedly be coming down the line shortly. Certainly, film mixers have been able to mix for five discrete channels for some time (and sometimes seven, with five in front and two in the back, or 5.1 feeding something into an omni bass boost channel). There are consoles that are designed to pan for the new format, so it's all going to be available soon. I don't think the tools, or lack thereof, is the biggest obstacle in our move toward multichannel music. I return again to the creative question — more information is wonderful, but what does the artist do with it? And the answer is probably, "Give them a tool and find out."

Life is at *least* three-dimensional and, in the sense that we use music to tell stories about life and sound to paint sketches, multichannel technology will give artists a new palette for the telling of stories in multiple dimensions instead of just left and right. Other than that, we don't know very much. We do know multichannel music is going to be different than sound effects in music and sound effects for film. Early on we realized that you

16. Particularly in the form of either AC-anything, Musicam, MPEG Audio, or PASC.
17. Tom Holman: "The field was hotly contested, but MPEG delivered bunk software that had very audible aliases that sounded like phono-cartridge mistracking, and MIT delivered a system that sounded OK on the tests, but which was incredibly more expensive in both bit rate and silicon."
18. Update Version 1.3 1 January 1996
19. Dolby's Web site.
20. Except perhaps JVC 4-channel disks. However, the first examples of the technology were cut far below standard disk levels. And the problem with the relatively quick deterioration of the high-frequency subcarrier information on the disk was never really solved.

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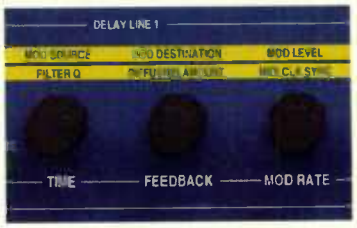

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couldn't utilize the full 360-degree sound space for music because there was an "exit sign" phenomena. If you had a lot of audio going on in the back, people would have a natural inclination to turn around and stare at the back of the room. However, there are some good musical indicators that demand closer examination.

REMIX, THEN AND NOW

Linda Ronstadt's *Cry Like a Rainstorm* record, which we did in 1989, is one example of a record I wish had been recorded for multichannel release. At the time, we recorded the album with a lot of ambient information and, when DVD comes along, I can't wait to remix it for multichannel and put some of those sounds back into a larger context. A lot of the sources were recorded tight with two separate ambiences. It's not impossible to imagine something originating in the back and then folding up to the front. I don't know how it will actually unfold, but I can't wait to find out. It would be very nice to explore that extra space. When we make the move to DVD, you'll see a lot of remixing going on. And, as DVD gets closer, you'll see artists beginning to approach their current projects with a future multichannel release in mind.

Take one of my favorite artists for coming up with new ideas — Beck. I love what he does as he explores the boundaries of technology in a way I frankly haven't heard since The Beatles. All the time he's noodling with things, with distortion, saturation, speed and (ohmigod) abusing equipment! I can't help but think that somebody like Beck, given more speakers to work with, will find something very interesting to say with multichannel sound.

This is the most critical issue: Is this not more an artistic challenge? If, in fact, there is a multichannel future for this format and we are given the right tools, then it is up to someone, somewhere, working with this bigger palette to come up with a work of genius to show us some ways creatively. One really wonders whether the vast DVD market really needs a higher-fidelity specification. Will incrementally better sound quality yield a better musical product?

And while we're on the subject of number of channels, there are some other options to be considered. Tomlinson Holman[21], citing the work of Michael Gerzon and his own tastes, would prefer to have the ability to store more channels (as opposed to better frequency response or wider digital words), perhaps as many as ten. And there are other options as well, many of which are possible to imagine in a rich and evolved, and, importantly, long-term future.

SO?

What is difficult to imagine right now is a flexible system for playing all of these formats back. How, for instance, is a consumer with a 2-channel 44.1 kHz playback unit going to be able to play back a DVD? That may be solved by the record companies wanting to keep the inventory down to single unit or single format inventory and asking for the so-called "Red Book" layer for standard CD playback on the DVD standard. It would accommodate an arrangement where you could either play this new DVD on a standard CD player or you'll put it into a DVD player and the laser would focus on the layer below Red Book by simply looking through the Red Book layer. Sounds logical, but how would the player be told whether it would be a 2-channel or a 10-channel surround-sound mix?

That's why, regardless of what format they decide on, each and every DVD will need to contain a format block or a parameter block, a descriptor that would tell the player everything about the disc you are about to play. It would need to provide enough room to describe all the possible encoding and decoding format possibilities. That's a lot of information right

21. Whom one might call "the Father of 5.1."

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there, but you'll also need to add automation for some kind of objective way to fold back 5-channel to two channels — and that's pretty tough.

At the same time, the electronics manufacturers are going to be looking for ways to keep the cost of the equipment down. Well, if you're reducing the cost of the equipment, you're unlikely to find playback automation onboard, which would require some signal processing (which is always getting cheaper but is by no means "free").

IS THIS CURTAINS FOR MR. CD?

You see, we can get caught up in all the technology without considering the realities of how the consumer is going to access all this new audio data. Will he/she be using a dedicated player, a home theater, a home PC, some sort of hybrid cable/internet box, direct broadcast satellite, or what? I think, for the time being, we are going to have to consider one box and this box will likely be a video playback unit. (The days of a dedicated CD player, at least outside of the audiophile community, is coming to an end.) Once Hollywood solves its issues about copyright protection, which held up a video DVD introduction for some time last year, the first box is likely to be: a video DVD playback unit that can playback constant bit rate video[22] JPEG and AC3-audio with 5-channel plus low-frequency support. The audio community will have to ride on the back of the beast. That's not the optimum creative decision mind you, but it is likely to be the most realistic one. What does it mean? It means that initially artists and producers will need to create music on a video DVD recorder without video, with the ability to move it directly to 5.1 without AC-3.

Multichannel technology will give artists a new palette for the telling of stories in multiple dimensions instead of just left and right.

What does this mean for the recording studio community — from the project rooms to the largest commercial recording facilities? It means that many of our new techniques for DVD production will come from the film soundstage. I'm already seeing music and film mixing coming closer and closer together. For example, I recently did a Tom Hanks movie. I did my CD mix and then we broke it out to TASCAM DA-88 and we looked very carefully at what we needed in the dubbing theater. I needed to break out the reverb and give the film mixer elements so that if he brought all the faders up to zero he'd get my mix, but he would more than likely pull back the reverb components so he could get a little more clarity for the film mix.

In other words, like it or not, we are already slouching toward a DVD standard. What we would like to see beyond that is something that will accommodate future technologies. What if, for instance, we discover that the great majority of the public doesn't buy into the 5-channel 24-bit/96k format? Wouldn't it be great to be able to do something else with this new platform? Let's not get bogged down because DVD is primarily video-biased and must deal with multicontinent video standards and compression schemes that are far more difficult to deal with than audio considerations. DVD audio allows for multiple formats to coexist and having enough imagination right now is important. Let's simply imagine where we can go in the next 20 years. Is there anything we've imagined that we haven't covered in this new format?

The most important thing to remember is that today's commercial record business is not driven by audio. It was for a short time during the '70s, but no longer. Remastering the back catalog for CD was a bonanza for the record business, but we're talking about something quite different in terms of remixing for DVD. Sure, artists like Pink Floyd are going to do it. But we're talking about a tremendous new investment required here (not that I would rush out and open another new mix room in L.A. just yet.)

Remixing just one major release for multichannel could mean six, eight, ten months, or a year of work, so the record company is going to have to have a promising return on investment to warrant putting that kind of money in a catalog property. And, in the meantime, you're not going to find many major new artists exploring the possibilities that these new standards will provide. That's simply not the nature of the music business today. Today's biggest artists are not, shall we call them, "hi-fi artists." What would alternative record producers, who are for the most part classic reductionists, do in multichannel?

A MODEST PROPOSAL

Do we really believe that the DVD, or any, quantum leap of technology will be a panacea?

I'd like to think so, but I've got my doubts, mostly about an inflexible standard. Then again, for us to work together as an industry, we have to have agreements, and if I was the one sitting up in the boardroom deciding how to launch this new audio format — balancing my commercial responsibilities with my creative passions — I would probably take things one step at a time as is being done right now with an initial standard for movies. We have to work from a starting point and then expand the format as technology matures, costs come down, and exotic technology becomes commonplace in the future. My opinion is that 96 kHz, 24-bit, "lossless" coded 5.1 channels is a good next step. But that having been said, we need to establish the most flexible format set possible. In fact, I'd like to see the ability to have an open-ended capability so that a producer can say, "I want two hours of sound and I want it in five channels. I don't care so much about the sound quality, so let's compress the hell out of it, or maybe I'll change my mind half way through the project so that I can decide to improve the sound to just two channels of extraordinary 200 kHz bandwidth."

The record producer and artist should have a format that can be as flexible as their imagination demands, and as adaptable as future technology will be in the foreseeable future.

ACKNOWLEDGMENTS

The author would like to acknowledge the help and contributions of Peter Asher, David Goggin, Tomlinson Holman, Kyle Lehning, Richard Mithun, Anthony Morris, Richard Pierce, Martin Porter, Doug Sax, Chris Stone, and Gabe Wiener, all of whom added in different, substantial, and often profoundly important ways to this piece. EQ

22. From what I've heard from a friend designing JPEG silicon for DVD, the variable bit-rate video option provided for in the specification is not utilized in current hardware.

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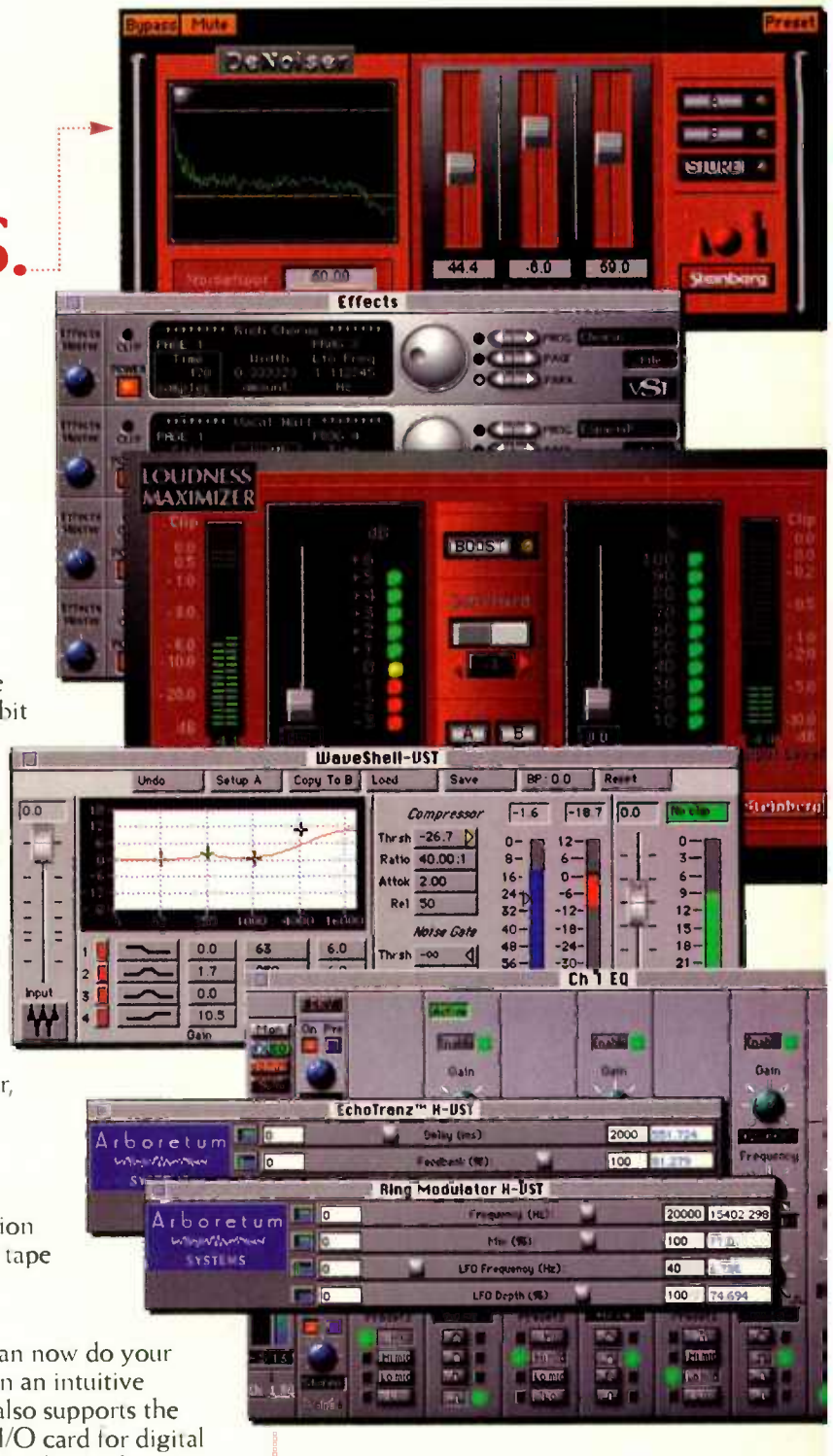
IT'S MULTIPLE CHOICE AND THERE ARE NO WRONG ANSWERS.



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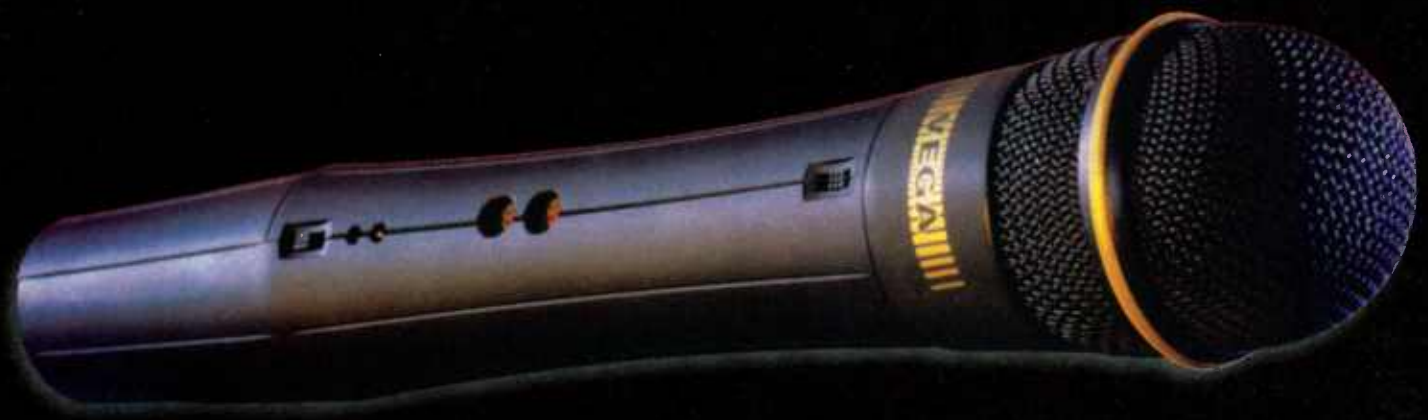

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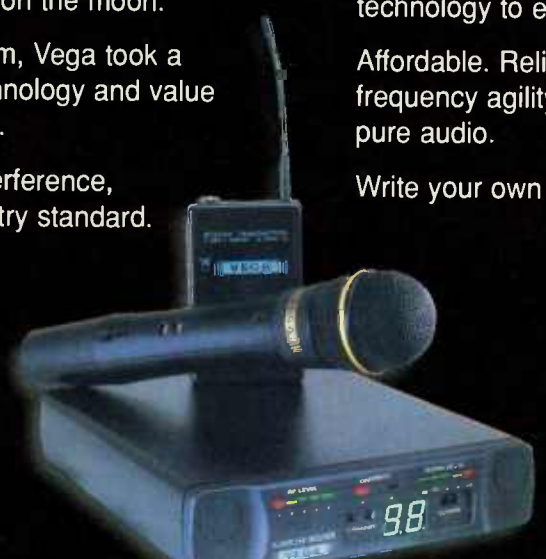

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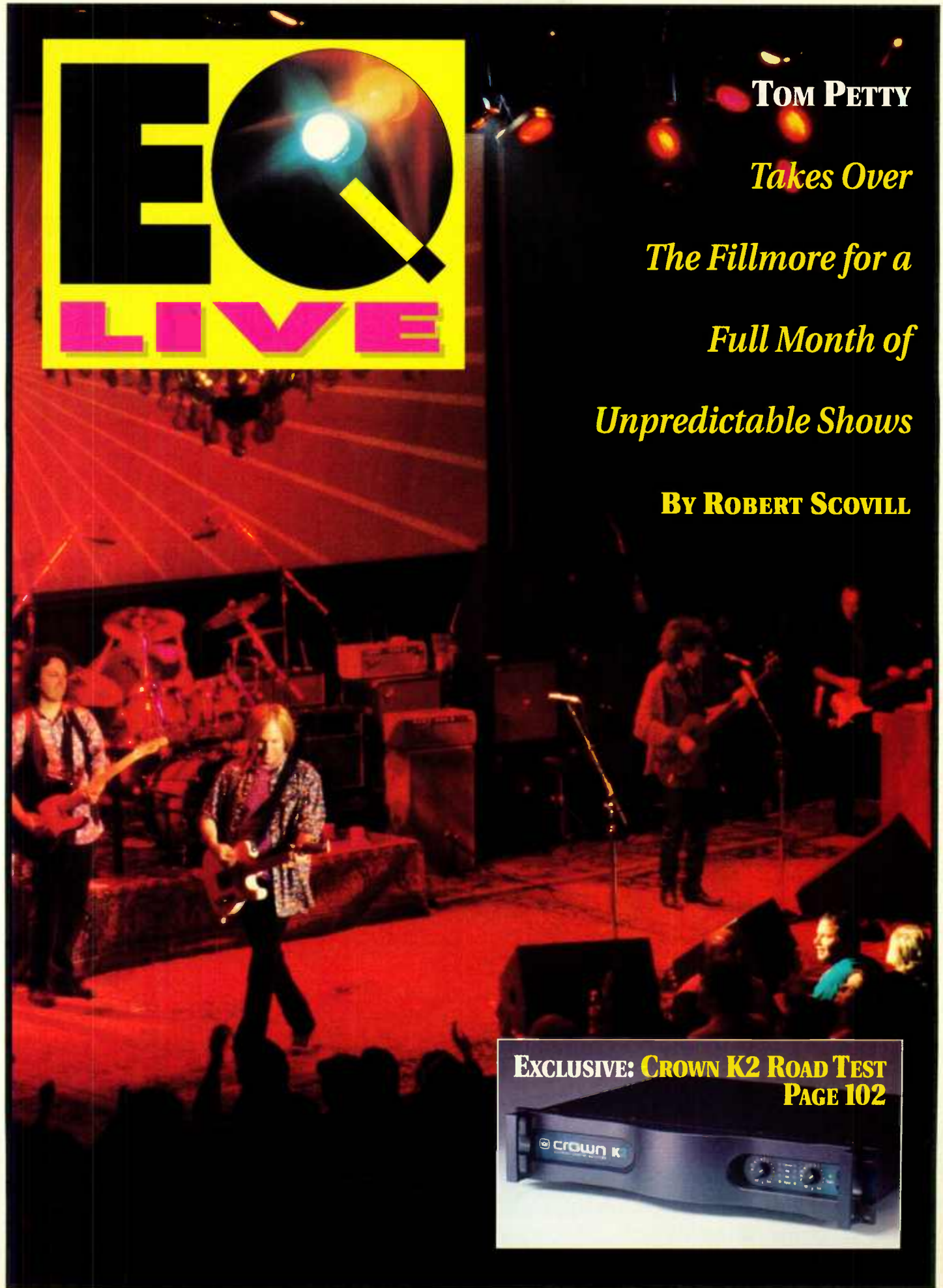


Tom Petty

Takes Over The Fillmore for a Full Month of Unpredictable Shows

By Robert Scovill

Exclusive: Crown K2 Road Test
Page 102

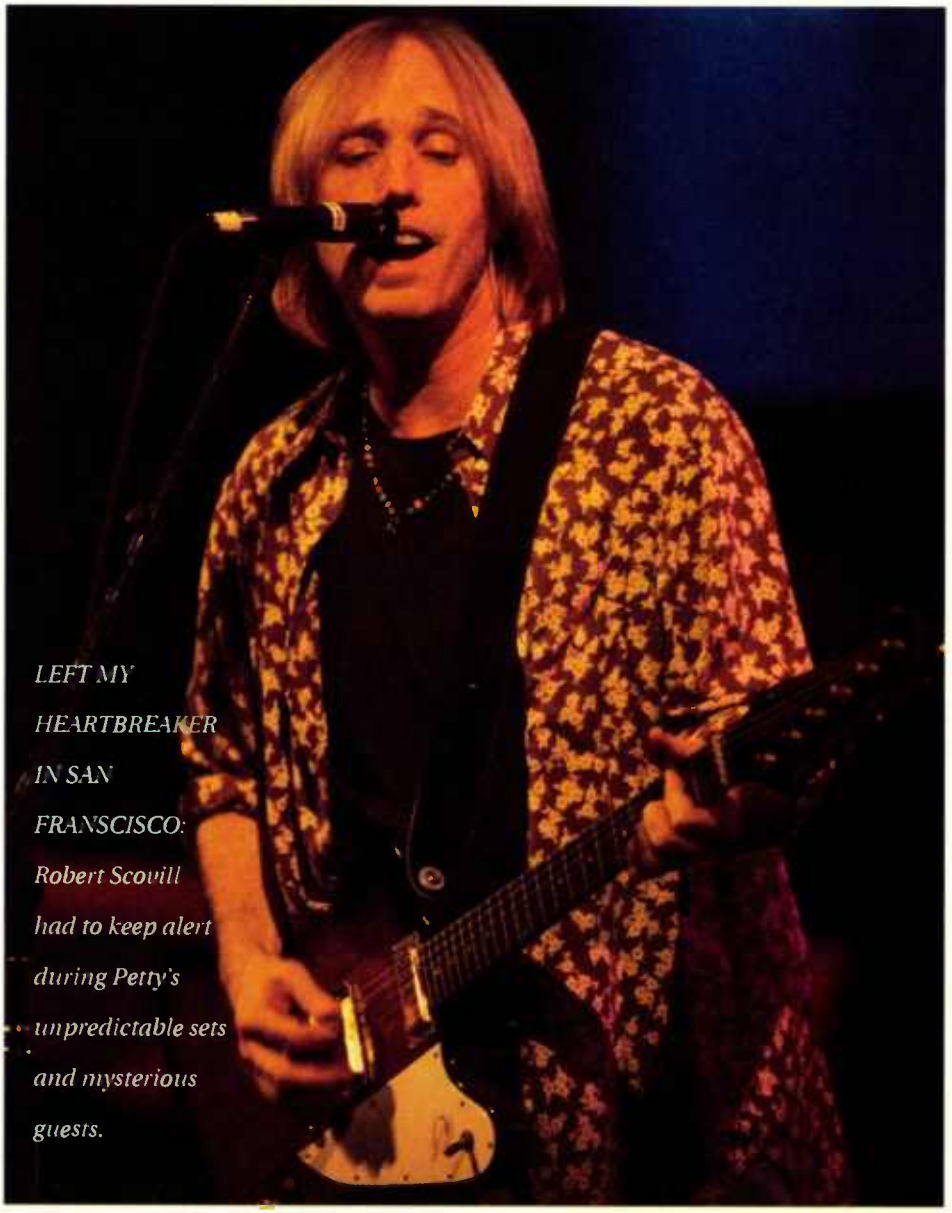
PHOTO BY STEVE JENNINGS

World Radio History

PETTY THOUGHTS

TOM PETTY MAKES HISTORY BY BECOMING THE FILLMORE'S "HOUSE BAND" FOR THE MONTH OF JANUARY

BY ROBERT SCOVILL



LEFT MY HEARTBREAKER IN SAN FRANSCISCO: Robert Scovill had to keep alert during Petty's unpredictable sets and mysterious guests.

