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## 1. You want accessibility.

There are over 30,000 ADATs in use all around the world! Chances are, you already know of someone who has successfully recorded projects on ADAT.

## 2. You want dependability.

ADAT uses eight discrete tracks. You won't have to worry about losing that great lead vocal when recording on a neighboring track. *Other digital formats re-record adjacent tracks, even in safe mode!*

## 3. You want superior engineering.

The ADAT MultiChannel Optical Digital Interface™ is now a patented technology. There's no clearer choice for groundbreaking digital recording.

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## 5. You want compatibility.

The ADAT Group™ of third-party manufacturers continues to develop products that set the standard in their class. Digidesign, Fostex, Apogee, Roland, Korg, J.L. Cooper, Steinberg/Jones, E-mu, EMagic and dozens more have all signed on and are making great use of ADAT's proprietary interfaces.

## 6. You want the best audio quality.

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## 7. You want cutting-edge technology.

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## 8. You want affordability.

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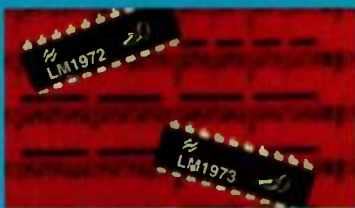
CIRCLE 23 ON FREE INFO CARD

World Radio History



# EQ

PROJECT RECORDING  
& SOUND TECHNIQUES  
VOLUME 5, ISSUE 7  
AUGUST 1994



## FEATURES

### EQ LIVE SUPER SUMMER SPECIAL

Attention gigging musicians! The season of touring is here and to celebrate, *EQ* presents this 45-page special live-sound section. Here's what you'll find:

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Cover: Bryan Adams by Mitch Gerber.  
Steve Albini by Steve Kagan.  
World Radio History







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Even among pros, there are times when your talent exceeds your budget. That's why we created the new AKG C3000. It has the warmth, clarity and character of the most popular AKG studio mic in the world — at about half the price. In fact, when you hear it you'll be amazed what a large, gold-coated diaphragm will do for your sound. The C3000 gives you all the quality of an AKG without having to pretend it's an AKG. It is.



*Bean, from D'Uickoo, whose new "Umoja" CD is on RGB Records.*

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## LETTERS TO EQ

### ME & MS. JONES

I read with great interest your article on Leslie Ann Jones in the May issue. I had the pleasure of working with her in the late '70s at the Automatt and learned an incredible amount about engineering from her. She (and Fred Catero) took the time to answer any questions a young engineer had and I'll always remember that. Leslie is an excellent role model for any aspiring engineer. By the way, she is a bit modest when she says she has a good sense of humor — she has a *great* sense of humor.

*Bill Hosch  
Bernhard Brown, Inc.  
Dallas, TX*

### NEW WORLD ORDER

I was glad to finally see an article regarding women in audio that did not gloss over or deny the existence of sexism. Women are encouraged to deny sexism or they risk being seen as complainers or whiners. The shifting of power and control is an important societal issue. Those who have power, status, and the inside track don't necessarily want to "share" it.

There is nothing genetic that makes men good engineers, producers, or musicians. They do have role models, opportunity, and encouragement. Women working in the field are oddities. They must prove themselves "better than" right from the start.

I encourage those who are truly brave to challenge themselves to confront their own racism and sexism.

*Eileen Krause  
Chicago, IL*

### CAUGHT US

The April issue of *EQ* contained information on the release of CMCI's new Oracle Wireless Monitor System in the *EQ Live* section. Owing to what we're sure was a printing error (*Um, yeah, that's what happened — Ed.*), the Oracle was credited with the ability to tune any of "116 UHF frequencies," when in fact the Oracle can tune to any of "16 UHF frequencies." We consequently flogged our engineers for a full 48 hours in an attempt to comply with *EQ's* specification but, alas, we have become convinced the ability to tune 16 channels of wideband stereo FM is quite an impressive design achievement in itself!

We would, however, like to assure *EQ* readers that when and if a wireless monitoring system *can* be produced with the capability of tuning 116 channels, CMCI will likely be responsible.

*Larry D. Droppa  
President  
Circuits Maximus  
Company, Inc. (CMCI)*

### MULTIMEDIA MAN

First, thanks for giving some attention to the growing world of multimedia in your excellent magazine. But after reading Murray Allen's "Audio For Multimedia" article [April 1994], some corrections are in order. He makes it sound hard to get into doing music and sound effects for multimedia projects. According to him, you have to be an "all-in-one" person. Well, it isn't that hard, and you don't have to know everything.

Murray describes a system where you use an emulator to "stream" music data from a sequencer to the target machine. This is approximately the same system we use here (created by the same person as EA's), but this is not where the big market is. If you want to do music/sfx for platforms like Super Nintendo, Sega Genesis, Atari Jaguar, and Sound Blaster-type PC-sound cards, an emulator is highly recommended. But here comes the cool part: to make the music sound really good on any of these systems, you have to know the hardware 100 percent. You can't ask this from a contractor who's been doing film-scoring all his life. Also, it's not too much fun to restrict yourself to five or six voices only, after you've become used to hundreds of voices from your synth or orchestra. Don't get me wrong, I still love to squeeze everything I can out of these limited machines, but I don't know of too many people who do. If you're interested in

### CORRECTIONS

In the "Women In Audio" feature, the picture that we ran of Laurie Spiegel was not of Laurie Spiegel. It was of Judy Lugacz, owner and one of the original founders of Olivia Records, the original all-woman record company. Also, in the "Sample Rate Perversion" article, Alesis' AI-1 I/O format listing in the lower chart should have read 1, 2, 3, 4.



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INNOVATION AT WORK.

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this, please read my article in *Keyboard*, November 1992.

The big market lies in Redbook music, General MIDI music, and sound effects. Other big gaps are postproduction needs and persons to do good ADR voice-editing work (there are too many companies out there who, despite thinking they can charge an arm and a leg for converting files to lower bit- and sampling-rates, still do a very poor job). Even though software companies will convert your Redbook music for some games to 22k and 11k, 8-bit mono for PC, and 22k 16-bit mono or stereo for 3DO, it's still music that you can do yourself. There is no additional knowledge required besides what you know about movie scoring.

Also, there are still many PC games that rely upon sound cards for music and sound effects reproduction (even CD games). Approximately 90 percent of our games still require music to be composed for sound cards. The rest have Redbook music. If you've been doing music on a Roland MT-32 or SC-55 (RAP 10) for years and are able to squeeze the most out of it, you're perfect for doing

music for PC games. By the way, if you are good at doing CD-quality music and sound effects of good General MIDI music, let me know; we're always looking to hire new talent.

Charles Deenen  
Audio Director  
Interplay Productions

## PEOPLE PERSON

Where have you been hiding Eddie Ciletti these past few issues? His stuff is great! He writes clear, intelligent, forthright articles that even I can understand. I really enjoyed the article on surround sound. I have modified my own project studio as per his design, and it's great! I now have a subwoofer in the front mix, along with two rear L-R speakers. It's given new life to a tired boring system. In addition, the mixes are still valid and retain their integrity on other monitors.

With guys like Anderton, Nichols, and Ciletti, you folks are on the edge of a new golden age of audio journalism. Your people have the right com-

bination of vision, talent, and explanatory skills. It's too bad we lost Len Feldman, but you have the key players to keep the ideas flowing.

Joe Hannigan  
Weston Sound  
Philadelphia, PA

## DAT DEBATE

In the "Across the Board" column in the May issue, Roger Nichols states: "Never try to use audio-grade DAT tapes for computer backup. I guarantee that you will never see your data again."

Well, I hate to disagree with anything Roger says, but I have been using Maxell D-120's to back up our computers since August '93. Every night we do an incremental backup using Retrospect and a Sony drive, and usually get four or five days' work onto each tape. We restore regularly — probably two or three times a week — and I have never had one problem with these tapes.

Dane Tate  
Irving Productions  
Tulsa, OK

# CONTROL FREAK



The DC 24 is the first dynamic controller with a built-in 24dB/octave crossover to allow separate dynamic control of high and low frequencies. This *bandsplit dynamic processing* delivers tighter control more transparently than conventional compressor/limiters. It reduces "pumping," "breathing" and other annoying side effects that can result from a single side-chain trying to accommodate both high- and low-frequency demands simultaneously. The DC 24 gives you the choice of re-combining the split program to a single output for studio/broadcast applications, or leaving the highs and lows separate for biamped live sound performance.

And with separate, individually controlled stereo ServoLock™ limiters, stereo compressors and stereo noise gate/expanders — that can all operate simultaneously — the DC 24 provides a degree of transparent dynamic performance that is simply not possible with any other controller on the market.

But then what else would you expect from Rane?

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# What do you like best about your DA-88?

"Built-in headroom. It makes a big difference when you're trying to track quickly."

"The TASCAM unit is clearly more dependable."

"I like having the A/D and D/A converters on an interface card because you can drop in a new card without having to disassemble the whole machine."

"MIDI syncing is so easy and clean. It's hard to know where the virtual recording ends and the taped recording begins."

"I've had a lot of experience with TASCAM... the dependability and the value. It was a no risk investment for us."

"With the sync card it's so easy to synchronize our audio both to video and other audio reels, including our DAT reels."

"Bouncing. I can bounce forever, it seems. The DA-88 just doesn't distort like other digital decks."