PHOTO BY STEVE JENNINGS

In January of this year one of the most legendary venues in the music world opened its doors to an artist that history will certainly show to be worthy of the legend that is "The Fillmore": Tom Petty & The Heartbreakers. Nostalgia and respect for those who came before has played an indelible role in the creation of rock 'n' roll and pop music. That is certainly not lost on The Fillmore or Tom Petty. If you have never been to this shrine for a show, do yourself a favor and go. I have come to call it "The *Real* Rock and Roll Hall of Fame."

The room itself is covered with show posters and memorabilia from days gone past, as well as every "new" artist that has graced its stage since its grand re-opening. This was my, as well as Tom Petty & The Heartbreakers, first foray into this wonderful setting that is just brimming with musical spirit. I think I can speak for Tom and I can certainly speak for myself when I say that what transpired during our stay might have been one of the highlights of his career and was certainly the highlight of mine.

IF YOU'RE GOING TO SAN FRANCISCO

The concept as handed down from Tom and Tony Dimitriades (Tom's longtime manager) was simple: Let's get together for a couple of low-key shows. No big deal, no big production; just get up and have some fun and play some music for the sake of playing some music. What better place to do that than The Fillmore, right? What transpired was sure to be a historic 20-night stand that showcased Petty & The Heartbreakers in a setting as intimate as your living room. The showcase also lent itself to guest appearance "sit ins" by music legends such as Carl Perkins, Roger McGuinn, and John Lee Hooker. The final night of the month-long appearance ended with a live broadcast of the final show engineered and mixed by Biff Dawes and Richard Dodd to the entire nation. The month-long stint was indeed a celebration of music past and present.

The room itself is of modest proportions, and is asymmetrical in its layout, which turns out to be somewhat of an asset in terms of the sound quality in the room. The capacity is somewhere around 1200 fans. But don't be fooled by this and lulled into thinking you are in a "club." This is a pretty ambient building, especially in the low end. On house left and at the rear you have a

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balcony for tables and seats. Very cozy indeed. The floor area is standing room only. Also...very cozy. The mix position is at the back of the venue dead center to the room in a very small cubicle. The available space there in and of itself defines...you guessed it, "cozy."

Early on in the planning stages for these shows, Tom's monitor engineer Brian Hendry and I made the decision to bring in our own consoles and effects racks. This afforded us the luxury of doing the shows with the equipment that we had been rehearsing with. This was a real advantage because of the limited load-in time allowed on the show day. Brian would use a monitor system and I would use a front-of-house system provided by Electrotec Productions of Westlake Village, CA.

After a brief contact with Derek Featherstone from Ultra Sound in San Rafael, CA and Chris Charuki from The Fillmore, it was also determined that we would use the in-house speaker and amplifier system that is installed at The Fillmore. This system is comprised of four Crest-powered Meyer MSL3's per side, which we augmented by under hanging a pair of Meyer CQ-2 powered speakers for a bit of vocal support for the people on the floor. The system also contained four Meyer subwoofers per side. In addition, we agreed that Derek would supply a Meyer SIM II System to assist us in the tuning of the room. I also requested additional Meyer CP-10 equalizers for the subwoofer system, as well as the CQ-2's.

We made a conscious decision to attempt to leave The Fillmore front-of-house system intact. They offer a Crest Century 32-input console as well as multiple effects and dynamics processors, and we felt that this would keep things simple by allowing the multitude of opening acts throughout the run (it was different opening act each night) to have access to their own console with out intruding on or being limited by the Tom Petty settings on my console. However, this was one of those plans that looked great on paper. Once we got there it was very apparent that the front-of-house mixing "booth" was more the size of a telephone booth. Somehow — don't ask me how because I am not sure I want to know — Chris Charuki was able to get a Gamble EX 56 with PSU rack, the Crest 32-input console, two 21-space double-bay effects racks, the SIM II computer, himself, Derek, and me all into this tiny space. Now, I must assume that Charuki is a master wizard at Tetrus. I must admit it was tight, but it was comfortable — deodorant, or lack thereof, never ever became an issue (at least I don't think it became an issue).

SIM-PLY MARVELOUS!

Recently, I have come to be a big fan of the SIM II platform. (Gotta have one!) The shows at The Fillmore certainly reinforced my positive feelings toward it. Derek integrated the SIM II for the first three shows and I took advantage of him as operator for those initial shows. We used it on the load-in day to do our initial system and room analysis, as well as helping us achieve some accurate time manipulation of the PA.

As I mentioned earlier, the room offers a very ambient feel to the bottom end — especially when the room is empty. With this in mind, I really wanted to concentrate on creating as close to a single image for the listener, especially in the low end, as was possible. Since the PA is a flown system, I knew there would have to be some delay tapering done between it and the subs, so I placed TC Electronic delays on the main left/right feed, the CQ2 feed, and the subwoofer feed. This allowed us to, in terms of time, move the PA upstage to time align it with band equipment, and in turn move the subwoofers in front of or behind the PA — whichever was deemed necessary. As I said, our goal was to make sure we had as coherent of an arrival time for the listeners as possible. By attempting to eliminate multiple arrival times of the sources from the stage and the PA, then and only then did we really stand a chance of competing with the ambience in the room, as well as keeping the volume under control.

No one who came to multiple shows saw the same show twice.

For our first use of the SIM II, we were attempting to time align the PA system with the band equipment on stage. If you have high-integrity delays available, this is a wonderful concept to actualize. It can make for a very dynamic-sounding show in that the PA takes on this "invisible" feel. You can change levels on the PA very effectively without the stage volume appearing to "jump" out at you, as is normally the case. In addition, if the PA is "in time" with the drum monitors and bass guitar cabinets, it can make for a very punchy sound indeed as opposed to the "smeared" or more specifically "comb filtered" quality that is apparent when two versions of the same sound arrive at the listeners ear at two different time intervals.

Since we were considering the stage transducers T-0, we used the drum monitors and then the bass cabinets as our primary

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noise source. PA systems were noised and then delay calculations were made using the SIM II's delay finder. The SIM II's delay finder feature is very handy indeed for setting these delay times in a very rapid and very accurate fashion. Once we felt that we had achieved this, it was time to align the subwoofer system to the PA again using the delay finder. Finally, we used a DAT recording of a "phase popper" just to check and see if the impulse that we were trying to create was to our liking. Indeed it was, and, in the end, was a "chalk and cheese" improvement over the existing default (physical) delay times between the flying PA, the sub system, and the back line.

Next we used the SIM II to assist us in our de-equalization of the room. As I stated earlier, we used the Meyer CP10 equalizer. (Guys and gals, if you have never used one of these, go get one now — you may never go back to a 1/3 octave again.) Again, it provided a quick and very accurate display of where the problems with the room lay, and within a few songs during the opening night's performance we had an implemented an EQ setting that was only minutely changed for the remaining 20 shows. This made for a very right-brain existence for me as a mixer, which is my goal at every show.

EPILOGUE

During my work with Tom in the past couple of years, I have grown to love and have a great deal of respect for the "off-the-cuff" attitude that lives within Tom & The Heartbreakers' camp. I feel that working with Tom is a lot like taking a music culture and history class. He and the band have an incredible retention of music both past and present. This was never more evident than at this series of shows at The Fillmore.

Tom showcased alternative arrangements of his own music as well as that of artists that are obviously very near and dear to his heart. Every night was special in that it was a basic core of songs surrounded by a batch of, "Hey let's do this one's." No one who came to multiple shows saw the same show twice. In addition, the "sit ins" by the guest artists were particularly enjoyable. It was endlessly impressive how effortlessly they traversed the setting. Carl Perkins just showed up with his guitar and plugged into one of Mike Campbell's AC30's and off we went through rock 'n' roll's past and present. It was positively seamless.

You never knew where the set list was going to take you, so indeed my personal credo holds true when dealing with the Heartbreakers: "The journey is the reward." It does, however, make for a very challenging show to mix in that, if you are doing any preset levels or processing changes song to song, you sort of have to get to know Tom's (as well as the band's) body language to get some clue of what song is coming next. It's kind of this mental calculator between songs. For example: OK — it's Tom with the Everly acoustic and it's capo'd at the G... Campbell with the mandolin...Benmont on the Wurlitzer...Scott with a harmonica (I wonder what key that harp is in...oh nevermind) AHHHG! Ferrone is heading for the cocktail kit...#$%^&*...zzzzzzzt...OK! That means it can only be one of these three songs. Scovill automation and recall swoops into action! Whoops, wrong again. Is this fun or what?

If you want to share in the fun, check out the Fillmore's Web site at www.thefillmore.com. You will find copies of the set list from every night's performance along with interviews as well as history and folklore of the venue. Thanks Kristin! You rule girlene!

Robert Scovill is a four-time TEC Award winner and is currently employed as his daughter's agent, securing equipment endorsement deals for her from the likes of Hafler and Huggies.

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Mick Guzauski, Producer • credits include:
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CLUB PROFILE: THE VIPER ROOM

THE FAMOUS (INFAMOUS) CLUB GETS AN AUDIO FACELIFT

BY STEVE LA CERRA

If there's one club on the Sunset Strip that's got "hip" written all over it, it has to be Johnny Depp's Viper Room. After all, what other place does Metallica stop at to play a few tunes after their gig at Lollapalooza is over? Although the Viper Room may be small (with a capacity of 250 people), make no mistake: this is a serious venue — a place where major artists such as Counting Crows drop into and jam, a place that is very cool to hang out in.

With all that in mind, it only made sense that the club's management should decide to renovate the PA system in order to provide the best possible sound for all of their featured artists. Installation of the upgraded system was handled by a team of engineers including Bob Doyle and David Webster (both of EVI Pro Audio, Europe), Roger Gibbons and Bobby Ross (both of A-1 Audio, Hollywood), Sal Jenco (Viper Room manager), and Frank O'Reilly and Joe Stella (the club's house engineers).

Roger Gibbons comments on how the whole thing started: "Initially A-1 Audio installed some of our DFM12 custom-made monitors, which is a wedge with a single 12-inch driver and a 2-inch horn. At that point the sound on stage was getting so good that it was really showing up the inadequacies of the house sound system, so the club decided to go for a complete upgrade."

And quite the upgrade it is. A Midas XL200 was chosen for the house console and is also used to run four on-stage monitor mixes from the front-of-house mix position (a Soundcraft Spirit monitor desk is also available for applications where up to eight monitor mixes may be needed). Since the pentagon-shaped stage is so small (16 x 14 x 6.5 x 11 x 8.5 feet), only six of these wedges are needed to cover the entire stage area. Amplification to the biamped wedges is handed by four Crest 7001's (which pump about 700 watts per channel into four ohms) and frequency division tasks are performed within a Klark Teknik DN800 crossover, which Klark Teknik custom-built to accommodate A-1's proprietary wedges.

Gibbons observes that "most artists going in there approach it with the limitations of the venue in mind. They don't try to put full production in there, which would never fit anyway. As long as it is approached that way, it's always a good night." Graphic EQ to the monitors is handled by two Klark Teknik DN3600's programmable stereo units located at the FOH, with each channel processing a monitor mix (more about those later).

POWER IN THE HOUSE

The house PA system is triamped with a speaker complement of Electro-Voice cabinets including four MTH-1 mid-high cabi-

THIS VIPER DOESN'T BITE: The club's small stage doesn't stop major acts like Metallica from playing there.

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Straight out of the box, Peavey's CEX 5 digital processor is a digital crossover/EQ with limiters that utilize the processing power of multiple Motorola 56002 digital signal processors. Each CEX 5 comes standard with five bands of parametric EQ on each input, and three bands of parametric EQ on each of four outputs for a total of 22 bands of parametric EQ.The crossover features selectable filters and slopes with a choice of using asymmetrical Linkwitz-Riley, Butterworth and Bessel filters with variable slopes of 6, 12, 18, 24, or 48 dB per octave. The CEX 5 allows for both analog and digital I/O. For more details, contact Peavey Electronics Corporation, 711 A Street, Meridian, MS 39301. Tel: 601-483-5376. Web: www.peavey.com. Circle EQ free lit. #TK

Peavey CEX 5

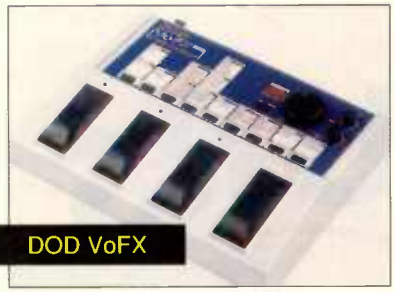
ROAM WHERE YOU WANT TO

Audio-Technica has unveiled its newest professional true-diversity UHF wireless system, the 900 Series. The 900 Series is available in two different forms — the ATW-0951 UniPak™ System, which is comprised of an ATW-R09 body-pack and an ATW-T51 body-pack transmitter with professional HRS connector and Hi-Z input; and the ATW-0952 Handheld System, which is made up of the ATW-R09 receiver and ATW-T52 handheld microphone/transmitter that utilizes an A-T Hi-Energy dynamic element with a neodymium magnet and double-dome diaphragm for smooth, accurate high-frequency response. The ATW-R09 receiver features true-diversity reception, utilizing two antennas to feed two completely independent RF sections on the same frequency. The 900 Series systems are available in a choice of 20 UHF frequencies (Canada: 10 frequencies) for minimum interference, and allow up to ten systems to be used simultaneously (Canada: 6). For more information, contact Audio–Technica U.S., Inc., 1221 Commerce Drive, Stow, OH 44224. Tel: 330-686-2600. Circle EQ free lit. #123.

Audio-Technica 900 Series

VOICE OF THE PEOPLE

Resembling a floor-based guitar multieffects unit, DOD's VoFX is a personal, floor–controlled multieffects processor exclusively for vocalists. The VoFX allows singers to manipulate their vocal effects on stage in real time with such effects as delay, reverb, compression, EQ, noise gate, and a modulation section that includes chorus, flanger, phase shift, pitch shift, and tremolo options. DOD has also included Pixellator, Ring Modulator, and Vocal Distortion patches for a wide range of vocal applications. The VoFX is equipped with 30 factory presets and 30 user-definable programs. Up to seven effects can be utilized at the same time to provide the vocalist with a wide sonic palette. An XLR input is offered on the rear panel of the VoFX to accommodate almost any microphone on the market, while a line-out is supplied for output. For more details, contact DOD Electronics Corporation, 8760 South Sandy Parkway, Sandy, UT 84070. Tel: 801-566-8800. Circle EQ free lit. #124.


DOD VoFX

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Renkus-Heinz TRAP JR

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Eliminating the need for numerous rack modules that require large amounts of rack space, the DR128 digital mixer combines mix, gain and level functions, gates, compressors, graphic and parametric EQs, and more into a single 2U system. The DR128 comprises 12 inputs to 8 outputs as a cross-point matrix with comprehensive ducking features. Infinite parameters and configurations can be saved on the unit's 16 internal memory patches or stored to disk. The DR128's user interface utilizes 12 user-defined soft keys and an LED screen on the front panel. The power capabilities of the base unit can be more than tripled thanks to the DR128's ability to be expanded internally — delays can be added and there are extensive possibilities for remote control. For more information, contact Allen & Heath U.S., 8760 South Sandy Parkway, Sandy, UT 84070. Tel: 801-568-7660. Circle EQ free lit. #126.

A&H DR128

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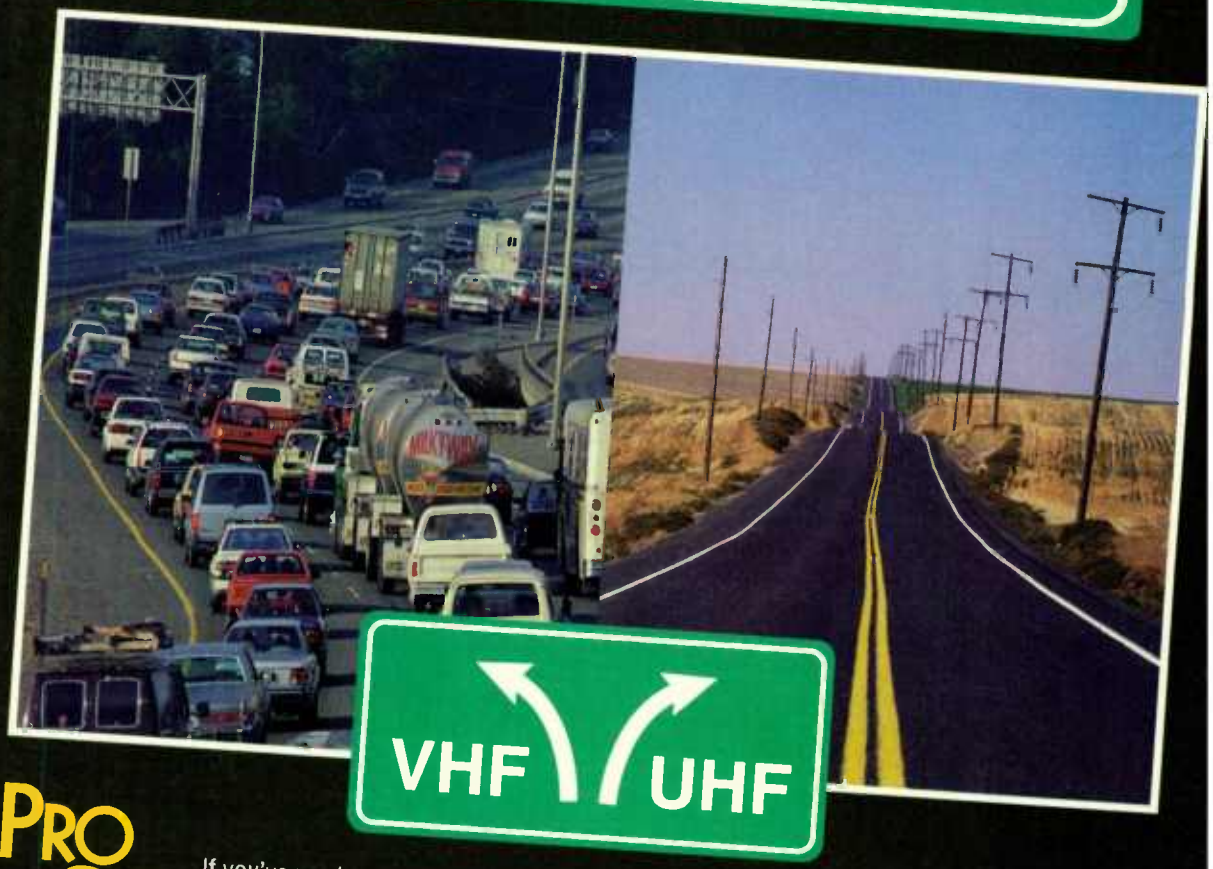

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World Radio History

CIRCLE 67 ON FREE INFO CARD

PA System Maintenance

HOW TO FIND TROUBLE SPOTS BEFORE IT'S TOO LATE

BY STEVE LA CERRA

By the time you have discovered that there's a problem with your PA system, it's probably too late — if you're in the middle of a show, you're already doomed. So the time to find problems is either in down time when the system isn't being used for a show or during soundcheck (where there's a slim chance you can make repairs before show time). In "The Quick And The Live" (*EQ*, April 1996) James Pearson offered his advice for general PA system prepping and maintenance. Here, we're going to get specifically into a performance check for your speakers and crossovers. If you can verify that these components are operating properly, there's a good chance of avoiding disasters. But keep this in mind: *If you are not careful, you could blow up a perfectly good speaker, so use caution.*

In order to perform this diagnostic check you are going to need several things, including a test tone generator (preferably one that can sweep from around 10 Hz up to 20 kHz), a power amp known to be in healthy working order, a soldering iron, a volt-ohm meter, an old-but-working 12-inch or 15-inch speaker (that you won't miss if it blows up), and your ears. Our goal here is to verify two main things: First, that your crossover is, in fact, crossing over the way it should be, and, second, that the drivers in your system are up to spec. *Remember that if you open up a new speaker cabinet, you'll probably void the manufacturer's warranty.*

Since your crossovers are responsible for routing audio frequencies to the correct drivers, we'll start by making sure that this is indeed the case. If you are using loudspeaker cabinets that have built-in crossovers, check the manufacturer's data for specs on the crossover frequencies and make note of them. Then you'll have to open up the cabinet, disconnect all speaker leads (you *will* remember to label them, won't you?) and remove the crossover.

Connect the test tone oscillator to the input of your power amp and then connect the power amp output to the input of the passive crossover. Connect the 12-inch or 15-inch guinea-pig speaker to the low-frequency output of the crossover. Make sure all output level controls on the amp and tone generator are down all the way and turn the units on, starting with the generator. Set the tone generator for 60 Hz and turn up the levels on the generator and power amp so that you are listening at a comfortable volume. Now sweep the tone generator slowly from 20 Hz upwards and listen. You should hear consistent level up to the low-to-mid frequency crossover point; as your tone reaches the crossover point, the volume should diminish and then completely fade away as you sweep up through 5 kHz to 10 kHz. This test verifies that your LF output on the crossover is not leaking high frequencies.

Next, connect the speaker to the high-frequency output of the crossover and do the same sweep from 20 Hz up. This time you are listening to make sure that low frequencies are blocked from the speaker (on most 12's or 15's you won't hear too much

SOUND CHECK-UP: Care and feeding of your PA will ensure a long, dependable life (for them and you).

PHOTO COURTESY OF JBL

World Radio History

EQ

The ingenious design team at Allen & Heath has come up with a new concept in EQ control. Keeping the original EQ quality, the all-British team of engineers has developed a ramped gain structure that is ideal for both rock and classical music performances. Over the first 40 degrees of control the gain is limited to around 6dB. This perfectly tracks the natural sound of acoustic instruments. The remaining gain of up to 15dB comes in thereafter and provides all the aggressive power for dynamic rock 'n' roll.

HF	+/- 15dB	12kHz	Shelving
MF1	+/- 15dB	500Hz to 15kHz	Peak/Dip
MF2	+/- 15dB	35Hz to 1kHz	Peak/Dip
LF	+/- 15dB	75Hz	Shelving

The EQ section on all input channels has the essential EQ in/out switch. This gives the engineer the chance to A/B test at the sound check.

Fader

All input channels, Left and Right mix busses, and subgroups boast smooth operation log law faders. Easy channel identification is on the write on strip immediately below each fader. Each fader provides and extra 10dB of gain to the mix, a real advantage when dealing with low level sources.

GAIN (MIC PRE-AMP)

Allen & Heath prides itself on the purity of their Mic pre-amps and for good reason: the Mic pre on the GL2000 comes from a long line of highly respected touring consoles. Each input has a wide ranging gain control to match any input source. The XLR connectors are designed to accept balanced line inputs from stage submixers or inputs from stereo DI boxes and FX.

Mic input range	+10dB to 60dB
Line input range	-10dB to 40dB

Note that the high pass filter is before the input gain stage. This means the maximum useful signal is fed to the pre amp with the unwanted frequencies being discarded before hand.

Switchable Low-Cut Filter

All Mono input channels include a hi pass filter set at 100Hz to filter out low end stage rumble, popping and wind noise without sacrificing the body of the sound.

Stereo Returns

In addition to the 2 Stereo dual Mic input channels the GL2000 also has a pair of stereo returns. Each Return is on a fader for visibility and usability and has a balance control and access to the L-R mix, a pair of subgroups, and the matrix A and B outputs. Return 1 and Return 2 are assigned to subgroups 1-2 and 3-4 respectively. This allows engineers to bring back special effects into the same subgroups as the source channels so the mix balance from the subgroups and their associated FX can be adjusted together.

+48V Phantom Power

Every Mic input on the console, including the stereo mic inputs front panel have switchable phantom power. The Talk Back Mic input has an internal link to disable phantom power to the Talk Back Mic. Every Mic input has an internal Phantom Power disable jumper for safety.

Mono & Stereo Inputs

Every frame size above 16 inputs has two fully featured stereo inputs. These, along with the two Stereo effects additional inputs. Each stereo input includes the same wide-ranging Mic pre-amp as the Mono inputs, a four band EQ sends. When using the Stereo Inputs as Mic inputs, you don't loose the stereo input function. The Mic/Line switch selects to be routed through the main channel path. If "Mic" is selected then the additional "Line to LR" switch routes the stereo input direct to the LR mix bus. With only the Left line input connected the signal is automatically monoed.

Talkback

The GL2000 offers individual TB facilities to each selected mix output at the press of a button. The TB level adjusts the Mic gain for the engineers voice or sets an appropriate level for a signal generator (ideal for testing the monitors). The TB XLR top panel connector includes phantom power which can be enabled or disabled using an internal link.

The 24 That Thinks It's a 32.

MORE THAN ENOUGH

All Allen & Heath customers expect success to come quickly. The GL2000 grows with them. The console can be expanded by using our unique Sysfink™ buss interconnection system.

In terms of price to performance the GL2000 is unequaled. Ask your Pro Audio dealer to show you around the GL2000.

- 2 Stereo Inputs
- Wide ranging Mic Gain
- 6 Aux Sends
- 4 Groups
- Individual Phantom Power
- Input meters on all channels
- 2 Stereo FX Returns
- Returns on Faders with EQ
- Pan control on all subgroups
- 2 Track Recording I/O
- Talkback
- 1/3Octave filters
- Internal PSU
- Quality Soft Armrest
- Optional Flightcase

The bonus of more inputs is always an advantage - the GL2000 offers more. Sound quality is exceptional - as you would expect from A&H, plus a very practical and functional feature set - again, everything you would expect from A&H.

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SYS-LINK™

SYS-LINK™ is a proprietary buss interconnect standard that is unique to Allen & Heath. Any number of conforming consoles can be linked together and operated as one large console. Every mixer in the Allen & Heath range supports SYS-LINK™ standard.

AUX/PFL busses, FX and PA feeds are available in a SYS-LINK™ system.

AUX Sends

Allen & Heath always gives engineers the levels where they need them. Divided into two logical blocks, each Aux Send block has its own pre/post switch and color coded. An Aux source can be switched pre or post EQ, pre or post Mute and fixed pre or post fader or adjustment altogether from an internal jumper. The Aux masters each have access to the AFL buss for monitoring.

MIC/LINE Switch

Both the mono and stereo input channels have balanced XLR and TRS inputs. The mic/line switch either operates as a source selector if both inputs are connected or a -20dB pad for the XLR input if the TRS jack is left unconnected to facilitate balanced line level XLR inputs.

MUTE

Allen & Heath is renowned for its silent mute switches. These cut the audio on each channel achieving an excellent -90dB shut off specification. Because the GL2000 is a dual function console, the mute switch can be linked pre or post the Aux Send Matrix.

Pre Fade Listen

Why do some console manufacturers leave off this vital facility? Monitoring for the engineer is considered mandatory on all Allen & Heath consoles. The GL2000 is no exception and supplements this with extensive AFL monitoring on the output paths and selectable mode switching for an engineer's wedge monitor.

Routing

The channels' pan controls adjust the level between odd and even pairs of the four subgroups. In monitor mode the L-R mix buss can be used to feed in ear monitors, and the other busses can be selectively routed to give mix minus feeds to different performers.

Input Meter

There are four stage LED input meters on every channel that show signal presence (-20dB), 0dB optimum operational level, +5dB over optimum level, and peak (+5dB from clipping). The LEDs are arranged such that the bar dynamically reflects the input signal.

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in the frequency range above around 3 or 4 kHz, but that's OK — the real concern is that frequencies below about 2 kHz are not passing). If your crossover has a midrange output, connect the speaker to those leads and again sweep from 20 Hz up. The signal should become noticeably louder at the low-to-mid crossover frequency, remain steady up to 2 or 3 kHz, and then decrease above the mid-to-high frequency point. Once you have performed these tests, you can be reasonably assured that your crossover is healthy.

If you are using an active crossover, the process is similar, but the crossover points will have been set by you or some other engineer working with the system. Connect the tone generator directly into the crossover and patch the low frequency output into the amp. Note your settings on the crossover, and sweep tone from 20 Hz up. You should hear the signal diminish and disappear as you sweep past the low-to-mid crossover point. Repeat the procedure for the crossover's mid- and high-frequency outputs, keeping in mind the crossover points set on the unit. You want to make sure that your crossover is not passing, say, 20 Hz through the high-frequency output. If the crossover is stereo, make sure to check both channels, and if there is a subwoofer output, check that as well.

Having done all that, you are either thinking about repairing your crossover or you're ready to move on to the drivers. Again, you must check the manufacturer's specs for frequency response and power handling for your particular drivers. Start with the low-frequency driver. Connect the tone generator to the power amp and the amp to the driver (*all level knobs down!*). Also connect the leads from your volt-ohm meter to the output of the power amp so that you can measure output voltage to the speaker.

If you can verify that these components are operating properly, there's a good chance of avoiding disasters.

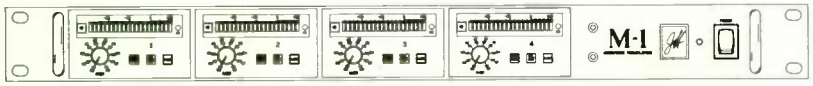
Start at a frequency of about 15 Hz and slowly bring up the level. You will be able to see your loudspeaker cycling back and forth. Bring the level up so that your meter reads about 12 volts and listen carefully for any rubbing sounds (voice coil against magnet) or "motorboating" (some part of the speaker mechanism is loose and is flapping around). Sweep tone up through 5 kHz while continuing to listen for these sounds. You shouldn't hear any. While you're at it, visually inspect the driver for loose parts (check the glue points at the dust cap, surround, and spider) and poor solder connections. Although you probably can't do anything about a voice coil separating from the cone, at least you can get the driver to a qualified recone center before it fails on the job.

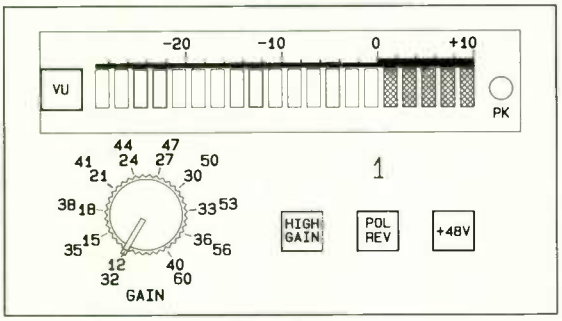
Repeat this process for the midrange driver and the high-frequency driver, but *beware* while testing the tweeter: high-frequency drivers do *not* want to see frequencies below about 1 kHz (again, check with the manufacturer). Test only within the manufacturer's specs for frequency response and power input. If you pump 20 Hz at 10 volts into a two-inch compression driver, you probably will blow up the diaphragm (and hurt your ears). That's terrible for your audio, though it does make a great science project.

Check out senior editor Steve La Cerra's Web page at www.mcmix.com/lacerra.htm.

M-1

MICROPHONE PREAMPLIFIER





(ACTUAL SIZE)

Gloria Estefan, Dolly Parton, Neil Young, Lou Reed, Laurie Anderson, Bob Dylan, Madonna, Eric Clapton, George Harrison, Paul McCartney, Paul Simon, Joe Henderson, James Carter, Ernie Watts, Bill Hollman, Saturday Night Live, The Muppets and many others have done great work with the M-1. The M-1 is clearly superior, *satisfaction guaranteed*. Here's why:

The Jensen JT-16-B Input Transformer. The world's best mic-input transformer. If you thought transformers were a compromise, you haven't heard the JT-16-B!

The 990 Discrete Op-Amp. The 990 discrete op-amp is superior to the monolithic op-amps found in other equipment.

No Coupling Capacitors in the Signal Path. DC servo circuitry and input bias current compensation circuitry eliminate all coupling capacitors and the degradation they cause.

Standard features: LED-illuminated push-buttons; phantom power switch; polarity reverse switch; conductive plastic gain pot and high-gain switch; shielded toroidal power transformer with 6-position voltage selector switch; gold plated XLRs; ground-lift switches.

Options: VU-1 meter (shown); PK-1 meter; Jensen JT-11-BM output transformer;

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indicate. This gives the 38 lb. (17.3 kg) unit a balance point that is far forward and well suited to life on the road and reconfiguring rental system racks. The controls are also recessed to extend their lifespan. Input level controls are calibrated using mechanical detent pots and level switching (full power at 1.4 V or 26 dB of gain) on the rear panel. It also includes rear-panel switches for summing the inputs or running in Bridge mode where greater output voltage is required.

When stacked one above the other, the K2 case shape creates air flow channels (front to back) between the units. This is especially important in gigs where the units are driven hard and may require cooling fans in the rack. However, Crown claims that the K2 can be driven 8 dB into clipping and still keep operating in a 40-degree C (104 degrees F) environment. The cabinet is warm to the touch in operation, but the incredible efficiency of the unit removes the need for noisy rack-cooling fans in almost all applications.

The K2 holds its own in listening tests with studio-quality amplifiers, delivering punchy, rock-solid low end and all the texture and atmosphere of the input signal. The very serious damping factor of the unit (>10,000 between 10 Hz and 100 Hz) allows the amp to maintain solid control over the driver's diaphragm at those critical low-frequencies where the mechanical restoring force of the drivers is weakest. If anything, the K2 adds a little midrange aggressiveness to some snare drum and piano sounds. This does not extend to any metallic additions to the sound quality, although the sampling frequency artifacts are visible on an oscilloscope. Even at maximum power the K2 doesn't add any mechanical noise to the listening environment, a feat few other amplifiers in the middle and higher power categories can deliver full time.

A major application for larger power amps is driving subwoofers. The K2 can drive multiple parallel drivers efficiently, handling these very low impedance and highly reactive loads easily while still detecting and protecting itself against shorted cables or voice coils. The excellent reference manual includes a variety of application notes, connection information, and general sound system information.

The K2 does appear to be a killer amp that addresses the needs of the sound-reinforcement industry. The new BCA technology brings efficiency to a new level while providing a reliable, stable MOSFET design that is truly digital. Crown seems to have achieved the very practical goal of getting more sound into the seats with less power from the disconnect backstage. Like its Himalayan namesake, the Crown K2 is outstanding.

Wade McGregor is a senior consultant for Barron Kennedy Lyzun & Associates, an acoustical consulting firm based in Vancouver, BC. For more info visit their home page at www.bkla.com.

MANUFACTURER'S SPECIFICATIONS

Frequency Response: ±0.25 dB from 20 Hz to 20 kHz, bandlimited at 8 Hz and 33 kHz

Power Output:

2-ohm load: 1250 watts
4-ohm load: 800 watts
8-ohm load: 475 watts

per channel at 1 kHz with both channels driven to 0.1% or less THD

Signal to Noise (A-weighted): >100 dB below rated power

Voltage Gain: 1.4 VRMS or a fixed voltage gain of 26 dB

Damping Factor: >3,000 from 10 Hz to 400 Hz

Input Connectors: Electronically balanced 1/4-inch phone jack and XLR connector

Input Impedance: Nominally 20 kohms, balanced and 10 kohms unbalanced

Input Sensitivity: 1.4 volts for full power or 26 dB of gain (switchable)

Output Connectors: 5-way binding posts

DC Output Offset: ±10 millivolts

Cooling: Convection cooled

Dimensions & Weight: Two rack-units high, 19 inches (48.3 cm) wide and 17.9 inches (45.4 cm) total depth. 38 pounds (17.3 Kg).

CROWN BCA TECHNOLOGY

Crown has sent a shockwave through the audio industry with its latest amplifier design. This new design is claimed to achieve double the efficiency of other audio amplifier designs. If an amplifier is more efficient, then it can produce more watts for the loudspeaker from fewer watts out of the Edison connector. A significant side benefit is the reduction in heat produced by the unit. Heat production has been one of the limiting factors in economically generating large amounts of amplifier power. Crown calls their new design the Balanced Current Amplifier or BCA.

This simple name represents a very innovative way of creating a switching amplifier. In the simplest terms, the BCA circuit uses MOSFET switches operating at 250 kHz to modulate (by varying the width of each pulse) the power supply's DC to emulate the waveform of the audio. The net result is that the active components (switching MOSFETs) are either fully on or fully off and do not need to operate in the less efficient range between these two states. The BCA design does not suffer from the current limiting common to conventional designs, and can therefore more easily cope with the very low (and highly reactive) load impedances of multiple subwoofer drivers.

The BCA approach essentially reconstructs the low-level audio signal with a pulse-width-modulated high-level signal. Two synchronized switches are connected to the positive and negative DC rails. When both switches are on for the same duration, the resultant combination cancels out (common-mode), but when one switch stays on longer that the other, an output is created that is related to that duration. The varying level of the audio waveform is generated by changing the relative duration that each switch is on. The offset between the Positive and Negative switches creates a resulting waveform that has the sonic advantages of a 500 kHz sampling rate while achieving the duty-cycle efficiency of the 250 kHz sample rate. The output circuit also handles the energy from highly reactive loads in a manner that allows this energy to be reused instead of simply being dissipated by the output devices.

More detailed information on the BCA design of the K2 amplifier is available on Crown International's Web site (http://www.crownintl.com). —*WM*

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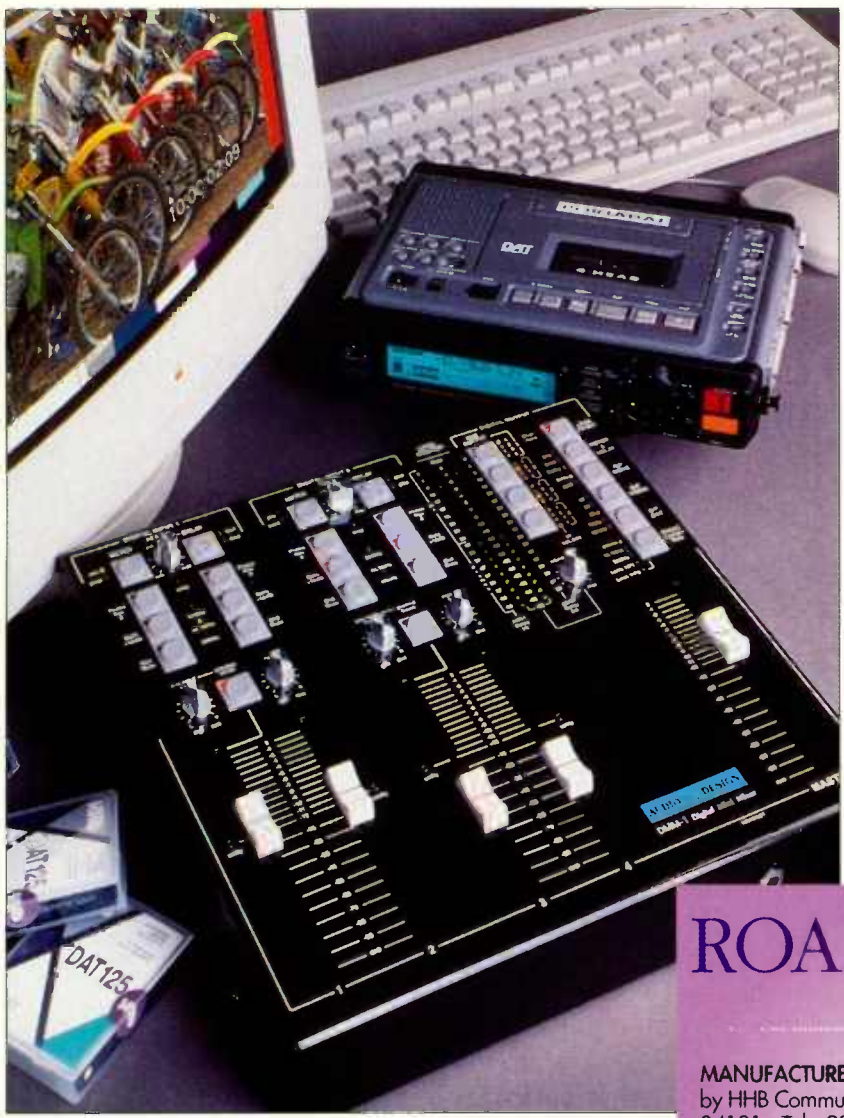
AUDIO & DESIGN DMM-1 DIGITAL LOCATION MIXER



By **EDDIE CILETTI**

One of HHB's strong suits is that they offer a collection of specialized audio products that prove beyond a doubt that their tastes exceed that of Charlie the Tuna by several fathoms.

The Audio & Design DMM-1 digital mixer is one example worth checking out — especially if your application is on-site audio-for-video. The DMM-1 will accept a pair of stereo signals — in all the popular sample rates and bit depths — and output them either as two stereo pairs (Betacam/D2 format) or mixed to a single stereo pair. It has a built-in headphone amplifier.