"It sounds great. Especially in the upper frequencies."

"The 108 minutes of recording time means we can do something we never could before — get an entire performance on a single piece of tape."

"The sync card has built-in SMPTE, video sync and Sony 9-pin. Perfect for our video house."

"Our DA-88 ended up in a pile on the floor after the earthquake. I put it back together, turned it on, and it worked fine. It's earthquake proof."

"We really like the convenience of the Hi8 format. You don't get tape stretch, you get much more time per tape, and it's really cost-effective."

"The Hi8 format is a superior recording medium, and it's a TASCAM."

"I can't help but notice the difference in the sound. Unbelievable."

"It's trouble free. All I have to do is clean the heads. I'd call it the stress-free modular digital multitrack!"

"It locks up a helluva lot faster than our other digital multitrack recorder."

"I needed over an hour and a half recording time. The DA-88 is the only digital recorder to offer that."

"The frame accuracy is so fantastic, I can edit voice-overs and guitar parts as small as two frames using the Absolute Time capability."

"Punching in and out is so simple. That fact alone made it worth buying a DA-88."

"The punches are very clean and accurate. A dream."

"I've been on the DA-88 nonstop for three weeks now. The transport is phenomenal."

"I like the size, the editing capabilities, and the price. I even like the way it looks."

"I just finished scoring two movies on it. Unbelievable machine."

"Two things. First, the DA-88 gives me a full one-hour and fifty minutes of record time. Second, the wind times are so wonderfully tight and quick... it takes my other digital recorder a day and a half to rewind."

"I like the auto-locator and rehearsal modes, and of course we're doing our next album on it."

"I can now offer my customers digital recording at analog prices."

"It's just faster. Speed counts. Time is money."

"It just feels better than any other recorder in its price range."

"We love the jog/shuttle wheel. It's working out great."

## No wonder the DA-88 is the preferred digital multitrack.

It features the latest generation in digital multitrack recording technology. According to users, it's the best sounding, best built, most functional and affordable digital multitrack on the market.

You're going to love the DA-88. Get to your dealer now and see why!

"It's the name. They make the best recording equipment, period."

"I wanted the serious machine for music production. That's TASCAM."

"I can lock it to video and my analog machines with no hassle. Life is so easy now that I have my DA-88."

"I'm focused on the TASCAM. It will become the standard. And I don't want to be left out."

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## SWITCHING SIDES

**Q** *My sound effects library is Macintosh-based and consists of both Sound Designer II and AIFF files. As I do more and more multimedia work, I'm discovering the need to play my sounds on an IBM/DOS PC. Is there a software solution that allows converting Mac-based AIFF audio files into IBM/DOS-based WAV files? Do I have to have a PC to do this?*

*Eric Stolberg  
New York, NY*

**A** AudioFiler, a recent rerelease of software from Spectral Synthesis can simplify a number of these otherwise irksome tasks.

AudioFiler is a Windows-based audio-file format converter, supporting AIFF, SDII, WAV, and SMP audio-file formats. Files can be transferred back and forth between formats, including between mono and stereo. The program is designed with an Object Oriented conversion engine that makes it possible to add support for new formats as they become available. Files can be converted in a batch by dragging selections from the Windows File Manager onto the AudioFiler window. You can move the audio files quickly between the Mac and the PC through a Local Area Network that supports AFS, or by floppy with third-party products such as DOS Mounter, or via the Apple File Converter (shipped with the Macintosh).

Presently AudioFiler only runs on the PC. The software diskette ships with a Windows version as well as with a stripped-down version for DOS command line use (in case you're a die-hard batch-file fan). Versions for the Macintosh, IBM OS/2, and various flavors of UNIX/Motif are planned — providing there is substantial interest from users of each platform. Spectral Synthesis indicates it will include all of the then currently available OS versions on the packaged DOS diskette. New versions will appear on Spectral's BBS if and when support for each new platform is added. Multiplatform

developers are allowed to keep a copy on one machine of each type they use at no additional cost.

There are a number of products on the market that allow audio-file formats to be converted from file to file. Unfortunately, most of these products are designed for other purposes and add file conversion as an afterthought. AudioFiler is an audio-file converter first, so it supports cross-platform file formats and is optimized for multifile operations. The cost is \$44.95. AudioFiler can be ordered through Spectral Synthesis dealers or direct from Spectral by calling 206-487-2931.

*Mark Doenges  
VP Marketing  
Randy Abernethy  
Network Consultant  
Spectral Synthesis*

## UP THE WALL

**Q** *Many of the composers' studios I see in EQ have keyboards up on the walls. This seems like a great way to save space in my studio. However, none of the pro audio dealers or manufacturers I've talked to know anything about this. Where can I get the hardware to mount keyboards on the wall?*

*Rick Aster  
Phoenixville, PA*

**A** The "keyboard mounts" you see are the metal or wooden brackets generally manufactured for building shelves, but used cleverly. They can be found in many hardware stores and building supply centers. They come with rails to attach the brackets to the wall, or some can be directly mounted to the wall (via the wallstud). Your interior-decorating tastes will decide if you get plain metal brackets or fancier wooden ones for your studio. Before you run out and start hammering, though, please remember that mounting keyboards on the wall presents certain problems. For instance, first make sure you can properly angle the keyboard to establish a comfortable playing position. Then see how convenient it is to have rear connectors so close to the wall. Next, figure out whether you can support those cables so they don't turn into a rat's nest. Finally, make sure you purchase brackets capable of supporting not only the keyboard, but also the pound-

ing to which it will likely be subjected.

The Quik Lok company (Music Industries Corp., 99 Tulip Avenue, Floral Park, NY 11001. Tel: 516-352-4110, or 1-800-431-6699 from outside New York) tells me it has recently developed keyboard wall mounts. These are due on the market very soon. Perhaps they now have what you want. Any other manufacturer should feel free to let us know if it has a similar product.

*Hector G. La Torre  
Executive Director  
EQ Magazine*

## OPENING RIGHT

**Q** *I am going on tour to mix for a band that will be an opening act and will be using many different existing house sound systems. How can I prepare so I'll do the best job?*

*Linda Harpers  
Billings, MT*

**A** Listen before you leap. For several years I operated sound systems under contract at the Greek Theatre and Universal Amphitheatre in Los Angeles. I was always amazed at how a touring engineer could come into the sound booth, and without ever hearing the system start turning knobs on the mixer. Setting mixer channel equalization requires thought and intense listening.

It has been my experience that engineers who do the best-sounding shows usually first spend time listening to the system with some well-recorded program material. They walk the room to check audience coverage of the loudspeakers and to see if the mix location is representative of the sound quality in the rest of the room. Next, they adjust the master system equalizer. I like to use a 1/3-octave real-time analyzer to confirm what my ears are telling me. I don't try to force the system into a flat state, but rather just take out the severe bumps in the house curve. If you need to turn the console channel EQ on every channel nearly the same, something is wrong with the master program EQ.

Now you are ready for the band to come on stage and do a soundcheck. Everyone has his/her idea of how this should be done. Most engineers like to start with the drummer, since this is the basis of most modern pop music. I





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think you first should listen to each band member individually, then try to put the group together in a mix. You need to be aware of how instruments sound individually and how they can fit together in layers, so that the entire finished result has good texture and space for each musical part. Remember, what you are doing as an engineer for a group is extending the musical performance. If you are fortunate enough to be able to make multitrack recordings

during live performances, spend time listening to each track in solo mode. You will learn about leakage and how one thing affects another. It also will help you learn to choose the right mic. You cannot fix everything with EQ. Learn the system by listening. EQ is like frosting on the cake — a little goes a long way.

Stanley R. Miller  
Sound Manufacturing, Inc.  
Hollywood, CA

## SHOULD I STAY OR GO NOW

**Q** I currently own a Fostex G-16S analog 16-track with the 8330 synchronizer card. I'm interested in getting the new digital linear multitrack machines, but am reluctant to part with my open-reel system. There's nothing wrong with it, and I like the way it sounds. What would you do?

Martin Kelly  
Seattle, WA

**A** Though digital linear multitrack has only recently been made accessible to most commercial and project rooms, consumers have long ago fully embraced digitally recorded music as a result of a decade-old love affair with the compact disc. The buzzword "digital" has a most compelling ring to it. Does this mean that analog multitrack recording is inferior to digital, and therefore obsolete? Not at all. Most professionals in the industry agree that in many applications analog recording offers sound quality superior to that of digital. For example, recording in the analog domain offers the option of creatively using tape saturation.

Regardless of format, record levels must always be carefully observed. In the digital domain, one must never cross the 0 dB threshold. Failure to observe this rule results in digital distortion — an effect that is not the least bit aesthetically pleasing. With the analog format, however, oversaturating the tape is a frequent occurrence because the level of saturation determines the amount of distortion. Contemporary drum parts are frequently recorded employing this technique because the resulting sound achieves more "splat," or limiting, than would normally occur. The sharp attack transients and short note duration of percussion parts yield themselves very nicely to this type of recording effect. Digital recording does not offer this creative option.

When all is said and done, the reality is that both formats have something valuable to offer, and this is precisely why many professionals tend to use both. Yes, digital recorders offer unlimited overdubs without the problem of noise inherent in analog recording, but the analog machine offers a far greater usable dynamic range.