VIDEO CONSIDERATIONS

Input and output expansion ports permit two additional DMM-1's to be connected "in cascade" for a total of twelve (six stereo) inputs. For video applications, each channel features a delay adjustment to compensate for the time it takes to process a video signal. Delay options are in four millisecond (ms) steps up to one frame of video, followed by increments of 40 or 33.3 ms (1 frame of PAL or NTSC). A switch to select PAL or NTSC is provided on the rear panel.

For my own purposes, it would be great to have even finer delay increments, perhaps half the values provided. Nagra-D users, for example, have requested 1/2-ms steps to compensate for phase anomalies resulting from microphone placement. Since the DMM-1 is software-based, A&D claim they will customize provided either a minimum of ten units are purchased or that the user pay for the cost of the modification.

SRC: EASY AS 1-2-3

There is a built-in sample-rate converter (SRC) for each channel. When bypassed, the resolution is 24 bits. When engaged, the resolution is 20 bits. Not only will the DMM-1 accept different source sample rates, it also accepts and outputs an assortment of flavors including AES, S/PDIF, and optical. Each input oper-

ROAD TEST

MANUFACTURER: Audio & Design, UK. Distributed in the U.S. by HHB Communications, Inc., 43 Deerfield Road, Portland ME 04101. Tel: 207-773-2424; E-mail: 75671.3316@compuserve.com.

APPLICATION: Expandable, 4-channel digital audio mixer.

SUMMARY: Simple, easy-to-use and thorough. It's the digital Swiss Army Knife!

STRENGTHS: Extremely flexible mixer that accepts and outputs various sample rates and word lengths.

WEAKNESSES: From an audio perspective, the unit is out-of-this-world expensive. The price is much more in-line with the specialized equipment made for video and location applications.

PRICE: mixer, $4275; rack ears, $150; case, $235

EQ FREE LIT. #: 128

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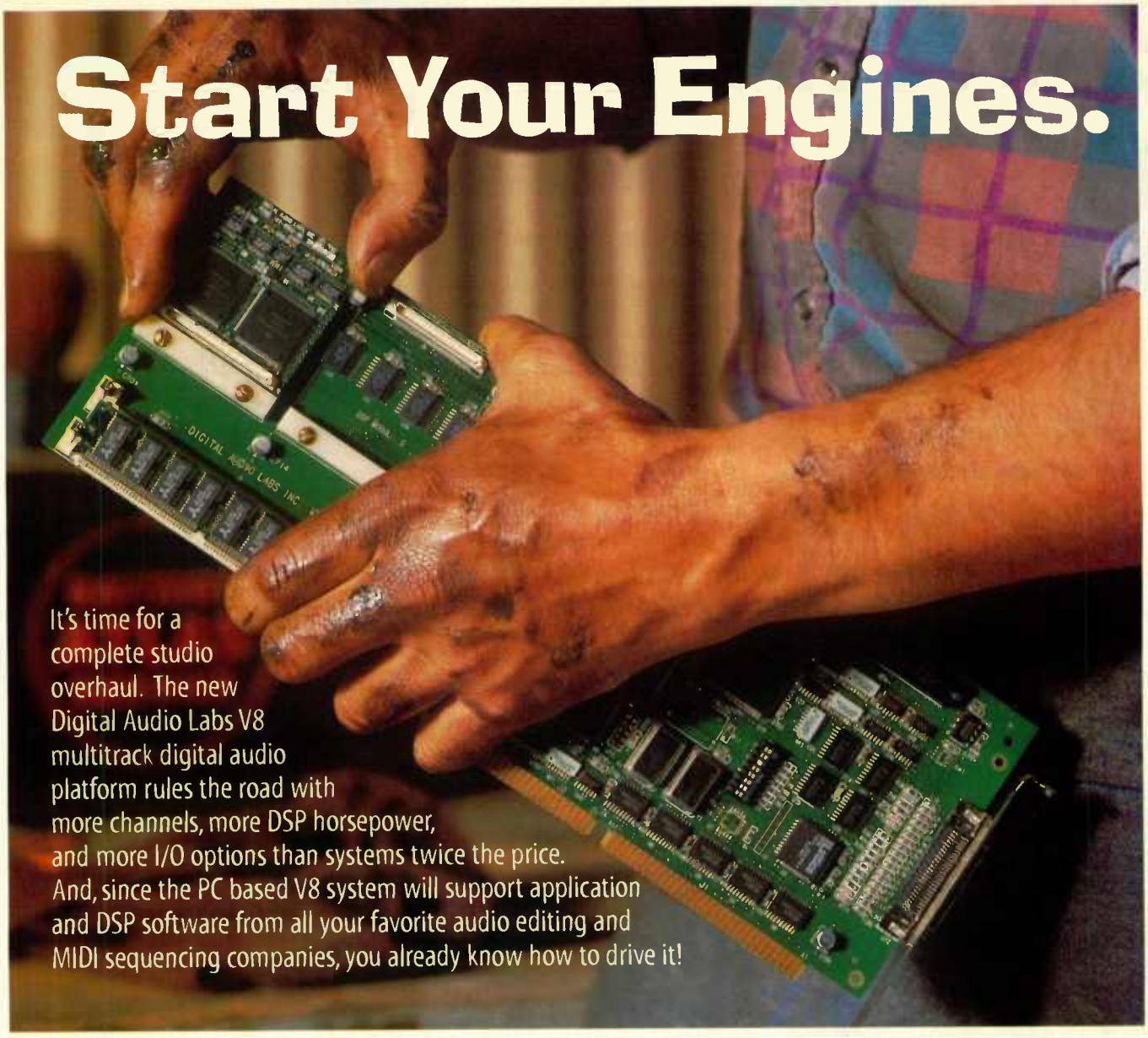
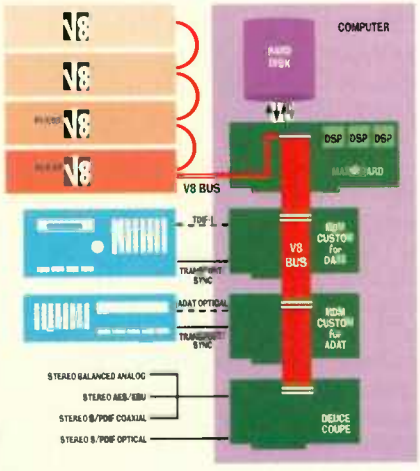
Start Your Engines.



It's time for a complete studio overhaul. The new Digital Audio Labs V8 multitrack digital audio platform rules the road with more channels, more DSP horsepower, and more I/O options than systems twice the price. And, since the PC based V8 system will support application and DSP software from all your favorite audio editing and MIDI sequencing companies, you already know how to drive it!

Under The Hood

The V8 Main Board is a virtual recording studio, including a sixteen track disk recorder, realtime automated mixing console, and an infinitely configurable routing/patching system. System I/O is handled through a variety of V8 I/O peripherals, including the 8 channel Big Block, the MDM custom ADAT interface and the Deuce Coupe stereo analog/digital interface.



The V8 Audio Gearhead Partners; Your Interface to the V8 System

With the V8 System, there's no new proprietary software to struggle with. Simply mix and match any combination of powerful applications and DSP plug-ins from our ever growing list of Audio Gearhead Software Partners to create your own custom tailored workstation. Look for the Audio Gearhead Approved seal on your favorite audio and music software, your assurance that the software is fully V8 enabled.

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Electro-Voice RE1000 Microphone

Get high-quality sounds without the high price tag

BY STEVE LA CERRA

PHOTO BY EDWARD COLVER

Electro-Voice's RE1000 is a single-pattern (supercardioid) condenser mic designed for high-quality sound reproduction. The RE1000 is sort of a "little brother" to the RE2000; at $928 (suggested list) the '1000 is more affordably priced than the '2000, and E-V's intention is to offer a mic with serious performance at a reasonable price. *EQ* had the opportunity to take the RE1000 for a test spin, and here's what we found.

Operation of the RE1000 is quite straightforward — the only external control is a low-frequency rolloff that kicks in at 130 Hz and can be used to minimize mic-stand rumble or excessive vocal popping. Included with the RE1000 is a simple pivot mount. When we received the mic, the pivot was a bit loose, enabling unwanted movement. This was easily remedied with a quick tightening of the pivot screw. While a shock mount is also available (E-V model 325), the mic was resistant enough to rumble-type noises that we didn't feel a shock mount was necessary. The diaphragm in the RE1000 is an ultra-thin, medium-sized affair designed to maintain the fast transient response of a small diaphragm while yielding the high output of a larger diaphragm. Our studio tests verify that E-V has succeeded in building a mic with those qualities.

We used the RE1000 in sessions with a variety of instruments, the first of which was a male vocal. It was a low baritone part — up close and intimate — and without the low-frequency rolloff, the mic sounded muddy. Turning the LF rolloff "on" definitely improved the clarity of the recording in this application and made a noticeable difference, especially after we layered about 15 tracks of background vocals.

Next we tried the RE1000 several different ways while miking drums. The first was for ambient miking of the room. In spite of added compression, the RE1000 was able

MANUFACTURER'S SPECIFICATIONS

Type of Mic: condenser
Polar Pattern: supercardioid
Frequency Response: 70 Hz to 18 kHz
Rated Source Impedance: 250 ohms
Maximum SPL: 130 dB for 1% distortion @ 1 kHz
Equivalent Noise: less than 14 dB, A-weighted
Power Requirements: 12 to 48 volts dc phantom

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By the same token, a road musician's gear needs to be as rugged as he is. That's what we had in mind when we re-designed the Peavey SP™ series sound-reinforcement enclosures.

Each trapezoidal enclosure is equipped with Peavey's revolutionary **Sound Guard**™ high-frequency driver-protection

circuit, a switching mechanism that doesn't affect the original signal until excessive power is introduced into the system. And we have fortified the SP 2G and 4G with **Black Widow**® woofers featuring field-replaceable baskets.

We have also added two floor monitors to the line, the SP 112M and 115M. Both units are equipped with **22XT™ Compression Drivers** and Black Widow woofers, as well as the Sound Guard circuit.

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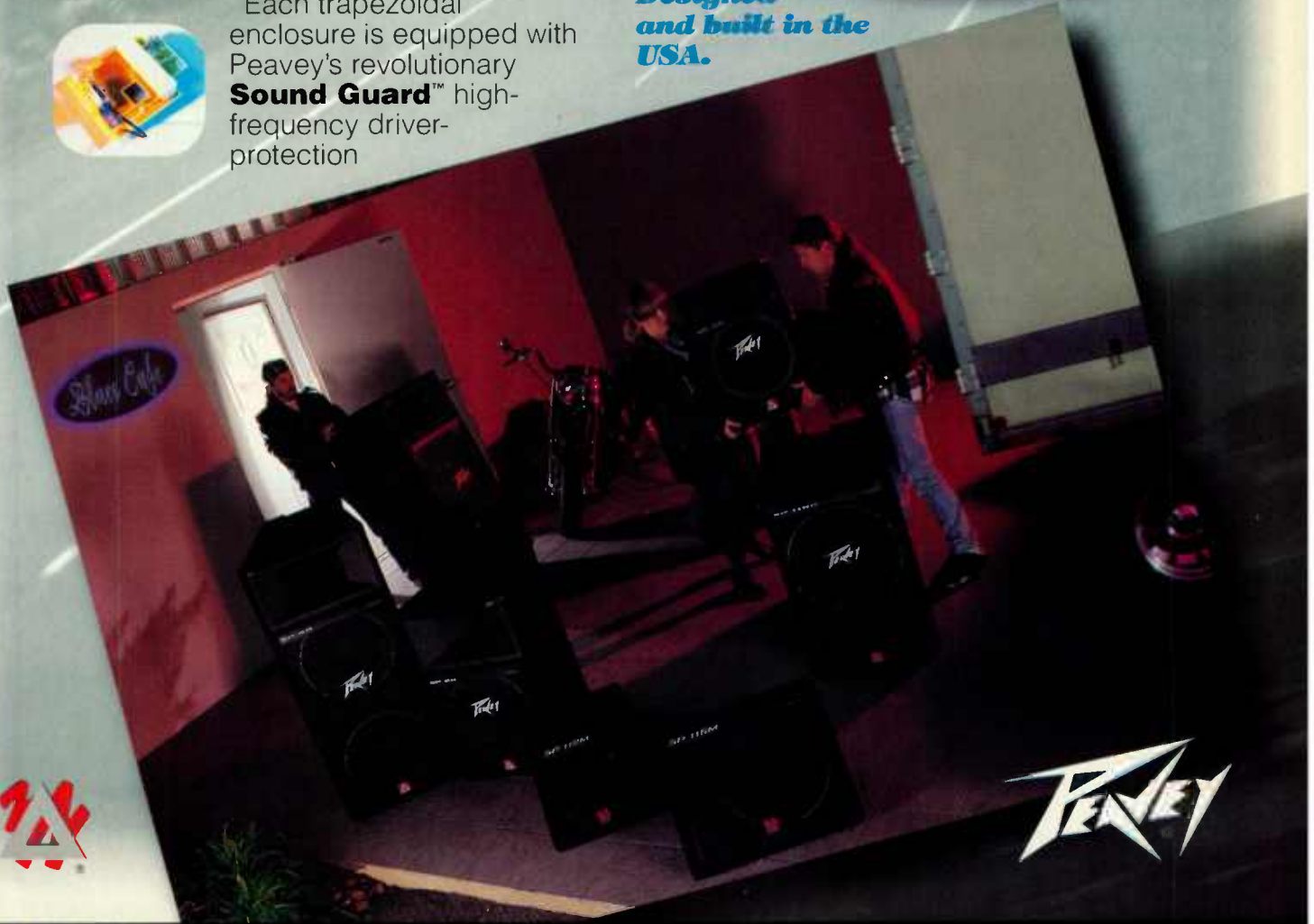
Designed and built in the USA.



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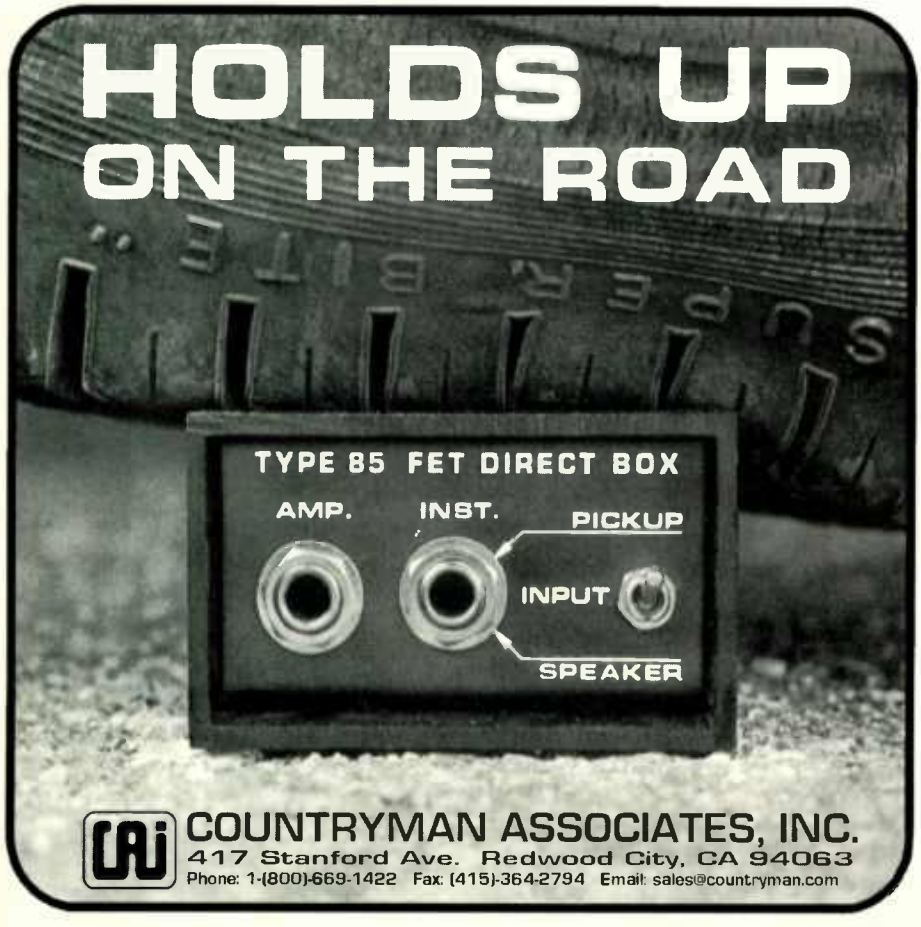

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to maintain an extended top end (we've found that many mics sound dull in this room under this application). While the compression may have been partly responsible, cymbal decay seemed to be much longer than usual.

We then proceeded to try the mic close-in on some of the drum kit components. Using it on kick drum was more a test of the '1000's SPL capability than anything else, and it did handle the blasting without a cough. On snare drum, the mic was wonderful. It sounded natural — not something we hear very often for snare. High frequencies were open without being hyped, and the mic translated the impact — the "pop" of the snare transients — really well. Rejection of the rest of the kit was quite good.

We were a bit disappointed in the RE1000 when it came to hihat — too metallic and edgy for our taste. But when it came to toms, the '1000 really shined. On a 13-inch rack tom, the mic translated a liquid bottom end and decay for days. On the floor tom (16-inch), you could almost taste the plastic tip of the stick hitting the head. Low frequencies were full and ballsy, and the snap of the high frequencies definitely caught your attention. This is the way toms should always sound.

When trying to record a Chilean Rain Stick, the RE1000 did not fare so well (and most mics don't). This instrument sounded too crunchy on top, and we heard a coloration that gave the Rain Stick too much weight — some kind of mild emphasis in the lower midrange that was also subtly audible in acoustic guitar recordings. For the latter, the mic was positioned above the side panel of the instrument, facing straight down towards it. In fact, it was right near the performer's ear, which we found gave a very natural sound. The guitarist commented that the recording sounded a lot like his guitar sounded to him while he was playing (yes, we know it's supposed to be that way, but not all mics attain that quality). There was plenty of warmth and the RE1000's quick transient response brought out the detail and percussiveness of the pick hitting the strings.

The Electro-Voice RE1000 is not going to solve all of your miking needs, but it does have specific strengths which make it a consideration for microphones in this price range. EQ

Price is $928. For more information, contact Electro-Voice, Inc., Mark IV Audio , 600 Cecil St., Buchanan, MI 49107. Tel: 616-695-6831. Circle EQ free lit. #129.

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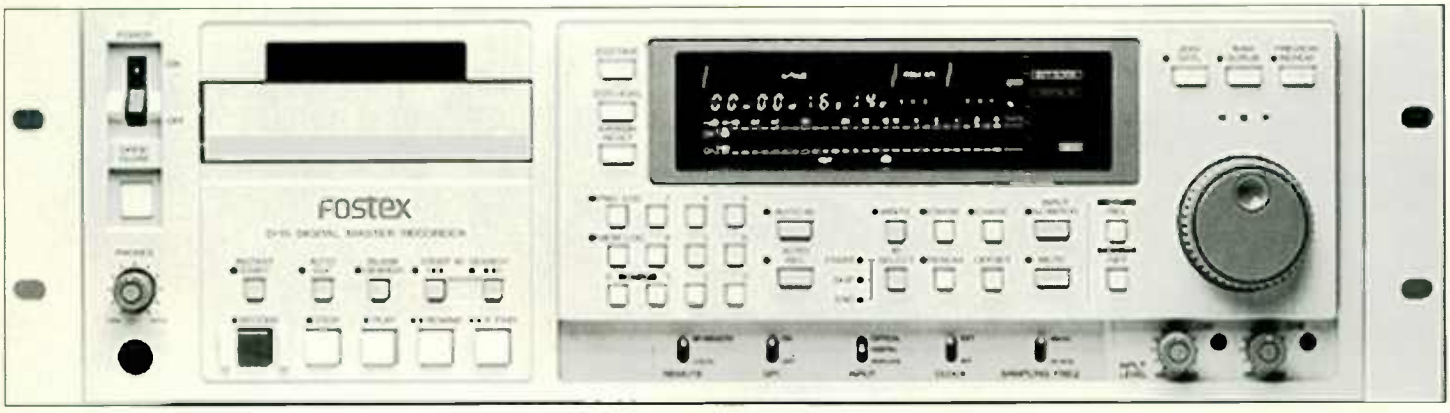
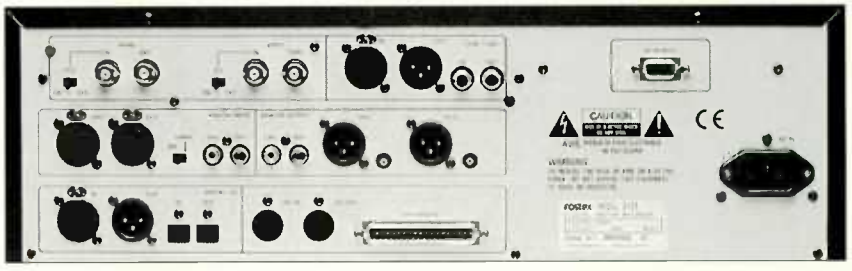
Fostex D-15 *Timecode DAT*



A DAT with everything — including the kitchen sync



You can't do long-form audio-for-video without a timecode DAT machine. Up until now, the options were to rent a TC-DAT or buy a digital multitrack. Depending on the project, a rental can cost about as much as a standard deck. The digital multitrack is a better bang-for-the-buck, but buying or renting aren't the answers you wanted to hear. So take heart (sfx: "splat!"), Fostex has come up with an alternative. At $3890, the new D-15 is the most affordable timecode DAT machine available, costing some $2000+ less than its nearest competitor.