Roger Maycock  
Senior Product Specialist  
Fostex Corporation

# Run Silent, Run Deep

ASHLY was the first to release a series of professional, fan-cooled amplifiers featuring power MOS-FET technology. The new CFT-1800 now offers the superior fidelity and rugged reliability of MOS-FET output devices in a quieter, convection cooled package. Designed primarily for use in recording studios, post-production facilities, or broadcast control rooms, the CFT-1800 will also satisfy even the most demanding audiophile enthusiast. In stereo operation, the powerful CFT-1800 delivers more than 300 watts per channel. Mono-bridged, the amplifier will put out a thundering 600 watts RMS for those room shaking subwoofer applications.

The user can also select various ASHLY Power-Card input options, such as a variable electronic crossover, an adjustable compressor-limiter, or even a very unique module for small mic-line mixing needs. The CFT-1800 is even covered under ASHLY's exclusive Five Year Worry-Free Warranty program. So, when the situation calls for running silent, while still running very, very deep, the CFT-1800 is the logical choice for the discriminating professional.



**ASHLY**

Ashly Audio Inc., 100 Fernwood Avenue Rochester, NY 14621 • Toll Free: 800-828-6308 • 716-544-5191 • FAX: 716-266-4589  
In Canada: Gertraudio Dist Inc., 2 Thorncliffe Park Dr - Unit 22, Toronto, Ontario M4H 1A8 • 416-696-2779 • FAX: 416-467-5819

CIRCLE 81 ON FREE INFO CARD

World Radio History



ONLY \$499.99\*

# Write On Target



"The Autograph II, a MIDI, 28-band graphic EQ, utilizes built-in RTA, pink noise generator, room sampling, storage for 6 target and 128 venue curves, feedback finder, & more to write perfect EQ curves and hit the bull's-eye every time!"



The Peavey Autograph II contains all the easy-to-use features necessary for accurately EQing PA systems. The MIDI controllable, 28-band, 1/3 octave graphic EQ features constant Q filters on standard ISO centers. The built-in real-time analyzer and pink noise generator perform RTA using multiple discrete and continuous room sampling. This amazing feature samples a room's frequency response at different locations, and averages them together for a final EQ curve. This final curve matches the system frequency response to one of six different factory or user target response curves stored in the Autograph II. You can then name and store this new curve in any of 128 available memory slots. It's that simple. For best results use the Peavey PVR-1 reference mic (sold separately), or store the curve from another mic and

use it for the RTA. Another exciting feature is the Feedback Finder which automatically locates a "hot" frequency and moves the cursor under it...press the down parameter button and the feedback is eliminated. The Curve Compare feature allows you to take an EQ curve, modify it, and then compare it to the original. Additional features: glitchless program changes, electronically balanced input/output, 40 Hz low cut filter, frequency response 5 Hz to 50 kHz, output noise below -94 dBv, ±6/12 dB cut/boost ranges, software security lock, relay/power-off bypass, and MIDI linking of two or more Autograph IIs. All for the incredible price of \$499.99! Write on target EQ curves every time with the Autograph II...only from an authorized Peavey dealer.

Suggested retail price (USA prices only) CIRCLE 56 ON FREE INFO CARD



The Monitor Magazine is a publication filled with the latest information musicians want to know. To receive 4 issues for only \$5 (USA price only) send check or money order to Monitor Magazine, Peavey Electronics 711 A Street, Meridian, MS 39301 ©1994 World Radio History

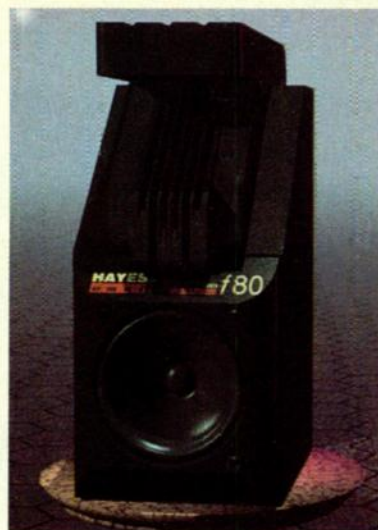


# EQ

## PRODUCT VIEWS

### FUN WITH FRACTALS

**P**asquan f80 is a radical new studio monitor from Hayes Omni. Hayes claims that its new design radiates sound waves as fractals, much as a natural sound source does. Hayes Omni calls the system "The Fractal Spatial System." Power handling is rated at 25–80 watts. Frequency response is 70 Hz–20 kHz. Directional response is truly hemispherical from 70 Hz to well above 10k. Sensitivity is rated at 86 dB (1W/1M), and nominal impedance is 8 ohms. For complete details, contact Hayes Omni, 249 North Ave., Aptos, CA 95003. Tel: 408-662-0421. Circle EQ free lit. #101.



### REDDY TO GO

**T**wo new additions to the Focusrite Red line of pro recording devices have recently been announced. Red 4 is a stereo preamplifier designed to interface up to seven sources individually transformer-coupled at either -10 dB or +4 dB and will be of particular value to studios



with limited source-monitoring facilities. Red 5 is a stereo power amplifier with a continuous power capacity of 250 watts RMS into 8 ohms and is designed for monitoring applications. It offers high transient output capability in excess of 800 watts for

short durations and faithful linear performance characteristics. The amp has a high-frequency switching-power-supply design that has the ability to support the amplifier for driving peaks and transients, while remaining cool. For more details, contact Focusrite Audio, Unit 2, Bourne End Business Centre, Cores End Rd., Bourne End, Bucks, SL8 5AS, England. Tel: 44-628-819-456. In the U.S. contact Group One Ltd., 80 Sea Lane, Farmingdale, NY 11735. Tel: 516-249-1399. Circle EQ free lit. #102.

### DO OR DI

**A**RX Systems of Australia is offering its new DI-2 Stereo Direct Box. Based on new low-noise circuit topology developed by ARX, the DI-2 is a true stereo pair of direct boxes in one case. Features include a switchable -20 dB pad and switchable +10 dB gain, plus audio ground lift and battery check switches with status LEDs. Dual XLR outputs are on the rear panel. For more information, contact ARX Systems, 33 Advantage Rd., Highett, Victoria 3190, Australia. Tel: 03-555-7859. Circle EQ free lit. #104.

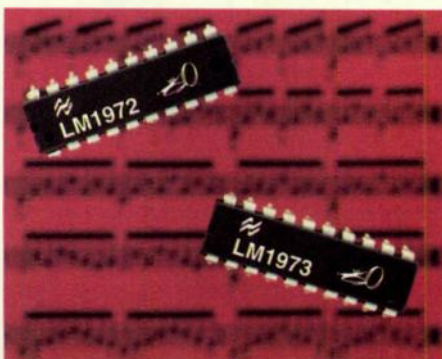


### AND THEN THERE WAS LIGHT...

**d**bx has moved in a somewhat new direction within its signal processing line. The 115 Power Light Module is a rack-mountable lighting system to help you see your way around the knobs and switches. It features two rack lights in all-metal retractable tubes. In addition, the rear panel has eight AC outlets with spike and surge protection. Front-panel controls include a switch and dimmer for lights, and a separate power switch for rear-panel outlets. List price is \$159. For more info, contact AKG Acoustics, 1525 Alvarado St., San Leandro, CA 94577. Tel: 510-351-0555. Circle EQ free lit. #103.

### ATTENTION TO ATTENUATION

**N**ational Semiconductor has introduced the LM1972 (2-channel) and LM1973 (3-channel) microPot audio attenuators, the latest additions to the company's Overture Audio Series. Frequency response is 20 Hz–20 kHz, THD is .003 percent. They provide up to 78 dB attenuation, and signal-to-noise and channel separation are both rated at 110 dB. Each channel of these new devices consists of a single resistor ladder that provides up to 78 dB of attenuation and includes a mute function. The resistor ladder design covers the range of attenuation in a maximum of 128 steps per channel for the LM1972 and 80 per channel for the LM1973. Both units are designed to use an external — rather than an onboard — buffer or op amp. For complete details, contact National Semiconductor, P.O. Box 58090, M/S 16-300, Santa Clara, CA 95052-8090. Tel: 408-721-4319. Circle EQ free lit. #105.





ALESIS  
MONITOR ONE

ALESIS  
MONITOR ONE

# The Truth From Left To Right

The truth...you can't expect to find it everywhere you look, or listen. But when mixing music, hearing the truth from your monitors will make the difference between success and failure. You'll get the truth from the Alesis Monitor One™ Studio Reference Monitor.

## Room For Improvement

Fact: most real-world mixing rooms have severe acoustical defects, with parallel walls, floors and ceilings that reflect sound in every direction. These reflections can mislead you, making it impossible to create a mix that translates to other playback systems. But in the near field, reverberant sound waves have little impact, as shown in the illustration. The Monitor One takes advantage of this fact and is built from the ground up specifically for near field reference monitoring.



The pink area in the illustration shows where direct sound energy overpowers reflected waves in a typical mixing room. The Monitor One helps eliminate such complex acoustic problems by focusing direct sound energy toward the mixing position.

## The Truth From Top To Bottom

The Monitor One's proprietary soft-dome pure silk tweeter design delivers natural, incredibly accurate frequency response while avoiding high frequency stridency and listener fatigue—typical of metal-dome tweeter designs. The Monitor One overcomes wimpy, inaccurate bass response—the sad truth about most small speakers—with our exclusive SuperPort™ speaker venting technology. The design formula of the SuperPort eliminates the choking effect of small diameter ports, typical in other speakers, enabling the Monitor One to deliver incomparable low frequency transient response in spite of its size.



Alesis SuperPort™ technology gives you the one thing that other small monitors can't: incredibly accurate bass transient response. No, the SuperPort doesn't have a blue light, but it makes the picture look cool.

The result? A fully integrated speaker system that has no competition in its class. You'll get mixes that sound punchier and translate better no matter what speakers are used for playback. The Monitor One's top-to-bottom design philosophy is a true breakthrough for the serious recording engineer.

## Power To The People

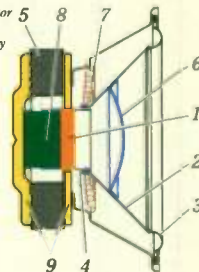
While most near field monitors average around 60 watt capability, the Monitor One handles 120 watts of continuous program and 200 watt peaks...over twice the power. The Monitor One provides higher output, more power handling capability, and sounds cleaner at high sound pressure levels. If you like to mix loud, you can.

## The Engine

Our proprietary 6.5" low frequency driver has a special mineral-filled polypropylene cone for stability and a 1.5" voice coil wound on a high-temperature Kapton former, ensuring your woofer's longevity. Our highly durable 1" diameter high frequency driver is ferrofluid cooled. Combined, these two specially formulated drivers deliver an unhyped frequency response from 45 Hz to 18 kHz, ±3 dB. The five-way binding posts provide solid connection, both electronic and mechanical. We even coated the Monitor One with a rubber textured laminate so when your studio starts rockin', the speakers stay put. Plus, it's fun to touch.

A cross section of the Monitor One's proprietary Alesis-designed 6.5" low frequency driver.

- 1.5" voice coil.
- Mineral-filled polypropylene cone.
- Damped linear rubber surround.
- Kapton former.
- Ceramic magnet.
- Dust cap.
- Spider.
- Pole piece.
- Front and back plates.



## The New Alesis Monitor One™

You don't design good speakers by trying hard. It takes years and years of experience and special talents that only a few possess. Our acoustic engineers are the best in the business. With over forty years of combined experience, they've been responsible for some of the biggest breakthroughs in loudspeaker and system design. The Monitor One could be their crowning achievement. They're the only speakers we recommend to sit on top of the Alesis Dream Studio™.

See your Authorized Alesis Dealer and pick up a pair of Monitor Ones. Left to right, top to bottom, they're the only speakers you want in your field.

For more information about the Monitor Ones and the Alesis Monitoring System, see your Authorized Alesis Dealer or call 1-800-5-ALESIS. Monitor One, SuperPort, and the Alesis Dream Studio are trademarks of Alesis Corporation. © Alesis is a registered trademark of Alesis Corporation.

Alesis Corporation 3630 Holdrege Avenue Los Angeles CA 90016



CIRCLE 02 ON FREE INFO CARD

World Radio History



# EQ PRODUCT VIEWS

## PUT THEM IN ISOLATION

**W**hisperRoom has unveiled its new Expandable line of portable sound isolation rooms. Available in numerous standard sizes, the new WhisperRoom can grow along with your space requirements: it can be expanded in 2- or 4-foot increments by purchasing expansion packages. Two series of these isolation booths are available: the Professional Series and the Residential Series. Professional Series WhisperRooms are equipped with ventilation systems, electrical service, and adjustable/locking casters. Options include a door window, wall window, and cable passage. The Residential Series is similarly equipped but in a more economical package. For more information, contact WhisperRoom, 116 S. Sugar Hollow Rd., Morristown, TN 37813. Tel: 615-585-5827. Circle EQ free lit. #106.



## WATTS THE STORY

**C**arlsbro Electronics is now offering the CPX line of power amps. There are four models in the line: CPX300 (150 wpc); CPX600 (300 wpc); CPX800 (400 wpc), and the CPX1200, which delivers 600 wpc — into 4 ohm loads. All four are also capable of driving loads down to 2 ohms. In addition, all models feature DSL, Carlsbro's proprietary Dynamic Signal Limiting that continually monitors peak output to detect any signal that will cause clipping before adjusting the amp's gain to a safe level. DSL also offers power supply monitoring to control the overall gain and protect against clipping under low mains power supply conditions. Other features include a mono bridging switch, balanced XLR and jack inputs, binding post connections for loudspeakers, soft-start power on, and a variable speed fan. Models CPX800 and CPX1200 also feature Speakon output sockets. For more details, contact Carlsbro Electronics, Cross Dr., Kirby in Ashfield, NOTTS NG17 7LD, England. Tel: 0-623-753902. Circle EQ free lit. #107.

# IF SILENCE IS GOLDEN, THIS CO

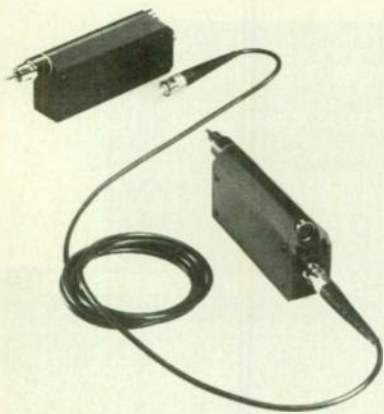


*The D&R Orion. From its Hi-Def™ EQs to its fully modular design, from its custom-welded RFI-killing steel frame to its incredibly flexible floating subgroups, the handcrafted Orion is every bit a D&R.*



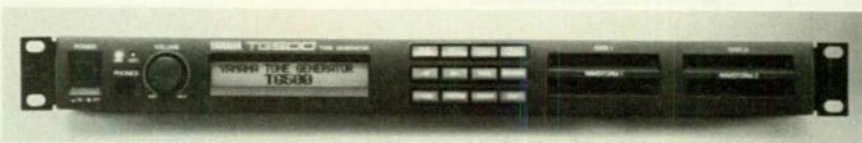
## LIGHT AND SOUND

The Cobra brand of fiber-optic cables developed for Cobra's Mon-goose optical cable system is designed to convey optical analog audio (and video) signals with high fidelity, negligible signal loss, and low noise. Every finished cable is individually tested, and cable pairs for stereo studio applications are matched to provide equal signal strength within close tolerances. The optical fiber is angle-cut, and the fiber ends are polished. For complete details, contact ASM Labs, 410 E. O'Dell St., Marionville, MO 65705. Tel: 800-214-9677. Circle EQ free lit. #108.



## OH WHAT A NIGHT

Night Technologies International (NTI) is producing the EQ3 Sound Enhancement System. This equalizer is an all-analog device. Unlike traditional equalizers, the EQ3's frequency shaping is accomplished by summing bandpasses. Five broad bands: 10 Hz, 40 Hz, 160 Hz, 650 Hz, and 2.5 kHz and an "air" band are controllable on each channel. The air band is a high-frequency boost-only control. The other aforementioned bands provide  $\pm 15$  dB in five 3 dB steps. A center concentric control on each band fine tunes in 1/4 dB steps. Performance highlights include virtually no phase shift, control over sibilance, transformerless balanced inputs and unbalanced outputs for operation at nominal line levels, and essentially no THD (.0005 percent). Frequency response is  $\pm 0.5$  dB 10 Hz-125 kHz; -3 dB 5 Hz-330 kHz. For more information, contact NTI, 1686 W. 820 North, Provo, UT 84601. Tel: 801-375-9288. Circle EQ free lit. #109.



## VOICES CARRY

Second-Generation Advanced Wave memory sounds, 64-note polyphony, and expandability are just some of the hallmarks of the Yamaha TG500 Tone Generator. The unit boasts an 8 MB waveform ROM. It also features the ability to install 1 MB of waveform RAM, allowing for loading of external samples via waveform cards or the MIDI Sample Dump protocol. The TG500 has four multi-instrument drum voices and 128 performance combinations. For more details, contact Yamaha, P.O. Box 6600, Buena Park, CA 90620. Tel: 714-522-9011. Circle EQ free lit. #110.

# CONSOLE SHOULD COST 7486% MORE

Next time you audition a console, from anyone at any price, ask to hear a test for which we're well-known. It goes like this: We select 'mic' across the board, and assign every channel to the mix bus. We crank up the studio monitor amp, all the way. We push up all the channel and master faders, all the way. We turn the console's monitor level up. All the way. Next, we invite each customer to place his or her ear right next to one of the monitor's tweeters.

Gingerly, they listen, to not much at all.

Then, we bring the monitor pot down from what would be a speaker-destroying level to a merely deafening level. Before ears are plugged and music blasts forth, we invite one last, close listen, to confirm the remarkable: Even with everything assigned and cranked up, a D&R console remains effectively — and astonishingly — silent.

Of course, a D&R is much more than the quietest analog

board you can buy. So we equip each handcrafted D&R with dozens of unique, high-sonic-performance features. And we back each board with our renowned factory-direct technical support.

How much is all of this worth? Well, if silence is golden, then every D&R is worth its weight in gold.

In which case, until we raise its price about 75 times, the D&R console pictured at left is one truly impressive investment opportunity.



D&R ELECTRONICA B.V.