The key to synchronization is the ability to read SMPTE timecode. The challenge is to do this while locking to an external reference such as video. The D-15 does this as well as any but doesn't have read-after-write heads or permit audio and timecode to be independently recorded. These features were dropped in favor of making a more affordable product.

KEY FEATURES

The D-15 provides Instant Start, AES and optical I/O, video and word inputs, a general purpose interface (GPI), 37-pin, and (optional) 9-pin RS-422 remote connectors. The 9-pin interface is standard in video land, where all equipment (tape and disk) communicates with an editor/controller via RS-422. This is a balanced version of RS-232, a bidirectional serial interface that provides not only transport control, but also uses multiplexing techniques to embed SMPTE information.

PANELING

Easy access to key features is provided via dedicated switches. On the front panel, five toggle switches select Local/Remote, GPI, Analog or Digital Input, Clock, and Sample Rate. The individual input level controls have center detents augmented by recessed trim pots. Standard DAT features, such as Start/Skip/Write/Erase/Renumber ID, also have dedicated switches. There is a concentric Jog/Shuttle control that serves double-duty for parameter selection and data entry. A numeric keypad facilitates the task of entering SMPTE locations.

DISPLAY WINDOW

The bright fluorescent display clearly indicates any error condition. If, for example, the incoming digital signal does not match the front-panel default, the selected sampling rate blinks. This is modus operandi for timecode DAT machines because the video world is not forgiving. If all

EQ LAB REPORT

MANUFACTURER: Fostex Corporation of America, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel. 562-921-1112.

APPLICATION: Synchronizing audio to video.

SUMMARY: An affordable timecode DAT machine.

STRENGTHS: Instant Start, balanced and unbalanced operation (audio and timecode), Word and Video In and Thru, plus GPI, a general purpose interface; RS-422 is optional.

WEAKNESSES: Display indication of the alphabet is cryptic.

PRICE: w/Instant Start, $3295; w/TC board, $3890; w/TC board and RS-422 option, $4085.

EQ FREE LIT. #: 130

BY EDDIE CILETTI

World Radio History

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World Radio History

Yamaha *REV500 Reverb*

Get the same quality reverb as the ProR3 at a fraction of the cost

No wonder I had a sense of *déjà vu* while reviewing this product — the REV500 uses the same DSP chip as Yamaha's ProR3 reverb (reviewed 11/96). However, the price difference is significant: $1299 for the ProR3 vs. $499 for the REV500. What exactly are you giving up, and just how effective is the REV500 in the project studio?

UP FRONT (PANEL)

Let's take a brief front-panel tour. An input level control with four-stage LED meters help set levels. There's a switch to toggle between user/preset program banks (100 programs each), and another switch to toggle through the four categories in each bank (hall, plate, room, special effects). Two Inc/Dec switches select individual programs within each category.

Four knobs for parameter editing vary predelay before early reflections (up to 200 ms for reverb and 299.9 for the echo/reverb algorithm), reverb decay time (300 ms to 99 seconds), high-frequency reverb decay time, and early reflections level. Some of these do double-duty, such as parameter/value selection when in utility mode, or to set the overall output level.

Additional buttons select program storage, play one of two sampled sounds for testing out the system, access the utility menu, and turn the power on and off (there's a real power cord, not a wall wart).

Finally, a readable LCD shows program number, name, and various parameter values. As you adjust the parameters, little bargraph lines give a graphic indication of the duration or decay of the selected parameter.

The rear panel has balanced ins and outs, available as both XLR and TRS 1/4-inch phone jacks, with levels switchable between –10 and +4. Operation is true stereo, with independent ins and outs (unlike reverbs that mix inputs to mono). Rounding out the rear panel are MIDI In/Out jacks (for program selection, real-time parameter control, and bulk dumps) and a footswitch jack for program advance or reverb mute.

THE EDIT ZONE

The REV500's eight algorithms are reverb, reverb + gate, reverb + resonator, reverb + dynamic filter, reverb + chorus, reverb + chorus/flanger/"symphonic," reverb + tremolo, and echo + reverb. Like more and more boxes, the REV500 has two editing levels: front-panel knobs for the most important parameters (described above) and several "hidden" parameters, accessed by going into utility mode.

For example, all algorithms have parameters for low-frequency reverb time, diffusion, high-pass filter, and low-pass filter. Specialized algorithms add other pa-

FEATURES AND SPECS AT A GLANCE

- 32-bit Internal Processing
- 20-bit A/D and D/A Converters
- 44.1 kHz Sampling Rate
- Independent Left and Right Channels
- 96 dB Dynamic Range (typical)
- 100 Effects Categorized Into 4 Sets of 25: Hall, Room, Plates, and Special Reverb Effects
- Fully MIDI Compatible
- Connections include XLR and 1/4-inch phone jack
- Input and Output Levels are Switchable between –10 and +4 dB
- Supports Real-Time Parameter Control via MIDI Control Changes and Program Selection via MIDI Program Changes
- Optional Footswitch Available

EQ LAB REPORT

MANUFACTURER: Yamaha, 6600 Orangethorpe Rd., Buena Park, CA 90620. Tel: 714-522-9011. Web: www.yamaha.com

APPLICATION: Provide artificial reverberation effects for individual instruments or program material.

SUMMARY: Really sounds great for not much more than a budget reverb.

STRENGTHS: Smooth sound quality, with flutterless tails and minimal noise; pro or project studio audio interfacing; cost-effective; easy to use; MIDI parameter as well as program control; true stereo operation.

WEAKNESSES: Limited MIDI implementation (no velocity, pressure, pitch bend response); changing program cuts off tail of previous program.

PRICE: $499

EQ FREE LIT. #: 131

BY CRAIG ANDERTON

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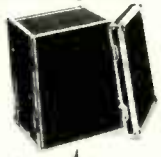

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rameters; for example, the reverb + chorus includes parameters for chorus speed, depth, and mix. Reverb + dynamic filter provides initial filter setting, sensitivity to input signal, resonance, and cutoff release time. Suffice it to say that most algorithms offer four specialized parameters, except for reverb + chorus and echo + reverb (which has two parameters—feedback level and the level of feedback going into the opposite channel).

MIDI-wise, you can control just about every parameter with its own continuous controller (the assignments are fixed and not editable). However, MIDI does not respond to velocity, pitch bend, or pressure messages.

So is the ProR3 really $800 better than the REV500? Regarding reverb sound itself, I'd say any difference is minimal.

DEMO DERBY

The REV500 includes a snare drum and cross stick sample for setting reverb, and even has a short demo (it's always fun to see what happens when engineers find a few free bytes left in the EPROM). You can trigger the sample to play once or repeatedly; this lets you tweak without having to run program material. Another application is sound reinforcement, since you can test out reverb parameters before the soundcheck starts.

SOUNDS LIKE REVERB

Here comes the hard part: trying to describe what a reverb sounds like using only words. As with the ProR3, there's 20-bit A/D/A conversion, 32-bit internal processing, and a 44.1 kHz sampling rate; the reverb sounds are uniformly smooth, with nongrainy tails that never flutter or break up as they fade out. Even with reverb decays over 15 seconds, the sound stayed smooth and clean. By any standards, the sound quality is excellent, but at this price, it's awesome.

Also like the ProR3, the REV500 has a "thick" character, as opposed to more "airy" reverbs (although lower density settings with reduced high-frequency decay times give a lighter, airier sound). With tweaking, you can obtain a variety of shadings anyway. To my ears, the hall algorithm is the big winner, although the plates work very well on vocals and the rooms have quite a few good sounds in there, especially with reasonable decay times.

So is the ProR3 really $800 better than the REV500? Regarding reverb sound itself, I'd say any difference is minimal. The main difference is the functionality; the ProR3 offers many more parameters (the reverb alone has 25), two different types of EQ (input tone controls and output 3-band parametric), dynamics and noise gating, and keypad program recall. However, the REV500 has 10 more presets and 10 more user programs, somewhat more flexible MIDI control, and lets you set a global "effect only" mix (amazingly enough, this was not in the ProR3).

If you just need great ambience for your project studio at minimal cost, the REV500 is an overachieving and exceptionally smooth reverb at an excellent price. But if you have the bucks, you'll appreciate the ProR3's extras. Either way, you get top-drawer reverb sound. EQ

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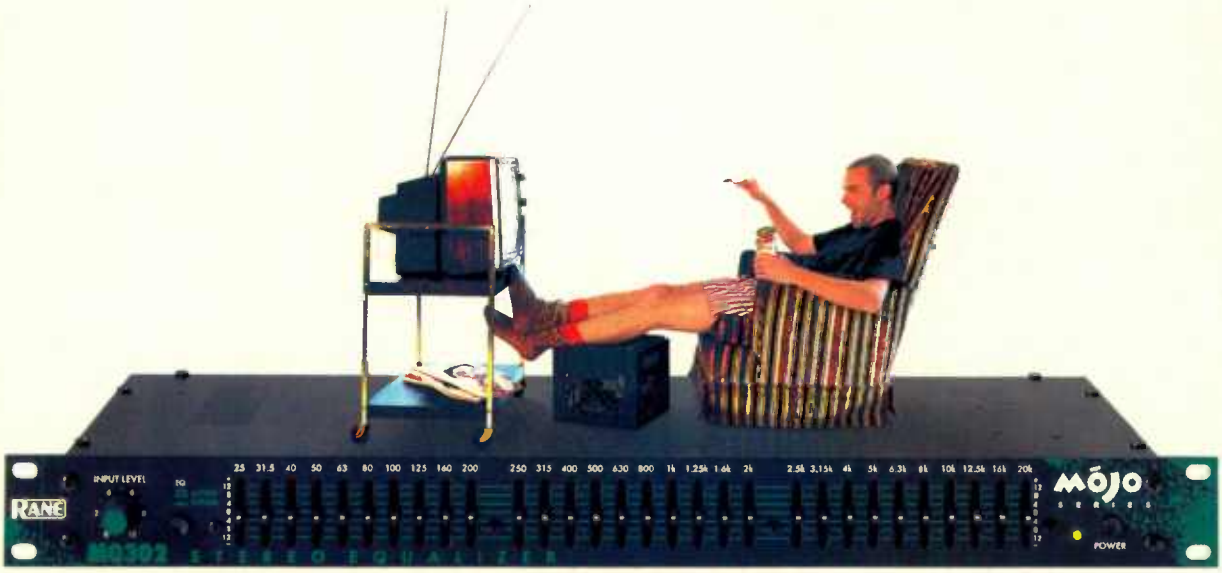

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Geek Thy *Neighbor*

PHOTO BY STEVE JENNINGS

The transmission speed you buy may not — and usually isn't — the speed you get

BY JON LUINI & ALLEN WHITMAN

Hello to all in print and Web space, from our home in FezBurg. This month's column finds us throwing a great handful of separate items from the audio codecs larder at the wall of our digital dining room. Some of these items may be news to you and some may be termed "common knowledge." Please read on and take notes. There will be a test.

Let's posit that you have placed a file on the Web. Let's assume that it works. You know this because you received e-mail from an ex who successfully downloaded (or streamed) your song and, after listening to the lyrics, felt compelled to round on you (in ASCII text) for divulging secret pillow idiosyncrasies. May we suggest that you expand your Web participation with a couple of new techniques and some useful information.

Hyperbolic jargon becomes useful information when translated into understandable language. Uncle Al the Fez asked Reverend Jon the Fez to give him a layman's explanation of the varying bandwidth options available as of this writing. Is it worth getting an ISDN line in your home? Maybe. Should you buy that dirt cheap 14.4 modem from your neighbor? No!

Bandwidth affects the speed at which your computer interacts with the Web. Modems rated at specific levels rarely, if ever, perform that function at their advertised speeds. You are familiar with the use of headroom in amplification. Even though you would almost never crank up an amplifier to its full wattage rating, having that extra space (or headroom) contributes to the amplifier's efficiency, audio quality, and overall performance. Modems can be thought of in the same way. Just because you have a 28.8 kbps connection to your ISP, doesn't mean you get 3.6 K/sec downloads from all sites on the Internet. There are a number of reasons for this, beginning with bandwidth and including (but not limited to):

1. The far-end computer is connected at 28.8 kbps and 100 people (your competition) are trying to download files. No doubt, we all have experienced what happens when six lanes of the freeway merge in one — a similar type of congestion (read: it gets slow!) happens here.

2. The ISP that the far-end computer is on has a T1 into the Internet, but has 3000 users who are also your competition.

3. There is a general "network overhead" involved with the way that data is sent over the Internet (the ubiquitous and mystic charm of "packet switching") so that you never quite reliably get full use of that 28.8 kbps. This is the headroom analogy.

4. Even though you have a 28.8 kbps modem, it's a different manufacturer than your ISP's and perhaps uses a different language, which means they only talk to each other at a lower speed like 22.0 kbps. This is the Tower Of Babel analogy. Everything is shrieking at the top of its lungs in a lexicon that requires at least one, and usually several, interpreters.

5. Your telephone line is being eaten by rats and *boy is it noisy*, and therefore a lot of retransmission brings your overall data rate from 28.8 kbps to 8 kbps. This is where the digital Dutchmen, with their coded fingers in the leaking hardwire dike, are holding back the flood of data lost during phone line transfer by casting the most holy and high "error correction" spells.

Because of this, a RealAudio 28.8 kbps stream is actually encoded at approximately 16 kbps. ShockWave audio provides for 16 kbps and 24 kbps encoding rates (at the low-end). Twenty-four kbps often has dropouts on a 28.8 kbps modem, so 16 kbps is more commonly used.

Fair enough. Using the yardstick of one minute of audio at three levels of compression, Reverend Jon the Fez was able to make Uncle Al the Fez understand, in estimated, real-world terms, what different rates of information ex-

THINGS THAT ARE USEFUL

Do you have a dialup connection with an ISP or online service that doesn't have a RealAudio server for real-time streaming? We suggest that you familiarize yourself with RealAudio's HTTP streaming solution, which allows you to stream your files without needing the proprietary server. You should already be familiar with the .ram metafile (FezGuys, Feb. '97) which contains a line that looks like:

pnm://realaudio.server.com/path/to/yourfilename.ra

To enable streaming via HTTP (the protocol your web server runs), change it to look like:

http://web.server.com/path/to/yourfilename.ra

You'll be set to go. It does require the 3.0 player at the other end, so anyone who has been living in a cave for the last few months will need to upgrade. Protocols and the apps that must provide the interface between them and us humans change like the weather. If you like change, read on. If you don't want any more change in your life, drop this magazine now!

Anyway, there is at least one disadvantage to using this format for your stream (as opposed to purchasing a RealAudio server or renting space on a server that someone else has purchased and installed). The player cannot seek to random positions throughout the file. There are other little things as well. After all, if you are going to pay $300 and up for something, you want to get features that you can't otherwise get for free, right? As we said in the other sidebar: R&D is expensive.

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World Radio History

change through phone lines actually translates into in terms of heating soup while waiting for a file to download.

If we start with a file containing...

A: 1 minute of CD quality (44.1 kHz, 16-bit, stereo)

B: 1 minute of MPEG 192 kbps audio (44.1 kHz, 16-bit, stereo)

C: 1 minute of 16 kbps compressed audio (RealAudio 28.8, Shockwave Audio, Xing, etc.) (5–8 kHz, 8-bit, mono)

...it will take, at the following rates, this long to download said file:

14.4k (for use over standard phone lines): The FezGuys strongly recommend that you upgrade to at least a 28.8k modem. All ISPs should support 28.8k by now.

A ~ 11 hours
B ~ 13 minutes
C ~ 1 minute 10 seconds

28.8k (for use over standard phone lines): This is the average home user speed now for people browsing the Web, sending e-mail, etc. If you're starting to do *real work*, you might feel that this is causing you to drink too much coffee while you wait for downloads and uploads.

A ~ 5 hours
B ~ 6 minutes
C ~ 40 seconds

56k (for use over standard phone lines): The new modem standard is in the process of coming out of the baudy closet. ISPs will begin supporting this as it becomes more common.

A ~ 2.5 hours
B ~ 3 minutes
C ~ 20 seconds

ISDN (requires special phone line and hardware): This can be 1 or 2 channels; 64 kbps is typical, depending upon the type of telephone service in your area.

single channel 64 kbps
A ~ 2 hours
B ~ 3 minutes
C ~ 15 seconds

dual channel 128 kbps
A ~ 1 hours
B ~ 90 seconds
C ~ 8 seconds

T1 — 1.54 MB (requires special phone line and hardware): Standard for most ISPs.

A ~ 38 minutes
B ~ 1 minute 15 seconds
C ~ 2 seconds

T3 — 54 MB (requires special phone line and hardware): When you want it now.

A ~ really fast
B ~ the blink of an eye
C ~ you do the math

Some useful information relevant to this table:

Nk (also Nkbps) = N kilobits per second transferred. A kilobit (kb) is 1000 bits. A megabit (Mb) is 1,000,000 bits. A byte is 8 bits. So 28.8 kbps = 28,800 bits/per/second, which is 3600 bytes per second, is what translates to the 3.6 K/sec in your Netscape download window.

The FezGuys remind you that, to play around creating audio content for the Web as we have been discussing, the following hardware requirements should be met: On any platform, 32 MB of RAM is recommended, especially since RAM is so cheap these days! One GB of disk space is also recommended (also cheap right now). If you are PC based, a Pentium-class CPU, operating at or higher than 133 MHz and a soundcard of some sort. If you are Mac based, the 8500 series (operating at or higher than 120 MHz) are great. The 7600 series models are nice, too. The 7500 series or below cannot do live RealAudio encoding, but are fine for encoding from prerecorded clips. As is standard with the Macintosh machines of these classes, the recommendations above come with built-in audio input/output jacks.

If you are UNIX based, there's some decent audio software for the SGI Indy. Xing has a long history with SGI support for their software. RealAudio supports Sun,

continued on page 128

THINGS THAT ARE NEW

• Progressive Networks (the RealAudio people) have released a RealVideo product, which adds video streaming to their existing audio technology. We hold the usefulness of incorporating some video content alongside your audio stuff to be self-evident. We will begin to hint at the melding of these media in upcoming columns. [**http://www.realaudio.com/**] Prices start from $295 without tech support. You have to pay extra for that. Let's face it: R&D and production are expensive, we understand, but tech support should be included in the purchase price — not added on as an option. The above comment reflects the views of the FezGuys, not the magazine wherein this column is printed. (Duh!)

• LiquidAudio demo player is now available for the Mac. For those still waiting with bated breath on word from us regarding the Liquid Audio Beta Liquifier, we offer this comment: "It looks great!" More later. Honestly. [**http://www.liquidaudio.com/**]

EQ

COMING UP IN MAY

WON'T TECHNO FOR AN ANSWER.
It may not be new, but the popularity of Techno is on the rise. EQ takes a look at this unique genre where the engineer is the performer.

IMPROVE YOUR TECHNIQUE.
The Techniques section goes behind the dash with Ben Vaughn, who recorded his new album, Rambler 65, entirely in a 1965 Rambler Amercian. Also get remixing tips from Ernie Lake and Bobby Guy and miking ideas from Mike Sokol.

QUARTERLY REPORT.
It's May, which means it is time once again for our PC Recording Quarterly supplement. Learn more ways of getting your computer to work better, and find out how some of today's hottest software programs really perform.

To be a part of this jam-packed issue, contact: Kathleen A. Mackay; Associate Publisher (ext. 460) Matt Charles (ext. 458), Andrea Berrie (ext. 471), Christine Cali (ext. 454); Advertising Sales

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CIRCLE 71 ON FREE INFO CARD

World Radio History

ROOM WITH A VU

continued from page 30

that he could find nothing to change. In his words, "It doesn't get any better than this." Other signal path notes:

• Tuck's guitar output goes directly into an Aphex 10/4 Interface (level-matching amplifier) and then into a GML A/D converter, and then into Sonic Solutions.

• Patti's vocals go directly from two B&K 4003 microphones into the Millenia preamp and then into Sonic Solutions.

• All recording is done in 20-bit directly into Sonic Solutions (Tuck and Patti were the first in the industry to do this outside of classical recordings).

STUDIO NOTES: In the central listening position at Binky Studios, the operator does not actually interact with a console — all three consoles are tucked away off to one side. Only the computer and the listening station are visible. To change mix or EQ, Tuck and Patti simply use the computer.

Most equipment is housed in four custom-built suspended 12-space racks. Normally, this would be an impossible wiring task, but Tuck and Patti have ingeniously developed a system that is as functional as it is fashionable. Each rack has a piano hinge at the bottom front, allowing the whole rack to flip down 180-degrees, which allows easy wiring (albeit, upside-down). A special spring-loaded pulley system carries the wires up and out of the way. When the rack is in its up position, no cords are visible, making for a very clean working environment.

Binky Studio was SIMM'd by Bob Hodas, a process that Meyer Sound developed for computer analyzing the acoustics of any environment. It took Tuck and Patti more than a year to design, create and build the studio which is essentially the size of a one car garage.

The vocal booth has 80 dB noise reduction. It features one-foot-thick dual walls and ceilings that reside over dual floating floors (using shock absorbers). Studio construction is double-walled with floating floor (felt over concrete) with a two-inch trough under the floor to hide cables. The studio had to be acoustically silent as Tuck and Patti's home is within earshot of a railroad line.