Rijnland 158, 1382 GS Weesp, The Netherlands  
tel (-) 31 2940-18014 • fax (-) 31 2940-16087

D&R WEST: (818) 291-5855 • D&R NASHVILLE: (615) 661-6892  
D&R SOUTHWEST: (409) 736-3737 • D&R USA: (409) 598-3411

*D&R handcrafts consoles for recording, live sound, theatre, post-production and broadcast, for world-class to project facilities. "Weight in gold" comparisons based upon 11/93 market prices.*

CIRCLE 20 ON FREE INFO CARD



# EQ STUDIO WARE

## ANGEL ON YOUR KEYBOARD

**A**ngel City provides sound libraries for a small group of synthesizers and other support services, including the Turbo-DW hardware expansion board for the Korg DW 8000. Disks for the Korg T-Series are issued on 3.5-inch diskettes and the library now includes 25 titles. Three new titles have just been introduced, including the PCM20, which is a 1962 Wurlitzer, String Bass, and Drum Kit collection. The PCM21 features '60s organs, electric basses, and Crumar analog synth. This disk features a virtual museum of 14 ultranostalgic organ sounds. The third new release, the PCM22, offers exotics including hammered dulcimers; orchestral and Cajun triangles; antique African marimbas; kalimbas; mechanical typewriter and machine sounds; wood drums; and bass. There are 27 samples and 100 patches. For more information, contact Angel City, 2 Liberty Pl., Middletown, CT 06457. Tel: 203-347-5166. Circle EQ free lit. #111.

## TAKE CONTROL

**T**B Systems has released Version 2.0 of its popular SoftMC MIDI controller for Windows program. (The previous version was reviewed in the June issue.) SoftMC V2.0 allows broad control over any number of MIDI devices simultaneously, at discrete levels, in a complex MIDI system environment. It controls virtually any MIDI device available and offers extensive built-in support for Lexicon's LXP-1, LXP-5, LXP-15, and PCM70 (Version 2.0 or above) multieffects processors. Among its capabilities, SoftMC allows the viewing of presets in the target device and in SoftMC simultaneously. For more precise control you can tweak multiple parameters simultaneously using the four programmable master faders available for setup. SoftMC offers 48 programmable faders; four programmable master faders and 16 programmable buttons per setup; 128 setups per machine file; and as many machine files as your hard disk can hold. You can select from any of 16 MIDI channels simultaneously. For further details, contact TB Systems, 2205 Boston Rd., Bldg. 0-144, Wilbraham, MA 01095. Tel: 413-596-8380. Circle EQ free lit. #112.



## THEY CAME, THEY SAW, THEY...

**S**oftware Audio Workshop (SAW), from Innovative Quality Software, is a professional hard-disk editing and multitrack mixing solution for Windows. It allows you to record and edit 16-bit resolution CD- and DAT-quality SoundFiles at sampling frequencies up to 48 kHz on your hard drive. SAW creates eight tracks in software and digitally combines them into a stereo output that plays through one compatible sound card. In addition, SAW gives you four stereo tracks. For more details, contact Innovative Quality Software, 3111 S. Valley View Blvd. Ste. F-102, Las Vegas, NV 89102. Tel: 702-368-2213. Circle EQ free lit. #113.





# DIGIDESIGN'S MOST AFFORDABLE 8-TRACK SYSTEM.



## Introducing the new 882 I/O™ for Session 8™—The break you've been waiting for.



If you've been wanting to get into a hard disk recording system but the price was a bit steep, we've got some great news for you.

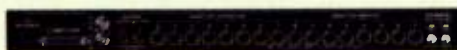
Because with the new 882 I/O, you can now get into Digidesign's revolutionary Session 8 system for about \$1,000 less. (Yes, you read that correctly.)

Imagine: 8 tracks of crystal clear digital audio. Random access digital editing. Digital track bouncing and stacking. And unparalleled MIDI compatibility. All for a price that compares very favorably to tape.

How did we do it? By creating a new audio interface that pairs the original Session 8's excellent AD/DA converters with a streamlined layout (8 ins, 8 outs, stereo mixdown, single-rack space design). Hook up the 882 I/O to your mixer and you have a complete system with the same sparkling sound quality that's made Digidesign famous.



882 I/O front panel



882 I/O back panel

### SOUNDS COOL, RIGHT? IT GETS EVEN BETTER.

Session 8 is now more compatible than ever. Here is just some of what's new. Call us for the latest!

- **Sequencer Support for Session 8** (EMAGIC™, MOTU™, Opcode™, and Steinberg™)
- **New Digidesign ADAT® Interface\***
- **New Sound Designer™ II\*\***
- **New DINR™ Noise Reduction System\*\***
- **New MasterList CD™\*\*\***

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World Radio History

**CIRCLE 22 ON FREE INFO CARD**



# OUR 8•BUS REALLY

**We** get a lot of calls from folks asking about who's using Mackie 8•Bus Recording/PA consoles.



Good question. After all, a board's only as good as its users.

So we grabbed the latest stack of 8•Bus Warranty Registration cards and hit the phones.

The names in this ad represent a cross section of current 8•Bus users. They range from platinum supergroups tracking new albums to high school choirs, from bar bands to sound designers working on network TV series and feature films. There'd probably be more names but we didn't want to make the type any smaller than it already is — or keep tying up our already clogged phone system.

As our production of 8•Bus boards increases, so does this list.

In a way, it's confirmation of the raves that magazine reviewers have heaped upon the console. Above all, it's proof that the Mackie 8•Bus is a serious tool for professionals. A tool that's getting used day-in and day-out for major projects.

Call our toll-free literature line 8AM-5PM PST and talk to a genuine Mackoid (no voice mail!). We'll send our obsessively-detailed 24-page color brochure on the 8•Bus Series.

Then become a part of this list by visiting your nearest 8•Bus dealer.

Currently in Spain tracking new album on multiple Mackie 24•8 consoles.  
Def Leppard

Sound design & mixing of commercials for G.I. Joe, Kenner Toys, Hasbro Toys, Transformers 1/2-hour show, infomercials.  
Lawrence Wakin • Tapestry Productions Inc. • New York, NY



Tracking for **Madonna**.  
Shep Pettibone • Mastermix Productions Ltd. • New York, NY

Recorded Grammy-Nominated "Sunday Morning" off of the album **Millenium** on 24•8, currently working on new album exclusively on console. "The 24•8 survived the 7.1 San Fernando Valley earthquake. It's definitely built for rock 'n' roll."  
Sheldon Reynolds • Earth Wind & Fire • Los Angeles, CA

Music scoring for **Pepsi Cola** and **McDonalds** and **Six Flags** TV & radio commercials.  
The Listening Chair • Dallas, TX

Recording and mixing of acoustic music & sounds from the **American West**. Recent albums include "Charlie Russell's Old Montana Yarns" by Raphael Cristy and "Where the Red-Winged Blackbirds Sing" by Jim Schulz.  
Bruce Anfinson • Last Chance Recordings • Helena, MT

**Pizza Hut** commercial scored to film, scoring of theme presentation for **The Baseball Network**, self-produced album "Rick DePofi and the Mels," currently producing **NY Noise's** 1st solo artist, **Aaron Heick** (Chaka Kahn's alto player).  
Rick DePofi & Craig Bishop  
New York Noise • New York, NY

<sup>1</sup> Former posts include quality assurance with Warner Brothers, Sheffield Labs, Rainbow

Concert sound reinforcement at the **Showcase Theater**.  
Bob O'Neill, Manager of Entertainment • Six Flags Great Adventure Theme Park • Jackson NJ

Used by students for learning recording and sound design. The School of The Art Institute of Chicago, Sound Department  
Chicago, IL

Jazz choir sound reinforcement and recording.  
Dwayne Pedigo • Plano East Senior High School • Plano, TX

Sound effects, music and voice for **Atari** arcade games.  
Brad Fuller • Atari Games Corporation • Milpitas, CA



Mackie 32•8 Recording/PA console \$4,995<sup>4</sup>

MB-32 Meter Bridge \$895<sup>4</sup>

24•E 24-ch. expander \$2,995<sup>4</sup>  
MB•E Expander Meter Bridge \$695<sup>3</sup>

Tracking for R&B and rap groups including vocals for Polydor artist **T. Max**.  
Brad Young & Dow Brain  
Underground Productions  
Boston, MA



Dialog editing for **Untouchables**, TV series and **Movies of the Week**. "I work out of my home now. It's quite an achievement to be able to get a higher sound quality than most of the other sound houses in town."  
3-time Emmy winner David Scharf  
Helix Sound • Los Angeles, CA

Wide range of multimedia projects including major motion pictures (the names of which can't be divulged).  
John Acoca<sup>1</sup> • Oracular Multimedia  
San Francisco, CA

Records, Chief Mastering Engineer at JVC.  
Quote: "It's a great board, dude. Buy it!"

Albums for alternative groups **Twenty-Two Brides** and **The Cucumbers**, demo for **Freedomland**.  
John Williams • Ground Zero Studios • New York, NY

"Praise Songs" contemporary Christian album/CD, "Body Builders" children's album/CD.  
Peter Episcopo • Bridge Song Media • Old Bridge NJ

Sound design for **Pepsi Cola** TV spot aired during last January mondo-bowl.  
Hans ten Broeke<sup>2</sup> • Buzz, Inc.  
New York, NY

Sound reinforcement for theater presentations and concerts in a 300-seat theater.  
Centre Culturel Franco-Manitobain • Winnipeg, MB, Canada

<sup>2</sup> Quote: "It's the only analog component in my room. You hardly know it's there, it's so transparent."



# CONSOLES WORK.

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John E. Nordstrom II  
Love Den Productions  
Pacific Palisades, CA

Album/CD tracking and mixing for the groups *Mean Solar Day* and *Product*.  
Ramsey Gouda • Onion Head Studio of Chicago • Chicago, IL

Worship service and in-house concert sound reinforcement, recording of sermons.  
New Life Assembly of God  
Lancaster, PA

Sound reinforcement in a live blues club showcasing live, regional & national acts such as *Savoy Brown*, *Jr. Wells*, etc.

Manny's Car Wash  
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Rental for film mixing projects and home studios. "We love them because we never see them. They're great for our business."  
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MB•E Meter Bridge \$695<sup>4</sup>

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Skittles TV commercial, demo for new artist *Nita Whitaker*, original music for *Terpsicorps* modern dance company.  
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DNA sampling CD with mega-drummer *Bernard Purdie* (3000+ album credits)!  
Frank Heller<sup>3</sup> • Weasel Boy Recording • Brooklyn, NY

<sup>4</sup> Suggested retail price. Slightly higher in Canada.

<sup>3</sup> Quote: "This job had extremely unusual and demanding monitoring & effects requirements. I honestly couldn't have done it without the 32•8."

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**Slash**,  
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**Steve Brown**,  
guitarist/producer for Trixter

**Natalie Cole**,  
solo artist

**Greg Droman**,  
Grammy-nominated engineer  
for Linsey Buckingham

**Gregg Field**,  
drummer for Frank Sinatra

**Michael Frondelli**,  
Engineer-Producer (Eric Johnson,  
Crowded House, etc.), Creative  
Director for Capitol Records

**Bill Gould**,  
bassist for Faith No More

**Bashiri Johnson**,  
percussionist for  
Whitney Houston, Madonna

**Mick Jones**,  
producer for Van Halen,  
guitarist for Foreigner

**Art Neville**,  
producer, The Meters,  
keyboardist, Neville Bros.

**David Frangioni**,  
MIDI specialist/Engineer  
Aerosmith, Elton John, and Extreme

**Danny Kortchmar**,  
producer for James Taylor,  
Billy Joel, Rod Stewart

**Bruce Kulick**,  
guitarist for Kiss

**Kyle Lenning**,  
President Asylum Records,  
Nashville

**Clair Marlo**,  
Artist, Producer

**Queensryche**

**Dave "Snake" Sabo**,  
guitarist for Skid Row

**Ben Sidran**,  
producer

**Leo Sidran**,  
songwriter for Steve Miller

**Steven Tyler**,  
singer for Aerosmith

\*Mention in this list is intended to indicate ownership only and does not in any way denote official endorsement.



Producer Ricky Peterson's Pre/Post Production Room with Mackie Designs 24•8 at Paisley Park.

R&B radio remix of *Boz Scaggs' "I'll Be The One"* for Virgin Records, recording solo album for the Japanese *Go Jazz* label.

Ricky Peterson, producer,  
Paisley Park  
Minneapolis, MN

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# Pinderossa: Home on the Range

**STUDIO NAME:** One Step Studios

**LOCATION:** Northern California

**MAIN MEN:** Mike Pinder (owner),  
Richard Kaplan (engineer)

**PROJECTS RECORDED:** Pinder's *Off The Shelf* (One Step Records)

**CREDITS:** Pinder is the former keyboardist and founding member of the Moody Blues. His tenure included everything from the Blues' first album, *Go Now* (1965), to 1978's *Octave*.

**CONSOLE:** D&R Vision

**KEYBOARD:** Roland A80 controller

**SAMPLERS:** Roland S770 and SP700

**SYNTHESIZERS:** Roland JD 990 enhanced

**MONITORS:** Genelec 1032A; Yamaha NS10

**AMPLIFIERS:** JBL 6260

**COMPUTERS & SOFTWARE:** IBM 486DX/33; Digital Audio Labs CardD; Atari Mega/STE; C Labs Creator/Notator

**STORAGE:** Dynatek 88 MB removables;

Chinon 535 CD-ROM drives

**RECORDERS:** Tascam MSR 24 with dbx

**DAT MACHINES:** Tascam DA 30

**OUTBOARD GEAR:** Roland SRV 330 reverb; Roland SDE 330 delays; ART LTX reverb; BBE 822/822A; dbx 160x, 163x, and 263x; Alesis 3630; White 140 analyzer

**PEDALS:** Morley

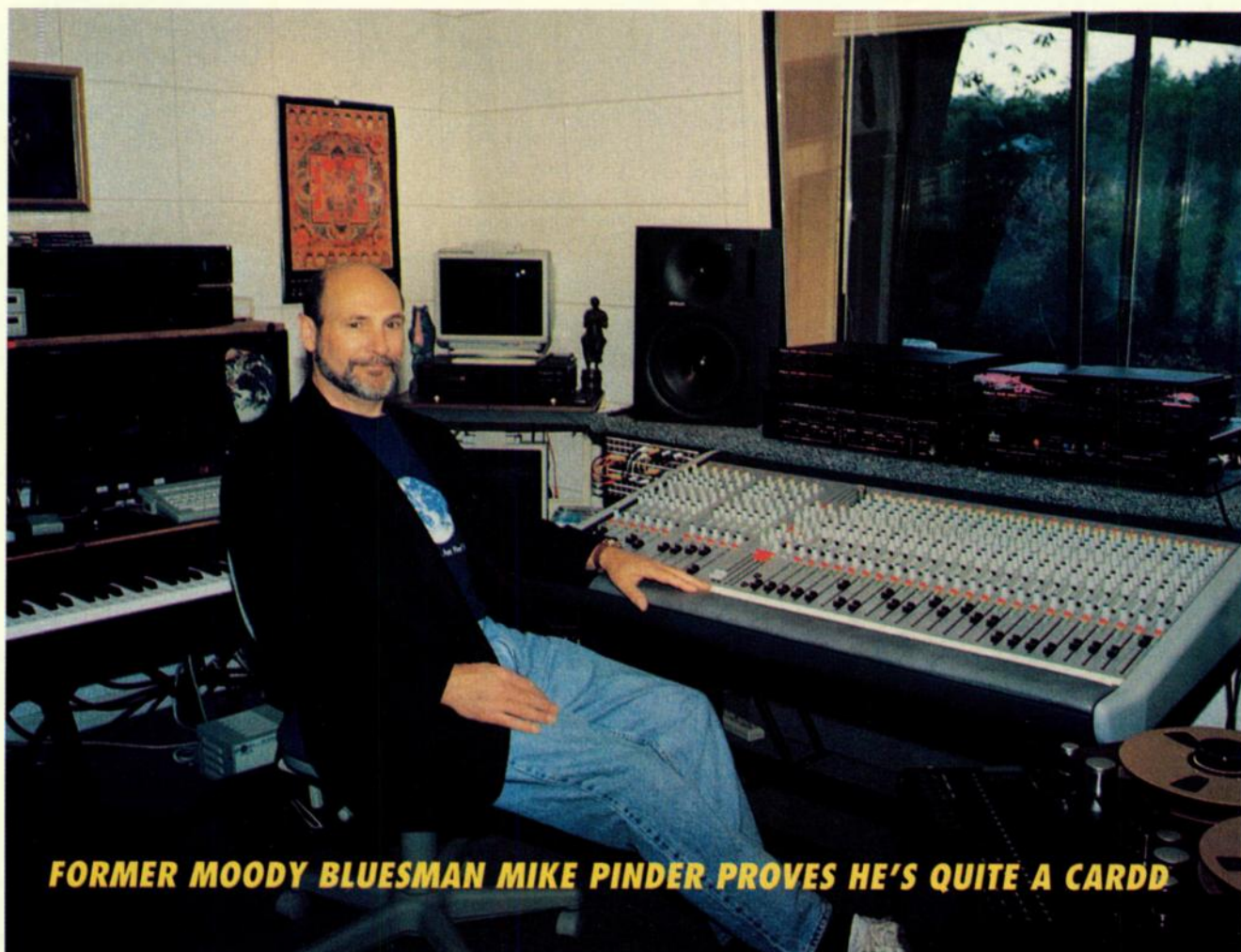
**FAVORITE MICROPHONE:** Schoeps CMC 5

**EQUIPMENT NOTES:** Pinder states: One of my favorite items is the Digital Audio Labs CardD. I regard it as an indispensable link in my audio chain. I mix directly to the CardD hard drive and then do any editing and necessary normalizing to master tracks. Then I do a digital dump directly to my Tascam DA 30 DAT machine; the CardD's A/D-D/A converters are superb.

I was lucky to be the first to get the Vision, my third D&R console. The first one I ordered on a gut feeling and I have never been disappointed with the company's products or service.

My Roland samplers have enabled me to transfer my Mellotron sounds into a more convenient format.