Tuck and Patti took another unusual approach to the housing of equipment in the studio: Everything that has a fan or creates any kind of sound — such as the computer, hard disks, and some audio processing gear — that could affect the acoustic mix was placed in a separate room. The result is a studio with an extremely low acoustical noise floor. Even the transformers on the Mackies have been remoted to lower the electronic noise floor for monitoring future 24-bit recording. EQ

THE FEZGUYS

continued from page 124

Linux, NetBSD, and SGI. In general, UNIX systems aren't recommended unless you already have a basic understanding of their arcane nature. The FezGuys recommend that you stick to Mac or Windows for easy GUI (Graphical User Interface) solutions. Point. Click. Point. Click. PANIC. System Crash. Point. Click. [Repeat.]

Coming up over the next couple of months: different software, recording gear and technology comparisons relevant to our work.

Our first correction: thanks to several who e-mailed us about the Macintosh AIF-to-MPEG audio file conversion program shareware URL. An errant "www" slipped into the address. It should read: http://home.ptd.net/~warnergt/.

LETTERS TO FEZGUYS

Dear Jon and Allen: Howcum I have RA 3.0 yet it [our secret word, see FezGuys, Dec. '96] came out as a 14.4 stream when I have 28.8. Hey whatever works right? —David Kaufman

Dear David: Indeed, "whatever works" is often our motto. The FezGuy behind the curtain whispered into our ear while creating that clip that we should make it as small as possible, thus enabling even those struggling 14.4k modem dialup users to listen to it in real-time. Since we did our *encoding* at 14.4k, no matter how fast your connection is (28.8k, ISDN, or T1), you will still only receive our 14.4k soundfile. Think of it this way: you still have enough bandwidth available to download those "Kill Barney" graphics while listening to us ramble on about secret passcodes (which has been changed, by the way). All the best. — The FezGuys

May the Fez be with you! Please check out the FezGuys Web site: http://www.fezguys.com/.

Jon Luini is a working technophile, a musician (bass player/singer) with full-blown facility and extensive experience on the Web and no free time. He is a co-founder of IUMA and currently is a partner/founder of MediaCast and Executive Vice President of Addicted To Noise. jon@fezguys.com

Allen Whitman is a writer and working musician (bass player/singer) with rudimentary technical knowledge and a keen, real-world interest in the practical use of the Web. He currently plays in the San Francisco-based band The Mermen. allen@fezguys.com They welcome your comments.

MAINTENANCE

continued from page 127

If you are not sure how much overbias is required, record a low-frequency sine wave no higher than 40 Hz. A course adjustment will deliver maximum output. Listen to what happens as the bias is varied and adjust until the fuzz and harmonic distortion are minimized. (Congratulations! You've just used your ears as a distortion analyzer.) Finally, with a high frequency such as 10 kHz, record and make note of its output (A), then reduce the bias until maximum output is achieved (B). The difference in dB (B–A) is the amount of overbias. Increase the bias until the signal returns to the level noted in "A."

NOT RECOMMENDED

Fig. 1 also makes reference to the fact that increased tape speed permits higher operating levels. Elevated levels are not recommended for narrow-format machines. Operating levels have been optimized by the manufacturer for use with a Noise Reduction (NR) system. NR is built-in out of necessity simply because smaller tracks yield less electrical output and therefore have a higher noise floor. Changing tape formulation and/or operating level will make your machine incompatible with other machines. Plus, the lack of a dedicated playback head makes alignments tedious.

NARROW-FORMAT GUIDELINES

Using NR improves headroom, so overdriving for "the sound" of tape saturation will likely yield more NR decode artifacts than actual tape compression. Narrow format decks typically have a global noise reduction on/off setting. Defeating NR on individual tracks is limited to the edge track designated for timecode purposes. (Some machines can be easily modified for individual control of noise reduction.)

Stick with standard formulations (contact your dealer or Ampex, 3M, Quantegy, AGFA/BASF, etc.). These tapes are 1 1/2 mils thick and have 1-mil cousins. High-output tapes are physically more difficult to pull through the mechanism. The resulting tension increase accelerates head wear.

TAIL OUT

The warmth for which analog tape is famous comes from the composite of its idiosyncrasies. There are obstacles, primarily noise, but also mechanical problems such as tension, flutter, and tape path. These will be tackled in a future article. I'll also be taking a closer look at why tapes shed and what you can do about it. Till then, be sure to play all your tapes all the way to the end and store them tail out. EQ

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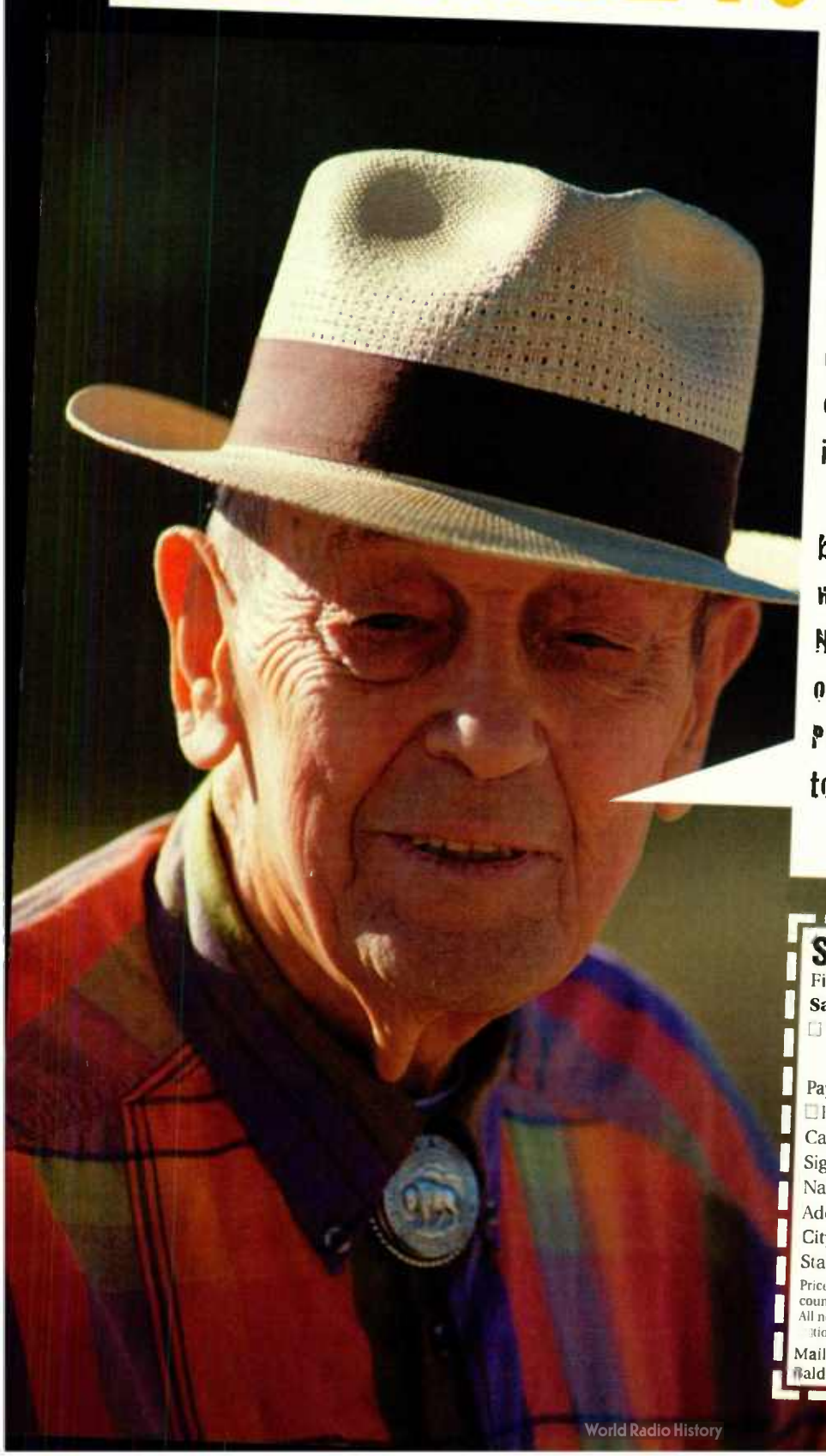

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If we wanted tips from the biggest pros in the industry, it just wouldn't show up on our doorstep! No, we'd have to set traps and when one'a them pros stepped into it — POW! And we'd keep 'em till they told us all they knew.

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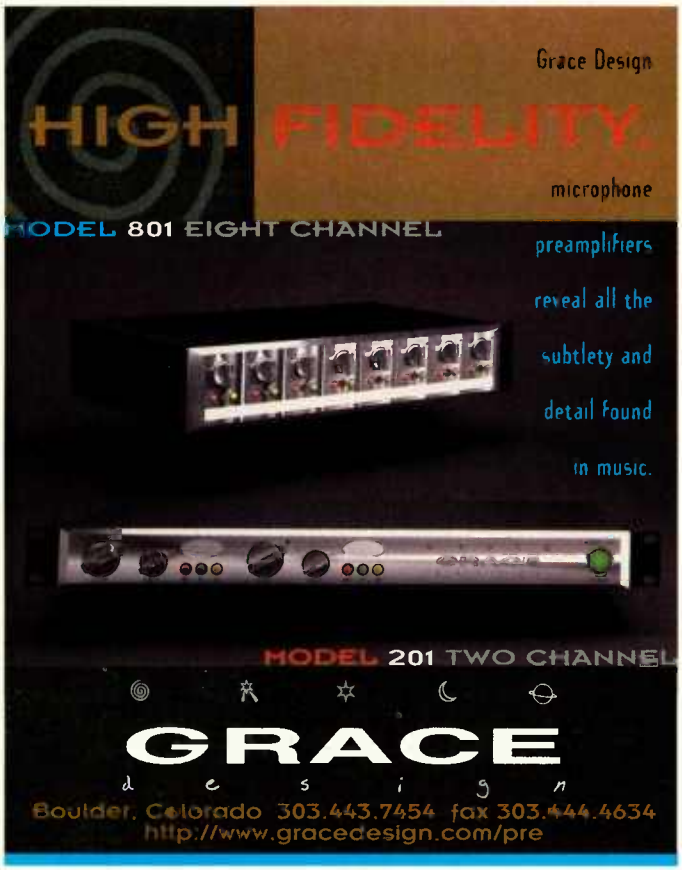

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PRO CASSETTE DECKS

TASCAM

202 MKIII / 302

Provides high-fidelity sound reproduction and a wide frequency response, as well as a host of features to help you easily dub, edit, record or playback using 1 or2 cassettes.

- Dual Auto Reverse, Normal and high-speed dubbing.
- 4-second autospacer.
- "Dolby HX Pro" extends high frequency performance and minimizes distortion.
- Auto sensing forNormal, Metal and CrO2 tape.
- Functions like Intro Check, Computerized Program Search, Blank Scan and One Program quickly find the beginning of tracks you want.

302 *Advanced Features–*

The 302 is 2 independent decks, each with their own set of RCA connectors, transport control keys, auto-reverse, and noise reducing functions.

- Individual/simultaneous record capability–both decks
- Cascade and Control I/O let you link up to 10 additional machines for multiple dubbing or long record and playback.

112MKII/112RMKII

A classic "no frills" production workhorse, the 112 MK II is a 2-head, cost effective deck for musicians and production studios. Extremely rugged and reliable, the 112 MK II is ideal for production mastering and mixdown. It also features a parallel port for external control and an optional balanced connector kit means it is flexible enough to integrate into any production studio.

112R MKII *Advanced Features–*

- Three-head transport with separate high-performance record and playback heads.
- Precision FG servo direct drive capstan motors.
- Hysteresis Tension Servo Control (HTSC)VIRTUALLY eliminates wow and flutter by maintaining consistent back tension on the tape all through the reel.
- Auto Reverse mode plays or records in both directions.
- Continuous Reverse mode allows you to loop the tape during playback up to 5 times, or record in both directions.

HEADPHONES

AKG

K240M

The first headphone of choice in the recording industry. A highly accurate dynamic transducer and an acoustically tuned venting structure produce a naturally open sound.

- Integrated semi-open air design.
- Circumaural pads for long sessions.
- Steel cable, self-adjusting headband.
- 15Hz–20kHz, 600Ω

JUST IN

SENNHEISER

HD 265/HD580

The **HD-265** is a closed dynamic stereo HiFi/professional headphone offering high level background noise attenuation for domestic listening and professional monitoring applications.

The **HD 580** is a top class open dynamic stereo HiFi/professional headphone that can be connected directly to DAT, DCC, CD and other pro players. The advanced design of the diaphragm avoids resonant frequenciesmaking it an ideal choice for the professional recording engineer.

marantz

CDR615 / CDR620 Compact Disc Recorder

Both next-generation stand-alone write-once CD recorders they offer built-in sample rate conversion, CD/DAT/MD/DCC sub-code conversion, and adjustable dB level sensing. Additional features include adjustable fade in/fade out, record mute time, and analog level automatic track incrementing. A 9-pin parallel (GPI) port and headphone output with level control are also included.

CDR620 *Additional Features–*

- SCSI-II Port • XLR (AES/EBU) Digital In/Out and Digital cascading
- 2x speed recording • Index Recording and playing*
- Defeatable copy prohibit and emphasis*
- 34 key, 2-way wired remote (RC620)

*Available on CDR615 w/optional Wired Remote (RC620)

PMD Series

Portable Professional Cassette Recorders

The world standard for field recording, the PMD line is also the value leader. They all feature RCA line input/outputs, 1/4-inch headphone jack, built-in speaker, pause control, audible cue and review, tape counter, full auto shut-off and low battery indicator.

- All models except the PMD-430 have 1/2 speed playback/record capability. With 1/2 speed playback, musicians can slow down complicated passages for analysis. At 1/2 speed the pitch is lowered by exactly one octave so the notes are still musically correct.
- By recording at 1/2 speed, a three hour meeting can be recorded on a single tape. A built-in mic and automatic level control make operation simple, and built-in speaker makes transcription convenient.
- Three standard 'D' cell batteries provide up to 7-1/2 hours of operation and the optional RB430 rechargeable battery delivers up to 5-1/2 hours.

General	PMD-101	PMD-201	PMD-221	PMD-222	PMD-430
Stereo/Mono	Mono	Mono	Mono	Mono	Stereo
Heads	2	2	3	3	3
Inputs/Outputs					
Mic Input	1/4-inch	Miniplug	Miniplug	Mini/XLR	1/4-inch
Condenser Mic	Built-In	Built-In	Built-In	Built-In	—
Remote Jack	—	Yes	Yes	Yes	—
Modular Tel. Jack	—	Yes	Yes	Yes	—
External Speaker Jack	—	Yes	Yes	Yes	—
Record Controls					
VU Meters	—	1	1	1	2 (Illuminated)
2-Speed Recording	Yes	Yes	Yes	Yes	—
Dolby B NR/dbx NR	—	—	—	—	Yes
Mic Attenuation	—	0,-10dB, -20dB	0,-10dB, -20dB	0,-10dB, -20dB	0,-15dB, -30dB
Ambient Noise Cont.	—	Yes	Yes	Yes	
MPX Filter	—	—	—	—	Yes
Manual Level Control	—	Yes	Yes	Yes	—
Limiter	—	Yes	Yes	Yes	Yes
ALC	Yes	Yes	Yes	Yes	—
Peak Indicator	—	—	Yes	Yes	—
Playback Controls					
Pitch Control	±20%	±20%	±20%	±20%	±6%
Bias Fine Adj.	—	—	—	—	Yes
Tone Control	Yes	Yes	Yes	Yes	—
Memory Rewind	—	—	Yes	Yes	Yes

Telex

ACC2000/4000 Cassette Duplicators

Designed for high performance and high production, Telex duplicators offer easy maintenance and operation. The ACC2000 is a 2-channel monaural duplicator, the ACC4000 is a 4-channel stereo duplicator. Each produces 3 copies from a cassette master at 16X normal speed and with additional copy modules you can duplicate up to 27 copies of a C-60 original in ***under two minutes.*** And they copy both sides at once!

ACC2000XL / ACC4000XL

The XL Series feature "Extended Life" cassette heads for increased performance and wear characteristics.They also offer improvements in wow and flutter, frequency response, S/N ratio and bias.

Easy Maintenance:

- Slanted work surface and "heads-up" cassette platform prevent oxide build up on the heads and makes cassette loading and unloading easier.
- 3 point tape guidance system eliminates skew problems and prevent unnecessary wear and tear on the tape head mechanism.
- Audio and bias along with head adjustments are made easily from the top of the unit. A switch on the back engages the head and pinch roller for convenient cleaning.

Fingertip Operation

- Individual rotary audio level controls, "Peak" LED indicators
- Side A or A/B select button
- Stop all tapes instantly, at any point during the copy or rewind cycle.
- Short tape indicators alert you if a tape stops before the original does, identifying incomplete copies caused by jam or short.
- Automatic or manual selection of rewind and copy operation:
  –Rewinds tapes to the beginning or end automatically (AUTO mode) or manually.
  –In AUTO mode the copy button activates the entire rewind/copy/rewind sequence. In manual mode, it starts copying immediately.

Telex Copyette EH Series Duplicators

The Copyette series produce high quality, low cost cassettes in large quantities at approximately 16X normal speed. The 2 versions are capable of duplicating either 1 or 3 cassettes at a time. Available in both mono and stereo.

Stereo Copyette 1•2•1

Weighing only 8 lbs. (3.6 kg), this unit has a durable, impact resistant housing and includes a removable power cord, carrying handle and protective cover. Optical, non-reflective end-of -tape sensing system provides gentle tape handling.

Stereo Copyette 1•2•3

This duplicator copies both sides of three cassettes at once, yet it's as small as the 1•2•1. It weighs only 12 pounds (5.4 kg) and includes a hard cover to protect the unit while not in use. It uses all DC Servo motors for the ultimate in reliability.

MICROPHONES

AKG

C414B/ULS

A reputation for flawless performance and uncommon flexibility in the most demanding studio and concert sound applications.

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- 20Hz–20kHz.

JUST IN

Studio Condenser Mics

The "bench mark" for cost and performance, the Equitek series of microphones incorporate a unique servo design and exceptional flexibility to provide extraordinary ballistic capability and exceptional transient response.

E-300

A multi-patterned side address mic that combines vintage capsule design with advanced head-amp electronics, the E-300 has an unusually wide frequency response of 10 Hz to 20 kHz and an exceptional dynamic range of 137 dB. Also extremely low self noise of 11dB. Ideal for the most critical applications.

Shown with optional ZM-1 Shockmount

Unique powering of all mics is accomplished with a pair of rechargeable nicad 9-volt batteries in combination with 48-volt phantom power. This overcomes inherent current limiting associated with most phantom power supplies and can supply 10X the current.

E-200/E-100

The first member of the Equitek family, the **E-200** is also a dual capsule side address multi-pattern condenser mic but with lower specifications than the E-300. The **E-100** uses the same electronics as the E-200, but with only one of the same capsules in a supercardioid pattern.

- Frequency response of 10 Hz to 18 kHz.
- Dynamic range of 137 dB • Low self noise of 16 dB.

audio-technica.

AT4033

Cardioid Capacitor Microphone

The AT4033 is a transformerless, studio microphone designed for use in the most demanding applications.

- Gold-plated, "aged-diaphragm" condenser element with internal baffle plate to increase S/N ratio which, coupled with low-noise transformerless electronics, makes the AT4033 ideal for critical digital recordings.
- Dynamic range is 123 dB without built-in attenuator.
- Accepts up to 140 dB SPL without distortion above 1% T.H.D. A built-in switchable 10 dB (nominal) pad increases it to 150 dB.
- Internal open-cell foam windscreen.
- Integral 80 Hz hi-pass filter for easy switching from a flat frequency response to a low-end roll-off.

AT4050/CM5

The AT4050 multi-pattern condenser expands upon the AT4033 to set the standard for studio performance mics.

- 2 capacitor elements.
- Cardioid, Omnidirectional, and Figure 8 polar pattern settings.
- Vapor-deposits of pure gold on specially-contoured large diaphragms are aged through 5 steps to ensure optimum characteristics over years of use. Transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

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PROCESSING

BEHRINGER

MDX 1200 Autocom

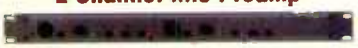
- Attack/Release times, with Intelligent Program Detection.
- Noise gate, switchable Soft Knee/Hard Knee characteristics for varied sound pressure levels.
- Bright, illuminated LEDs show gain reduction.

MDX 2100 Composer

- Integrated auto/manual compressor, expander & peak limiter.
- Compresses "musically" in dynamic range without any audible "pumping" or "breathing".
- Attack & release times are controlled automatically or manually.
- Interactive Gain Control (IGC) combines a clipper and peak limiter for distortion-free limitation on signal peaks.
- Servo-balanced inputs and outputs are switchable between +4dB and -10dB.

APHEX

107 Tubessence
2 Channel Mic Preamp



The 107 delivers outstanding sonic performance, as well as a great degree of presence, detail, openness and image.

- 2 independent channels with front panel XLR inputs
- Up to 64dB of gain available
- 20dB pad with red LED indicator, 2 LED input meter
- Full 48V phantom power with red LED indicator
- Low cut filter with red LED indicator: 80Hz, 12dB/octave
- Polarity inversion switch with LED indicator
- Individual channel remote mute capability
- Switchable +4dB/-10dB output with 1/4" TRS phone jacks

TUBESSENCE combines the best attributes of both tube and solid state circuitry to provide performance unmatched by conventional designs. The solid state front end is transformerless and only high end capacitors are used in the signal path. The tube circuit imparts the sonic characteristics of tubes without the extremely high voltages, heat, fragility, and short life span of conventional tube circuitry.

109 Tubessence
Parametric EQ

The Aphex 109 is an extremely versatile and high performance parametric vacuum tube EQ with unique features, flexibility and sound.