**STUDIO NOTES:** Pinder continues: The studio was originally designed for me, although over the last few years I have produced some private releases for local talent. All the equipment was hand-picked. Having gone through a lot of equipment over the years, I was happy to settle for mid-priced equipment since it had improved so much lately. There's very little that I'd change. **EQ**



**FORMER MOODY BLUESMAN MIKE PINDER PROVES HE'S QUITE A CARDD**





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# Audio-Technica AT4050/CM5

This new mic proves it doesn't have to be old to be a classic

**MICROPHONE NAME:** Audio-Technica AT4050/CM5

**VALUE:** \$995, includes AT8441 shock mount

**TYPE OF MIC:** Dual element condenser

**POLAR PATTERN:** Cardioid, figure eight, omnidirectional

**FREQUENCY RESPONSE:** 20 Hz–20 kHz

**OUTPUT IMPEDANCE:** 100 ohms

**NOISE (A-WEIGHTED):** 17 dB SPL ("typical")

**SIGNAL TO NOISE RATIO:** 77 dB, 1 kHz @ 1 Pa ("typical")

**DYNAMIC RANGE:** 132 dB, 1 kHz @ max SPL

**MAXIMUM INPUT SPL:** Without pad — 149 dB SPL 1 kHz @ 1% THD; with 10 dB pad — 159 dB SPL

**POWER REQUIREMENTS:** 48V DC phantom (±4 V)

**CURRENT CONSUMPTION:** 3.2 mA ("typical")

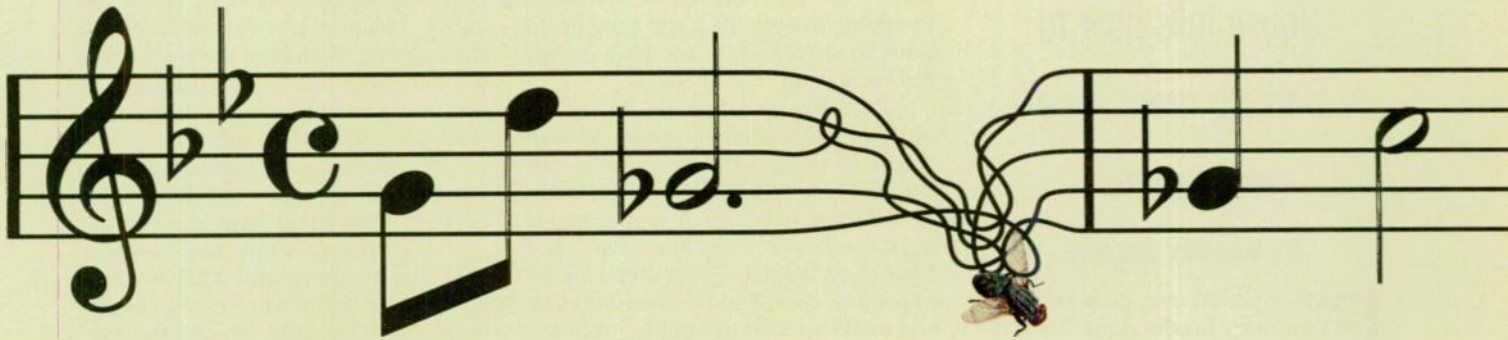
**MIC NOTES:** The AT4050/CM5 actually uses two separate microphone elements, each with a 2-micron-thick vapor-deposited gold diaphragm. Audio-Technica maintains that the design of these diaphragms allows the mic to reproduce subtle high-frequency sounds that a typical large-diaphragm mic might not be able to capture. The electronics within the body of the mic combine these two elements in various ways to produce the three different polar-pattern responses.

Each AT4050/CM5 diaphragm is put through five "aging" processes that ensure that the sound of the mic will remain consistent over many years of use. The mic has a matte-black finish and can be used either with the included AT8441 shock mount or with an AT8430 stand clamp.

A low-frequency roll-off switch kicks in at 80 Hz with a rate of 12 dB per octave; it can be used to reduce the microphone's sensitivity to low-frequency rumbling and to reduce vocal "popping." An open cell windshield is permanently attached to the inside of the grille to further reduce the chances of popping. **EQ**







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# Anatomy of A Remix

The Godfather of House tells how to make a great song even better

BY DARREN RESSLER

Possessing an ever-growing list of flawless productions and a smooth DJing style, New York City's Frankie Knuckles — known as the Godfather of House — is the Don of the worldwide remix Mafia. While living in Chicago in the early '80s, Knuckles became frustrated with the versions of songs he was hearing. To compensate, he used an inexpensive home setup to liven up the mix, and would bring his reels to Windy City clubs such as Warehouse and Power Plant.

"I taught myself how to edit at home on a Pioneer 707 reel-to-reel and a pair of Technics SL5200's," says Knuckles. "At that point, dance music had taken a turn as disco had fallen off and most of the songs that were coming out were R&B and country. The songs that I liked were a problem to break on my dance floor; I had to completely reedit them to make them more interesting."

Since pumping First Choice's now-classic "Let No Man Put Asunder," Knuckles has steadily built his reputation. His remix discography reads like a Who's Who of pop music, tweaking cuts for Pet Shop Boys, Patti LaBelle, Lisa Stansfield, En Vogue, Elton John, Michael Jackson, Luther Vandross, and dozens of others.

So how does he approach a remix project? "I like to hear the original song first and listen to what the songwriter had intended, what the producer did, and the approach the artist took with that particular song," explains Knuckles, who enjoys trying new equipment to keep his work fresh with the only constant being a Roland

909. "I try to live with a song before I go into the studio. I start to hear it in my sleep and a lot of the string and rhythm arrangements come to me. So when I get into the studio, I know if I'm going to embellish the song or if I want to strip away everything except the vocals and reconstruct it."

Knuckles turns down most of the mix work he's offered, opting instead to get involved with projects he can lend his songwriting skills to. But when he was approached to do club versions of Diana Ross's "Love Hangover" and "Someday We'll Be Together" for an upcoming compilation, the Godfather was made an offer he couldn't refuse.

"Both of her songs are ultimate club classics," said Knuckles, "and I personally didn't want to remix it. But when I was told about the project, I figured that I could keep a certain classic flair about them and also make them different."

Oddly, when Knuckles played the masters of Ms. Ross's songs, he was shocked at what he discovered. "When I dissected the tapes, I had a lot of trouble with the vocals because there was no such thing as SMPTE or timecode back then. There was so many different lead vocal takes [on the masters], and when I listened to some of the performances, it shocked me. To hear somebody who you think is the ultimate female singer with all of those hits and then you hear the

outtakes — it was a scream!"

Knuckles' first task was to lock things up and to generate some type of timecode to ensure a movement-inducing rhythm on both tunes. On "Love Hangover," he really didn't time stretch or change the tempo, but on "Someday We'll Be Together" he did, as the label wanted a more dance-floor-friendly, in-*yer-face* mix.

"I couldn't make 'Someday...' too hardcore or give it a hip-hop flavor because it isn't that kind of song, so I gave it a more up-tempo feel," he says. "We put it through the Lexicon 2400 and re-created a whole new rhythm for it and a new BPM, which was probably the hardest thing. It looked at one point that we were going to have to sample each line of the song and fly them back, but we managed to get around that because [keyboardist] Eric Kupper used a short cut to actually get it as close to perfect as possible."

Knuckles feels that having a songwriting ability is as important to the remixer than technical smarts. "Remixing is necessary to artists for the simple reason that it allows artists from one arena to cross over to another," Knuckles stresses. "Ultimately, if remixers expect to make any type of real achievements, they have to be able to grow beyond remixes and become really good producers and understand songwriting." **EQ**



NUCKLES HEAD: Frankie Knuckles and his many LPs.

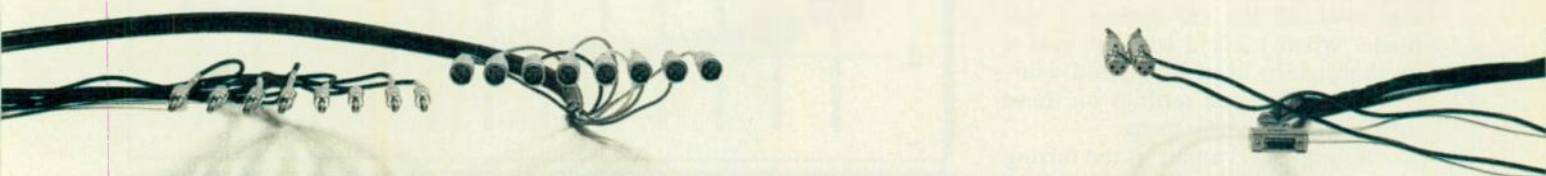
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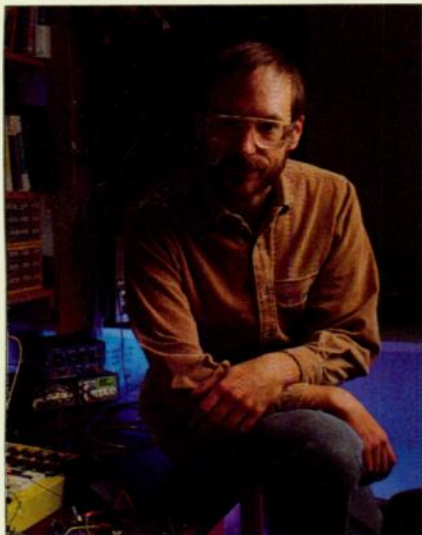
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# EQ: How to Really Make It Work



Think you know EQ? Now find out the real story.

BY CRAIG ANDERTON

Too many people adjust equalization with their eyes, not their ears. For example, after doing a mix recently, I noticed the client writing down all the EQ settings I had made. When I asked why, he said it was because he liked the EQ and wanted to use the same settings on these instruments in future mixes.