- **Great for "warming up" digital signals.**
- True tube circuitry in the output stage.
- Dual (stereo) 2 band or mono 4 band EQ configuration offers flexibility from general sweetening to critical problem solving.
- Operates in the EQ flat mode yet still passes signal through the Tubessence vacuum tube stage.
- 1/5 octave to 2 octave bandwidth adjustment.
- Switchable -10dBV/+4dBu operating level.

t.c.electronics

Wizard M2000
Studio Effects Processor

The M2000 features a "Dual Engine" architecture that permits multiple effects and 6 different routing modes. There are 250 factory programs including reverb, pitch delay, chorus, flange, phase, EQ, de-essing, compression, limiting, expansion, gating and stereo enhancement. The M2000 also features 20-bit A/D conversion, AES/EBU and S/PDIF digital inputs/outputs, "Wizard" help menus, 16-bit dithering tools, Tap and MIDI tempo modes and single page parameter editing.

HIGH-END MIC PRE-AMPS

Focusrite

Red 1 / Red 8 Mic Pre-amps

The Focusrite Red Series is instantly recognized by leading engineers worldwide for its fidelity, musicality, precision and control. The Red1 is a 4 channel mic pre while the Red 8 has 2 channels. Both are ultra-high quality for use in digital recordings, and with high-quality ribbon, valve, and condenser microphones.

Each channel offers–

- Phantom power & Phase reverse.
- Warm, and crystal-clear.
- Easy-to-read, accurate illuminated VU meters.
- Low noise floor with high gain bandwidth.
- Mic gain has 66dB range.

ISA 215 Dual Mono Mic-Pre & EQ

Engineers, producers, and musicians worldwide are familiar with the legendary ISA 110 mic pre/EQ that forms the heart of the Focusrite Studio Console. Frequent requests for a 19" rack unit with the same circuitry have led to the development of this high-quality studio device.

- 2-independant mic pre-amp & EQ.
- Microphone inputs feature variable gain and switchable phantom power.
- Independant HF and LF shelving sections.
- Overlapping Upper and Lower Mid EQ w/variable bandwidth.
- Independant High and Low pass filters.
- Integrated PSU
- Large, easy to use control knobs and switches.

Focusrite Green Range
NOW AVAILABLE!

ALESIS

3630 Compressor RMS/Peak 2Ch.Comp/Limiter/Gate

The 3630 is a dual-channel compressor that offers Ratio, Threshold, Attack and Decay controls to handle the toughest signals. It also offers a choice between RMS and Peak compression styles, plus Hard and Soft Knee dynamic curves for every application from subtle gain control to in-your-face punch. Ideal for use in applications from studio recording and mixing to live sound reinforcement and broadcast.

M-EQ 230 Dual 1/3 Octave/Precision Equalizer

Used extensively in recording studios since 1989, the M-EQ 230 provides 2 independent 30-band 1/3 octave graphic EQ'sin a single rack space. Covering every band from 25 Hz to 20 kHz in 1/3 octave increments the M-EQ 230 is ideal for tuning the monitors in your project studio or even getting the most out of a home stereo setup.

MidiVerb 4 2 Ch. Parallel Processor w/Auto Level Sensing

The MidiVerb 4 extends Alesis' line of affordable professional multi-effects processing. It provides the sonic quality and programming power required for studio recording and live sound reinforcement at an affordable price.

- Wide variety of dense, natural-sounding reverbs, rich chorus and flange, versatile delay, rotating speaker simulation, pitch shift, panning and more.
- Auto Level Sensing feature automatically sets your input signal to the optimum level to take advantage of the MidiVerb 4's wide dynamic range.
- 18-bit oversampling digital converters add to the excellent audio fidelity, with a resulting 20 kHz frequency response and a dynamic range over 90dB.
- 128 preset and 128 user-editable programs.
- Mono or Stereo single effects, dual-mono effects, and multi-chain configurations for 2 or 3 effects at once.

QuadraVerb 2 2 Ch. Master Effects w/Digital I/O

Alesis' most powerful signal processor, the QuadraVerb 2 offers the amazing audio fidelity of a high-end dedicated vocal reverb while providing powerful multi-effects capabilities.

- 300 programs (100 preset and 200 user-editable),
- Dctal Processing allows use of up to 8 effects simultaneously in any order. Choose between over 50 different effects types for each block, including reverb, delay, chorus, flange, rotary speaker, pitch shift, graphic and parametric EQ, overdriver and more.
- 5 seconds sampling, triggerd pan, and surround sound encoding are also built in.
- Selectable -10 dB and +4dB levels, servo-balanced TRS inputs and outputs.
- ADAT Digital Interface allows you to work entirely in the digital between the Q2 and an ADAT XT.

MIDI

OPCODE

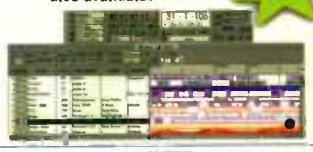
Studio 5 LX
Macintosh MIDI Interface

The Studio 5 LX is arguably the most advanced MIDI interface on the market today. It incorporates a MIDI patchbay, MIDI processor, and SMPTE synchronizer with it's interface functions, all in a 2 rack space unit.

- 15 Independant MIDI ins and outs.
- SMPTE reads and writes all formats– 24, 25/29.97/29.97DF/and 30.
- Network multple units, 240 MIDI channels each.
- 128 patches, unlimited virtual instrument controls.
- 2 assignable footswitch inputs, 1 controller input.
- 8X speed when used with DMS.
- Internal power supply.

Studio 3 & 4 MIDI interfaces, and Vision sequncing software also available.

JUST IN



Mark of the Unicorn products now available.

PROCESSING

HOT!

White instruments

4200A, 4400 & 4700
L-C Series 1/3 Octave Active Equalizers

- The 4200A (active, cut only graphic EQ) and 4400 (active graphic EQ) provide 28 1/3-octave filters on I.S.D. centers from 31.5 Hz to 16kHz. Hand-tuned inductor/capacitor (L-C) resonant circuits provide the ultimate in performance and reliability.
- Better than 108 dB signal-to-noise ratio with no degradation even when filters are used.
- Continuously adjustable high and low-pass filters band-limit unwanted subsonic and ultrasonic noise.
- 3 outputs and powered accessory crossover socket facilitate distribution and level control to three subsystems. (Bi-amp or tri-amp operation with optional 2-way and 3-way plug-in crossover networks.
- The 4200A has a -15 dB control range, the 4400 has a ±10 control range.

The **4700** is similar in specifications to the 4200A/4400 EQs, the difference is that all functions of the 4700 are digitally controlled.

DSP 5024
Digital Signal Processor

- 2 input, 4 output signal processor with 107 dB of dynamic range.
- Crossover can be configured as 2-way, 3-way, 4-way or dual 2-way.
- Adjustments can be performed in frequency 1Hz steps, slope (6, 12, 18, 24 dB/oct.), shape (Butterworth, Bessel, Linkwitz-Riley).
- Parametric filters include boost, cut, high pass, low pass, rising shelf and falling shelf, adjustable in 1 Hz steps, 1/10 dB steps and bandwidth from 1/70th octave to 4.8 octaves.
- Delay up to 680 ms on each output.
- Ten non-volatile memories and presets with password security.
- Remote preset select interface includes PA422.

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STUDIO MONITORS

JBL

Control 5
Compact Control Monitor Loudspeaker

The Control 5 is a high performance, wide range control monitor for use as the primary sound source in a variety of applications. It's smooth, extended frequency response combines with wide dynamic capability to provide acoustic performance that's ideal for recording studios, A/V control rooms & remote trucks.
- 6-1/2" low frequency driver provides solid, powerful bass response to 50 Hz and a pure titanium 1" dome handles high frequency response to 20 kHz.
- Magnetically shielded for use near video monitors.
- Choice of black, gray or white finish.
- A host of mounting systems including ceiling, rack and tripod allow positioning in exactly the right spot.

4200 Series
Near-Field Monitors

The 4200 Series near field monitors come in 6.5"(4206) and the 8" (4208). Both offer exceptional sonic performance, setting the standard for today's multi-purpose studio environment .
- Multi-Radial baffle directs the axial output for optimum summing at approximately 3 to 5 ft.
- Curved surface of the ABS baffle virtually eliminates baffle diffraction distortion.
- Superb imaging and greatly reduced phase distortion.
- Vertical alignment of the transducers across the baffle center produces natural mirror-imaging.
- Pure titanium diaphragm high frequency transducer provides smooth, extended response.
- Magnetically shielded for use near video monitors.

6208
Near-Field Monitors

An internally bi-amplified near field studio monitor, the 6208 provides excellent reference in a small, portable package. It combines optimized electronics with an 8", two-way speaker system on a Multi-Radial baffle that aligns acoustic centers of high and low frequency transducers. The transducers are magnetically shielded to allow safe placement near sensitive equipment such as tape recorders and video monitors.
- XLR or 1/4" inputs are compatible with both -10 dbV and +4 dBu nominal operating levels.
- 2.6 kHz electronic crossover with discrete circuitry.
- Low feedback design, with no slew rate limiting and extremely low distortion.
- 8", low frequency transducer delivers a long, linear excursion resulting in a smooth extended bass output with low power compression. It is coupled to a one inch titanium diaphragm, high frequency transducer with patented "diamond pattern surround" exhibiting flat response, +/-2 db from crossover point to 20 kHz.

MIXING BOARDS

BEHRINGER

EURODESK MX 8000
24 Channel 8-bus Console

- 48 input channels with dedicated EQ, Mute, Pan, & Level.
- Channel, Subgroup, and Mix insert points.
- Direct Outputs, 24 balanced tape ins/outs.
- 4 band EQ with sweeps.
- 6 Aux sends, 6 stereo Aux returns w/extensive routing.
- Optional **MB-8000** Meter-bridge.
- Optional Cybermix automation software for Windows.

MACKIE.

CR-1604 VLZ
16-Channel Mic/Line Mixer

A hands-down choice for many major touring groups and studio session players as well as broadcast and sound contracting. The CR-1604 VLZ features everything you would expect from a larger console, and then some!
- 24 line, 7 AUX, 3-band EQ w/ mid sweep, 10-segment LED output meter.
- 90 dB S/N and 108 dB dynamic range.
- 16 studio-grade, phantom powered mic preamps.
- AFL/PFL solo & mute w/ overload and signal indicators.
- Rear panel features 1/4-inch/ XLR connectors, inserts on every channel, and RCA tape inputs/outputs.
- Rotary I/O "pod" allows3 different positions for set-up.

MS1202VLZ and MS1402VLZ *IN STOCK!*

The new MS-1202, 1402 and 1604 all include VLZ (Very Low Impedance) circuitry at critical signal path points. Developed for Mackie's acclaimed 8•Bus console series, VLZ effectively reduces thermal noise and minimizes crosstalk by raising current and decreasing resistance.

TASCAM

M-1600
16/24 Channel 8-bus Console

Great for modular Digital Multitrack setups and hard disk recording, the M-1600 is part of Tascam's next generation series of recording consoles. It features multiple option for inputs and outputs and uses the same, easy to install D-sub connectors as Tascam's more expensive console, all in a compact design.
- XLR Mic inputs w/phantom power on 8 channels.
- Signal present/overload indicators on each channel.
- Balanced/Unbalanced tape returns and Balanced Group/Direct outputs using D-sub connectors.
- TRS Balanced Line Inputs on all channels.
- 3-band EQ with sweepable mids.
- 5 Aux sends (1 stereo)
- 4 assingable aux returns.
- Perfect for use with DA-88 and ADAT setups.

Digital Multi-Track Recorders

TASCAM DA-88

- Hi-8mm tape format.
- ATF system ensures no tracking errors or synchronization loss on up to 16 cascaded decks.
- 16-bit D/A, selectable 44.1 or 48KHz .
- Flat 20Hz to 20KHz, 92dB dynamic range
- Seamless Punch-in and out, for programmable digital crossfade and insert.
- Individual track delay for special effects and timing correction.

SONY
PCM-800 Digital 8-Track In Stock!

ALESIS **adat *xt***

S-VHS DIGITAL

The ADAT-**XT** sets the standard in modular digital multitrack recording. The ADAT-**XT** operates up to four times faster than the original ADAT and offers an intelligent software-controlled tape transport as well as provides onboard digital editing and flexible autolocation.
- IncludesLRC remote control with transport and locate functions
- Advanced transport software continuously monitors autolocation performance.
- 56-pin ELCO connector operates at +4dB and -10dB
- Built-in electronic patchbay
- Flawless copy/paste digital edits between machines or within a single unit.

STUDIO MONITORS

ALESIS

Monitor 1
Near Field Reference Monitors
- 6.5" low frequency driver provides excellent image and transient reproduction, powerful bass, and smooth, extended high frequency detail.
- Exclusive SuperPort speaker venting technology eliminates the "choking" effect of port turbulence for solid high-power bass transients and extended low frequency response.

Monitor Two
Mid Field Studio Reference Monitors

Today's popular music demands more bass at louder volumes than a small near field monitor can possibly produce, the Monitor 2 delivers.
- 10" three way speaker design with a unique asymmetrical crossover to maintain the same accurate tonal balance and imaging of the Monitor One—but with a much larger sound field.
- 5" mid frequency driver offers exceptional mid frequency detail
- 1" silk dome high frequency driver delivers a broad but natural frequency response from 40Hz to 18kHz.
- Covered in a non-slip rubber finish, the Monitor Two comes in a mirror imaged pair for mixing accuracy.

Point Seven

NEW PRODUCT

- Shielded reference monitor.
- Front ported venting system for great bass response.
- 50 watts RMS– 100 watts peak @ 4Ω.
- 85Hz–27kHz, ±3dB.
- 2kHz crossover for accurate phase and a wide "sweet spot" for mixing.
- Accurate flat sound reproduction.
- Great for studio and multi-media applications.

TANNOY

PBM Series II
Near-field Reference Monitors

The PBM II Series is the industry standard for reference monitors providing true dynamic capability and real world accuracy.

PBM 5 II
- Custom 5" injection-molded bass driver
- Woofer blends seamlessly with the 3/4" polymide soft dome ferro-fluid cooled tweeter providing extended bandwidth

PBM 6.5 II
- 6.5" lowfrequency driver and 3/4" tweeter
- Fully radiused and ported cabinet design reduces resonance and diffraction while providing deep linear extended bass.

PBM 8 II
- High tech 1" soft dome tweeter and 8" driver capable of powerful bass extension under high SPL demands.
- Hard wired crossover features true bi-wire capability.
- Full cross-braced matrix medite structure virtually eliminates cabinet resonance as a factor.
- Ensures precise low frequency tuning by incorporating a large diameter port featuring laminar air flow at higher port velocities.

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PORTABLE DAT RECORDERS

TASCAM
DA-P1

- Rotary 2 head design and 2 direct drive motors.
- XLR mic/ line inputs (w/phantom power)
- Analog and S/PDIF (RCA)digital I/O
- 32/44.1/48kHz sample rates & SCMS-free recording.
- Built in MIC limiter and 20dB pad
- TRS jack w/ level control for monitoring
- Includes shoulder belt, AC adapter, & battery.

HHB
PDR1000/PDR1000TC

- 4 head Direct Drive transport
- Balanced XLR mic and line analog inputs and two RCA analog line outputs. Digital inputs and outputs include S/PDIF consumer (RCA) and AES/EBU XLR
- Left/Right channel mic input attenuation selector(0dB/-30dB)
- 48v phantom power, limiter & internal speaker.
- Illuminated LCD display shows clock and counter, peak level metering, margin display, battery status, ID number, tape source status and machine status.
- Nickel Metal Hydride battery powers the PDR1000 for two hours, AC Adapter/charger included.

PDR1000TC Additional Features:

- All standard SMPTE/EBU time codes are supported, including 24, 25, 29.97 (drop frame and non-drop frame) and 30 fps.
- External sync to video, field sync and word sync.

STUDIO DAT RECORDERS

FOSTEX
D-25/D-30

- Pro DAT master recorder featuring confidence monitoring and insert editing with a 4-head transport.
- Sync functions include the ability to chase sync to a master timecode. Resolves to WORD/VIDEO/DAT frame signal + WORD.
- Independent left/right recording.
- Scrub from tape or buffer, Jog/ Shuttle 1/2X to 16X.
- SMPTE/EBU TC generator/reader
- On board chase/lock sync, RS-422 slot.
- 4-head 4-motor transport.
- 16 MBit RAM bufferforinstant Start & Edits.

D-30 Additional Features:

- Large, high resolution backlit LCD display which shows all parameters at a glance
- Intuitive menus from 10 dedicated soft keys
- 2/ RS-422 ports for added flexibility.

FOSTEX D-15 TimeCode DAT NOW AVAILABLE!

Panasonic.
SV-3800/SV-4100

The SV-3800/SV-4100 feature highly accurate and reliable transport mechanisms with search speeds up to 400X normal. Both use 20-bit D/A converters to satisfy the highest professional expectations. The **SV-4100** features instant start, program and cue assignment, enhanced system diagnostics, multiple digital interfaces and more.

Roland

A-90EX Master Controller for the Next Century

The A-90EX is an 88-note, weighted master controller with the best keyboard action currently on the market—bar none. It offers incredibly realistic piano sounds, powerful controller capabilities and 'virtual' programmable buttons which can be configured to operate your software and other devices. The A-90EX combines the majestic sound of a concert grand, the expressive action of a fine acoustic keyboard and the comprehensive MIDI functions of a master controller—all in a portable stage unit.

Keyboard Controls

- Master Volume Slider and Global Transpose features allow you to send control commands to your entire MIDI setup without changing the balance between connected units.
- Sequencer Control Section lets you control song selection, tempo and other parameters quickly.
- The keyboard can be split into eight zones and features 20 different controls and connectors.

Superb Sound

- 2 types of stereo-sampled grand pianos, various acoustic and electric pianos (including a great classic Rhodes).
- 128 patches selected from Rolands extensive "JV" and "JD" series library.
- 64-voice polyphony. Built in effects

Extensive Performance Configurations

- Stores up to 64 Performances,(128 w/optional M-512E card) which may consist of up to 4 preset Patches along with various user-configurable parameters such as zone, effects, and MIDI channel.

88 Key Keyboard

- Proprietary 88-note hammer-action, velocity sensitive keyboard w/aftertouch offers the natural resistance and rebound of an acoustic piano and control of a synth.

JV-2080 64-Voice Synthesizer Module

JUST IN

Roland resets the standard with the incredibly expandable JV-2080 64-Voice Synthesizer Module. This amazingly powerful package offers unprecedented expandability, digital signal processing, and remarkable operational ease, all housed in a 2-unit rack-mount design

Features

- 64-Voice polyphony / 16-part multitimbral capability.
- 8 slots for SR-JV80 series expansion boards.
- 3 independant effects sets plus independant reverb/delay and chorus.
- 64-Voice polyphony/16-part multitimbral capability.
- NEW patch finder and Phrase Preview functions for easy access to the huge selection of patches.
- Large backlit graphic display
- Compatable with the JV-1080, XP-50, and XP-80.

NEW SR-JV80-10 "BASS & DRUMS" EXPANSION BOARD NOW AVAILABLE!

DM-800
Digital Audio Workstation

A compact, stand-alone multi-track hard-disk recorder that provides an amazing array of features at an unbelievably low price. Used music production, post production and broadcast, it performs all digital mixing operations from audio recording and editing to rotation track-bouncing and final mixdown. It supports SMPTE and MTC and features a built-in Sample Rate Resolver for sync with any time code.

NEW PRODUCT

VS-880 V-Xpanded
Digital Studio Workstation

The VS-880 V-Studio Digital Workstation, is now even more versatile with the release of the VS-880 V-Xpanded. This new version incorporates powerful additional functions that allow you to get the most out of the VS-880's incredilbe creative potential.

NEW FEATURES

Mixer Section

- Auto Mixing Fuction records and plays back song data in realtime including fader movements and panning positions. No external sequencer is required.
- Easy recording with an inserted effect in "INPUT-TRACK" mode.*
- Process the master output with a specific inserted effect such as total compression.*
- Scene change by MIDI program change message.

Recorder Section

- Simultaneous playback of 6 tracks in MASTER MODE recording.
- Digital output with copy protection.

Effects Section*

- 10 additional effect algorithms (30 total) including Voice Transformer, Mic Simulator, 19-band Vocoder, Hum Cancelor, Lo-Fi Sound Processor, Space Chorus, Reverb 2, 4-band Parametric EQ, 10-band Graphic EQ, and Vocal Cancellor.
- 100 additional preset effects patches.
- Effect change by MIDI program change message.
- Effect edit by MIDI control change message.

And More...

- Additionally, over 20 powerful and convenient features in editing/sync sections have been added.

The functions marked * require the optional VS8F-1 Effect Expansion Board

VS-880-S1 SYSTEM EXPANSION KIT

Current owners of the VS-880 now enjoy unprecedented support from Roland with the release of this System Expansion Kit. Supplied on a ZIP diskand including a new owner's manual, the VS-880-S1 will provide current version users with all of the benefits of the VS-880 V-Xpanded at a fraction of the cost.

HARD DISK RECORDING

ATTENTION MAC USERS–

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SOUNDSCAPE
DIGITAL TECHNOLOGY LTD.

SSHRD-1
Hard Disk Recorder/ Editor

A professional Multitrack Digital Audio Workstation for the PC, the SSHDR1 combines the highest quality processing hardware with easy-to-use Windows-based software for the most complete and affordable solution for high quality digital audio recording and editing on the PC. The SSHDR1 has over 50 powerful editing tools and is expandable from 8 to 128 tracks, with up to 32 inputs and 64 outputs. Ideal for a wide range of applications ranging from, recording music in project studios with an 8 track system, to multiple unit 32, 48 and 64 track systems used by major TV and film studios for audio post productionlinked to video.

- All audio processing, disk handling and sync. is carried out by the powerful DSP in the hardware, so any PC can be used. Even a 386!!!
- Up to 64 virtual tracks all with Move, Copy, Trim, Slip, Solo, Repeat, Delete, Cut, Glue edit functions.
- Solo/Multi-track audio scrubbing, 999 named markers
- Realtime fade In/Out (8 selectable curves).
- Automated Punch In/Out, Volume contouring.
- All SMPTE formats, including 29.97 and 29.97 DF.
- AV file support w/full sync. (Req Video forWin.V1.1).
- Optional EDL File support w/full auto conform via RS422.
- Volume and Pan controls, assignable fader grouping.
- Reverse/Phase Invert/Compute tempo.
- Optional Time Module features Time stretch/Time compression Pitch shift and Sample rate conversion.
- 8 physical output channels, selectable for each PART
- Non-destructive sample-resolution editing.
- Cycle record mode with stacked TAKES and pre-roll (like analog multi-track tape recorders)
- **AND MUCH MORE...**

FOSTEX
DMT-8 VL

JUST IN

The latest in the Fostex HD recording family, the DMT-8 VL truely brings the familiarity of the personal multi-trac to the digital domain.

- 18 bit A/D, 20 bit D/A conversion.
- 8 channel mixer, CH. 1&2 feature both mic & line level
- 2 band EQ and 2 AUX sends per channel
- Cut/Copy/Move/Paste within single or multiple tracks.
- Scrub from tape or buffer, Jog/ Shuttle 1/2X to 16X.
- Built-in MIDI Sync., 6 memory locations.
- Dual function Jog/Shuttle wheel provides digital "scrub" without pitch change.
- Divide the drive into 5 seperate 'virtual reels" each with it's own timing information.
- **NO COMPRESSION!**

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LA-2A LA-3A OWNERS

Before you by a new T4B optical attenuator, have it rebuilt at a fraction of the cost. Also stock OPTO's.

ANTHONY DEMARIA LABS
914-256-0032

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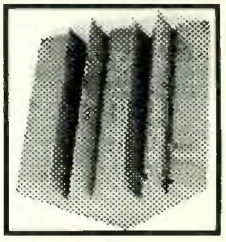

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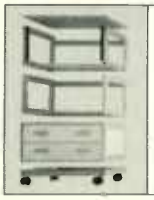

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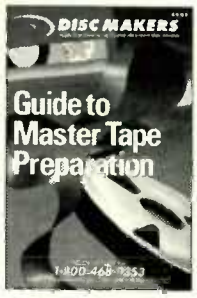

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World Radio History

Fly Me To The Moon

...Just not through LAX

BY MARTIN POLON

One of the more fascinating gigs that can come your way in the personal and project recording universe is the "remote" recording session that is out of town. There is a certain "cachet" to both bringing somebody in and being the somebody brought in. None of this matters to the individuals who work at the various airports of the world. If you are air traveling attached in any way, shape, or form to remote recording gear, you are guaranteed to make even the most competent airport security worker paranoid!

There are several givens of air travel with recording gear in 1997 that need to be expounded upon:

1. Since the TWA flight 800 disaster (NYC-Paris), the level of apparent security is higher than it has ever been. The word "apparent" is used because the real level of security is little improved from before the TWA incident, and it was not very good at that juncture. Do not take my word for this; watch one of the TV network news magazine shows that focus on airport security and observe the minimum-wage personnel who are not under the control of sworn city, state, or federal police agencies entrusted with airport security.

These skyward "rent-a-cops" work for the airlines, and it is clear both from numerous experiences that we all have had at passenger security gates and from print and TV journalistic scrutiny that the airline's financial bottom line is the number one issue at work. In short, rocket scientists need not apply for employment as airport security specialists.

2. Checking your recording gear as luggage is high risk. The old suitcase commercials you may remember from your misspent youth showing gorillas banging suitcases around their zoo quarters are closer to the mark than you might think. Many individuals who move their necessary electronic tools via baggage have learned to use nondescript cases with extraordinary padding and survival strength — and especially not to mark the cases as fragile. The feeling amongst most recording engineers is that the less said, the better. In addition, much of today's checked luggage is being x-rayed today, and that could end up with your bag being forced open for "inspection" — and even left behind as your flight takes off!

The airline will not — in the best of cases guided by the "Warsaw Convention" of 1947 — refund your replacement costs. That convention is an agreement as to how little the airlines have to give passengers back on the occasion of loss. The amount is limited by numerous court actions testing the convention and it cannot exceed $1500 except in very special circumstances. If the airlines know that you are attempting to send delicate electronics equipment in that way, they may well give you a special baggage tag that absolves them of any responsibility at all.

Checking your recording gear as luggage is high risk.

3. If you have miniaturized your portable recording suite to the point where it can travel as carry-on luggage, your biggest problem will be surviving the tender mercies of the security and x-ray inspection area. The current practice requires you to open and unpack everything you have that could be remotely construed as being part of some nefarious infernal machine. Incidentally, do not use these or other similarly large words in dealing with security personnel.

4. Understand that gate inspection technicians, as they are sometimes called, have to examine thousands of pieces of carry-on luggage and deal with an equal number of unhappy souls. Ditto to being pleasant. You may indeed be flying to Washington, D.C. to record the musical evening for the President and Mrs. Clinton, but unless they have sent Air Force One to pick you up (which is highly unlikely), you have no clout with the airport security guards! It does not cost much to be nice. One other point. Frequently, as revealed by the network news shows, some of the individuals at these security gates are both minimum wage and non-fluent English speakers. They may not understand what you do or what your equipment is. Be pleasant; it is really the only tool that you have to survive the experience.

What you can do to make the experience of air travel with your equipment a successful one:

A. Do not send your equipment by checking it as baggage or as carry-on luggage at all. Consider renting from a qualified audio rental house or renting dealer at your destination. If your equipment is damaged, held back, or confiscated, or if you miss your flight, the advantage of having your own gear at the gig quickly pales!

B. Use Federal Express (FedEx) or United Parcel Service (UPS). Their jet delivery services use their own planes and crews. Their cargo handlers are amongst the most professional in transportation. Your precious recording equipment will not disappear only to be found in Irkustk, Siberia three weeks hence. Your equipment can either be delivered to the location of the session, your hotel, or held for pick-up at an nearby regional FedEx or UPS center. As to cost, it can be built into your session fees. And you can purchase insurance on your equipment from FedEx or UPS that will cover the full declared value of your gear!

C. If you must do carry-on, keep a small portable amplifier/speaker unit with your gear, such as the one sold by Radio Shack that fits into the palm of your hand. With it, you can demo your gear at the security check point, if you have to prove that it does what you say it does. And it is a handy tool to troubleshoot with once you get to your destination.

Fly safe, fly happy...plan ahead! EQ

World Radio History

ACROSS THE BOARD

continued from page 146

5. Admit To *EQ* Magazine, Yourself, And Another Human Being The Exact Nature Of Your Wrongs. Humility is the underlying thought in these 12 steps. Know that it is OK to let go and rely on *EQ* magazine to lead you down the right path.

6. Be Entirely Ready To Have *EQ* Magazine Remove All Of These Analog Defects In Your Character. This step is to remind us that we can't do it by ourselves. We must not cling to the old worn out images of our lives.

7. Humbly Ask Help To Remove Your Shortcomings. Find the strength and hope of others who have taken the steps before us. Place ads in *EQ* magazine to get rid of all of our analog gear to those who are as yet unsuspecting of their situation.

8. Make A List Of All People You Have Harmed And Become Willing To Make Amends To Them All. We selfishly combined vocals to save tracks. We made bad punches that we had to cover up with percussion or effects.

9. Make Direct Amends To The People We Have Wronged. Offer to transfer their analog tapes to digital before they deteriorate even more. Offer them discount rates to record on your new digital gear. You are on your own. You are ready to apply your new knowledge.

10. Continue To Take Inventory, And When You Are Wrong, Admit It. Are you still coveting your neighbor's Echoplex? Never be selfish or condemning of others. Don't avoid facing responsibilities.

11. Seek To Improve Contact With Higher Authorities. Strive To Maintain The Right Direction In Your Life. Write to *EQ* and tell them what you need to have discussed. Remember that going it alone for so many years has brought you much trouble and frustration.

12. Having Had A Digital Awakening As A Result Of These Steps, Carry This Message To Others. Give your presence and encouragement to that new person. Remember, what you do speaks louder than what you say.

Living my new digital life by these 12 steps has helped tremendously. Let me know how it works out for you. I have to go now, I found a new 12-step meeting for people addicted to restoring '65 Mustangs. Maybe someone there has some gear shift linkage he won't be needing anymore. EQ

VIPER ROOM

continued from page 94

Room offers a healthy bunch in the FOH rack. For compression and gating, there's a Klark Teknik DN514 quad gate and DN504 quad compressor, as well as two dbx 166 compressor/gates, a Yamaha SPX990, Lexicon Alex, and a Sony DAT machine for recording the show. Speaking of recording the show, the Viper's vision was to have provisions for tie lines whereby a broadcast truck could park outside at the back of the club and record the gigs. So there's a transformer-isolated split to feed microphone signals to a recording console without any interface aggravation (it is also interesting to note that the club simultaneously broadcasts and records shows on the Internet, giving the Viper Room worldwide recognition).

Among the microphones made available by the club to visiting bands are six Shure SM58's and four '57's, four Electro-Voice 408's, two Sennheiser MD409's and three MD421's, two E-V RE27's and four E-V 857's, as well as Klark Teknik and Countryman DIs. Frank O'Reilly and Joe Stella's advice to visiting engineers? "The most important thing in a room this small is to get bands to turn down the level to a point where you can actually use the system!" EQ

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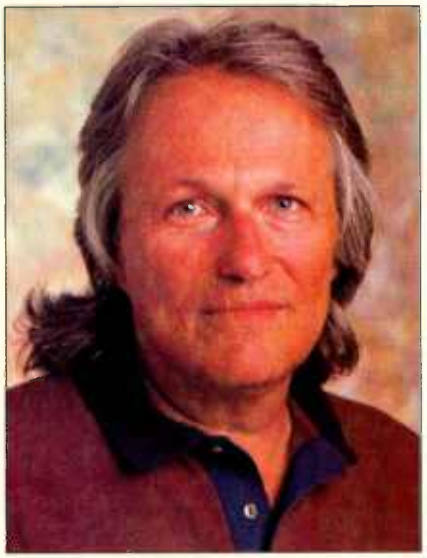
ADATs and AA

Is there an Analog Anonymous meeting near you?

BY ROGER NICHOLS



In the last few issues there was voiced a concern about the transfer of tapes between ADAT-XT machines and the original ADAT recorder. I was concerned and decided to check it out myself.

The difference between the two units is in the absolute polarity of the analog audio I/O compared to the digital audio stored on tape. Both the ADATs and ADAT-XTs by themselves exhibit absolute polarity from analog input to analog output. The original ADAT inverted the analog signal before conversion to digital, and inverted the analog signal again after conversion back from digital. The ADAT-XT performs no inversions.

If you have your ADAT or ADAT-XT connected digitally to Pro Tools or a Yamaha 02R, then there is no difference between the ADAT and the ADAT-XT. Positive is positive is positive. And I'm positive about that. If you record through the analog converters on the ADAT and then transfer digitally to Pro Tools, then the signal will be inverted because of the flip while the signal was analog. If you use external converters for in and out, then there is no problem either.

If you record a tape on an ADAT-XT and play it back on an ADAT, the absolute polarity of the output will be inverted. This makes no difference to the way the audio sounds, except for critical listening to things like the kick drum, where you may, or may not perceive a difference. (For this discussion I am ignoring any minute differences between the old and new digital converters.) There is, however, one instance where this difference will bite you.

If you have a mixed system of old ADATs and ADAT-XTs, you could get into a situation where you have a stereo image with the left channel on an ADAT and the right channel on an ADAT-XT. As long as you remain in this environment, everything will be fine, because the absolute polarity of both machines is positive in, positive out. If you then take the tapes and play them back on a multi-ADAT system that consists of all ADATs or all ADAT-XTs, then the left and right stereo tracks that spanned machines will be out of phase with each other. With multiple tracks of drums, for instance, if most of the tracks are on one machine and only one or two tracks are on the other type of machine, then the reason may go unnoticed with the overall impression of sucky-sounding drums.

The easiest way to avoid the problem is to invert the phase of the signal connected to the ADAT if you have a mixed system. Just pretend that the ADAT is pin-2 hot and the ADAT-XT is pin-3 hot (when using the ELCO connectors). Now the data on tape will be exactly the same polarity and everything will work out fine.

Here are the 12 steps as they relate to those who cannot stop recording analog, and have the desire to seek help.

Now for the real reason for this month's column.

A 12-STEP PROGRAM FOR ANALOG ADDICTS

There are 12-step programs for everything. Twelve-step meetings can be found in every town at all hours of the day and night. I even heard that there is a 12-step program for people who are addicted to 12-step programs.

Every once in a while I relapse and record analog, as I did a few months ago with the Swamp Honkys. We can't do it alone. We need the support of others. Here are the 12 steps as they relate to those who cannot stop recording analog, and have the desire to seek help:

1. **Admit That You Are Powerless And Your Life Has Become Unmanageable.** Your studio is strewn with analog patch cords. Many of your cables have the ground cut at one end to attempt to prevent ground loops. Half of the gear is balanced, the other half is unbalanced. Some gear is +4 while other gear is –10.

2. **Believe That A Greater Power Can Restore You To Sanity.** If you can admit that you believe there is a way out, then you are on your way from step one.

3. **Make A Decision To Turn Your Will And Lives Over To Those Who Know, And Trust Them.** Find a sponsor, someone who has already turned away from the analog way of life.

4. **Make A Searching And Fearless Inventory Of All The Analog Gear In Your Lives.** Say to yourself, "As I see it, my shortcomings may be due to confusion, fear, and uneasiness." You are under pressure from your analog friends and you can't see how badly you are reacting.

continued on page 144

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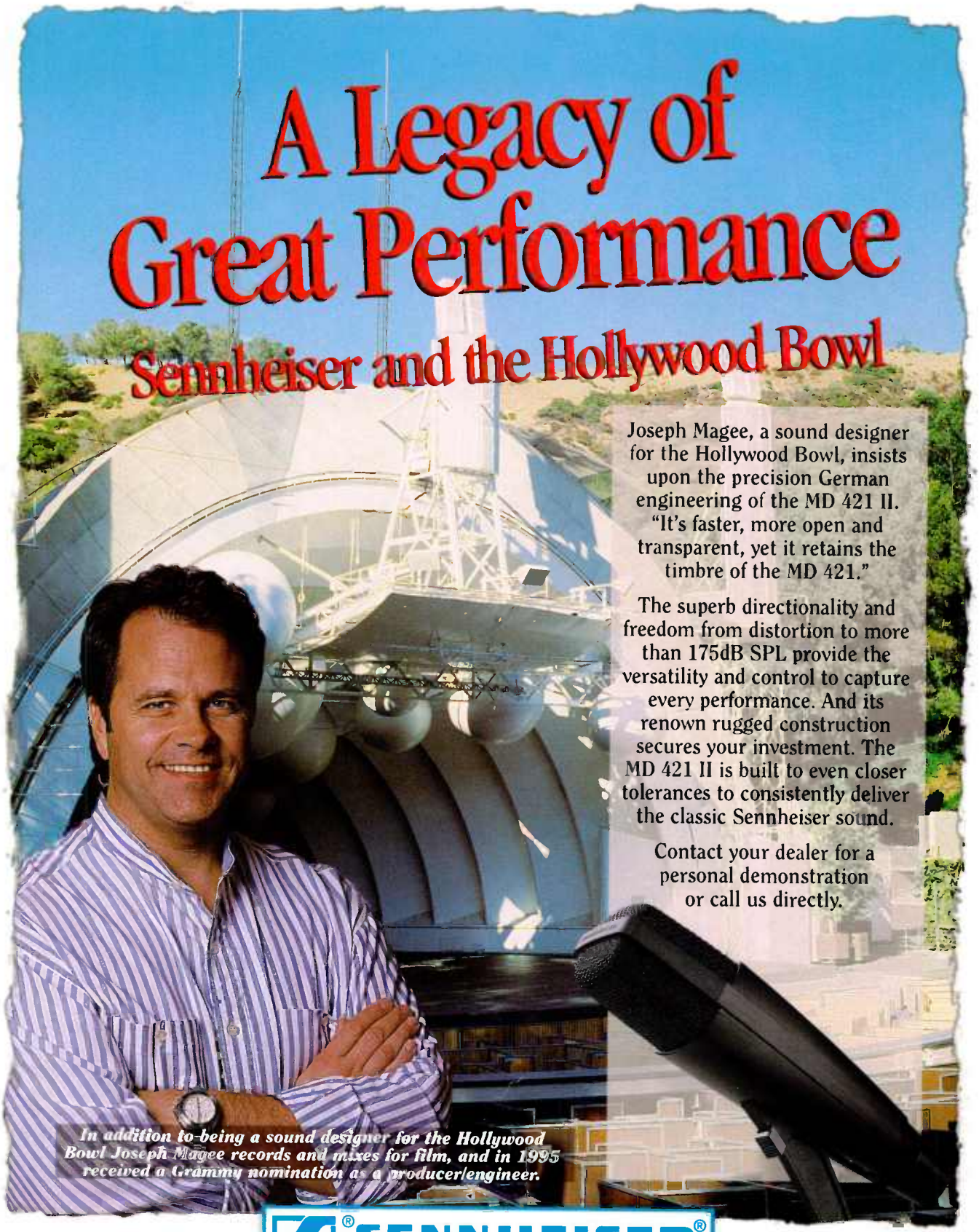

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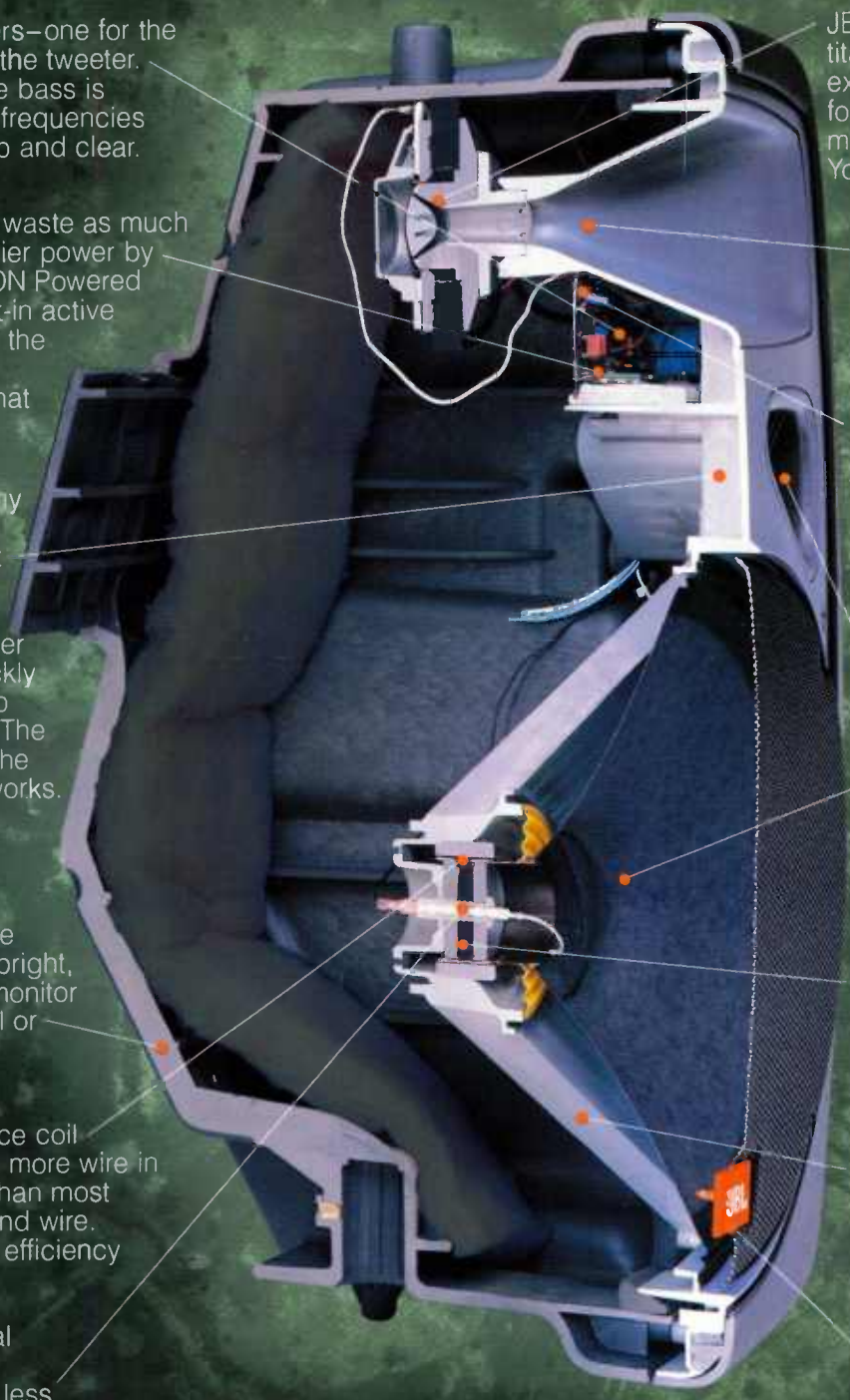

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