Wrong! EQ is a part of the mixing process; just as levels, panning, and reverb are different for each mix, EQ should be custom tailored for each mix as well. But to do that, you need to understand how to find the magic EQ frequencies for particular types of musical material, as well as what tool to use for what application.

Simply stated, there are three main applications for EQ. Each application requires specialized techniques and approaches for

- Problem solving
- Emphasizing or deemphasizing an instrument in a mix
- Altering a sound's personality

## PROBLEM SOLVING

EQ can fix some obvious problems. Examples: slicing a sharp notch at 60 Hz (50 Hz in Europe) can knock hum out of a signal; trimming the high frequencies can remove hiss. Generally, problems occur in specific frequency ranges, which makes the parametric type of equalizer ideal for problem solving (see sidebar).

Another common problem is an instrument with a resonance or peak that interferes with other instruments or causes level-setting difficulties.

For example, in 1977, I produced classical guitarist Linda Cohen's *The Case of the Classical Guitar* for Tomato Records, which Angel Alley recently re-released on CD. Linda had a beautiful instrument with a full, rich sound

that projected very well on stage thanks to a strong body resonance in the lower midrange, a resonance that caused a major level peak. However, recording was a different matter than playing live. If levels were set so the peaky, low-frequency notes didn't overload the tape, the higher guitar notes sounded weak by comparison.

Although compression/limiting was always an option, it altered the guitar's attack; while this effect might have gotten lost in an ensemble, it stuck out with a solo instrument. A more natural-sounding answer was to use EQ to apply a frequency cut equal and opposite to the natural boost, thus leveling out the response. But there's a trick to finding problem frequencies so you can alter them. The following tips work like a charm:

1. Turn down the monitor volume — things might get nasty and distorted during the steps that come next.
2. Set the EQ for lots of boost (10–12 dB) and a fairly narrow bandwidth (around a quarter-octave or so).
3. As the instrument plays, slowly sweep the frequency control. Any

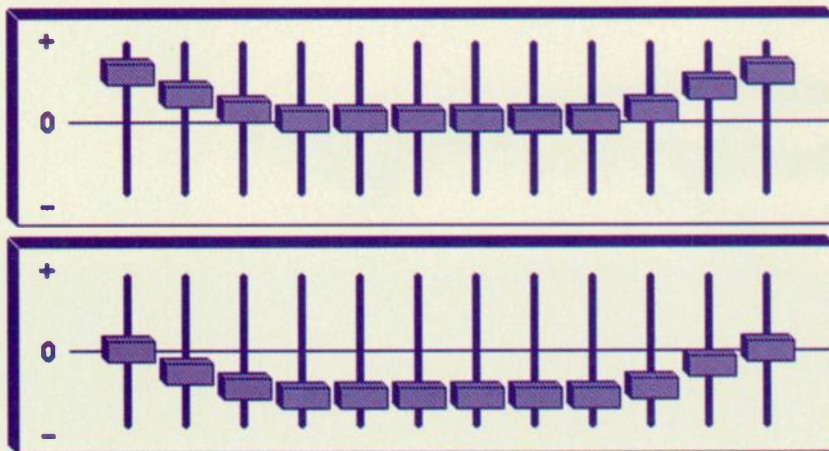


Figure 1 (bottom): Frequency ranges translated into musical terms. Figure 2 (top): The upper graphic EQ boosts the high and low frequencies; the lower graphic cuts the midrange to accomplish the same effect, but with less likelihood of distortion.



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peaks will jump out as a result of the boosting and narrow bandwidth. Some peaks may even distort.

4. Find the loudest peak and cut the amplitude until the peak falls into balance with the rest of the instrument sound. You may need to widen the bandwidth a bit if the peak is broad or use narrow bandwidth for single-frequency problems such as hum.

**ELIMINATING THE HONKING**

This technique of boost/find the peak/cut can help remove midrange "honking," strident resonances in wind instruments, and much more. Of course, sometimes you want to preserve these resonances so the instrument stands out, but oftentimes applying EQ to reduce peaks allows instruments to sit more gracefully in the track.

Digital workstation EQ, as found in hard-disk recording systems, can be particularly effective owing to its precision. In one of my more unusual projects, I needed to remove boat motor noise from some whale sam-

**GRAPHIC VS. PARAMETRIC EQs**

A graphic equalizer divides the audio spectrum into numerous narrow bands (generally up to 32), each with an associated vertical slider that boosts or cuts the amplitude at that specific frequency. The slider's physical positions create a rough approximation of the frequency response curve, hence the term "graphic" equalizer. New digital versions dispense with the sliders in favor of buttons and readouts, but are still called graphic equalizers.

A parametric equalizer has a lesser number of more versatile bands where you can change not just the degree of boost or cut, but also the frequency at which this occurs and the response bandwidth. "Pseudoparametric" equalizers omit the bandwidth control, whose absence can seriously hamper the experienced EQ aficionado. Arguably, manufacturers err on the side of too narrow a fixed bandwidth, which makes it difficult to effect subtle changes.

ples. Motor noise is not broadband, but exists at multiple frequencies. Applying several extremely sharp and narrow notches at different frequencies took out each component of the noise, one layer at a time, until the motor noise was completely gone.

This type of problem solving also underscores a key principle of EQ: it's better to cut than to boost. Boosting uses up headroom; cutting opens up headroom. In the example of solving the classical guitar resonance prob-

lem, cutting the peak enabled bringing up the overall gain and printing a lot more overall level on tape.

The same technique of finding and cutting specific frequencies can also eliminate "fighting" between competing instruments. For example, while mixing a recent Spencer Brewer track for Narada Records, there were two woodwind parts with resonant peaks around the same frequency. When playing in an ensemble, they would load up that part of the fre-

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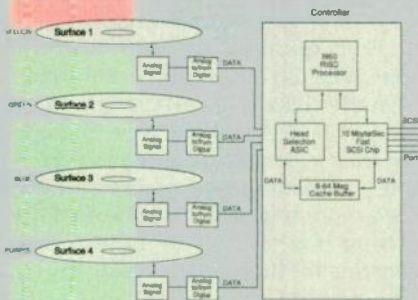


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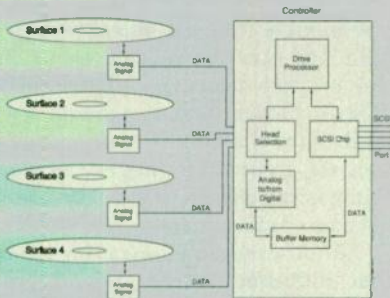
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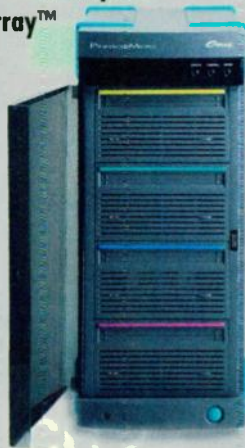
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quency spectrum, which also made them difficult to distinguish. Here's a way to work around this:

1. Find, then reduce, the peak on one of the instruments to create a more even sound.

2. Note the amount of cut and bandwidth that was applied to reduce the peak.

3. Using a second stage of EQ, apply a roughly equal and opposite boost at either a slightly higher or slightly lower frequency than the natural peak.

Both instruments will now sound very articulated, and because each peak in a different part of the spectrum, they will tend not to step on each other as much.

EQ can also change a sound's character; for example, it can turn a brash rock piano sound into something more classical. This type of application requires relatively gentle EQ, possibly at several different points in the audio spectrum. A graphic equalizer works well, para-

metric EQs may not have enough bands to affect all the desired sections of the audio spectrum.

Musicians often summarize an instrument's character with various subjective terms. Figure 1 correlates these terms to various parts of the frequency spectrum (this is, of course, a very subjective interpretation).

For example, to add warmth, apply a gentle boost (3 dB or so) somewhere in the 200–500 Hz range. However, as in the previous case, remember that if possible, cutting is preferable to boosting—for example, if you need more brightness *and* bottom, try cutting the midrange rather than boosting the high and low ends (fig. 2).

#### OTHER EQ TIPS

Problem-solving and character-altering EQ should be applied early on in the mixing process since they will influence how the mix develops. But wait to apply most EQ until the process of setting levels begins; remember, EQ is all about changing levels — albeit in specific frequency ranges. Any EQ changes you make will alter the overall balance of instruments.

Another reason for waiting a bit is that instruments that sound great when EQed in isolation may not sound all that wonderful when combined. If every track is equalized to leap out at you, there's no room left for a track to "breathe." Also, you will probably want to alter EQ on some instruments so that they take on more supportive roles. For example, during vocals consider cutting the midrange a bit on supporting instruments (e.g., on rhythm guitar) to open up more space in the audio spectrum for vocals.

Finally, remember that EQ often works best when applied subtly. Even one or two dB of change can make a significant difference. However, inexperienced engineers often do such things as increasing the bass too much. This makes the sound too muddy, so they increase the treble; now the midrange sounds weak, so that gets turned up...you get the idea. One of your best "reality checks" is an equalizer's bypass switch. Use it often to make sure you haven't lost control of the original sound. (In a perfect world, all mixers would have bypassable equalization.)

So there you have it. Go forth and tweak those tones!

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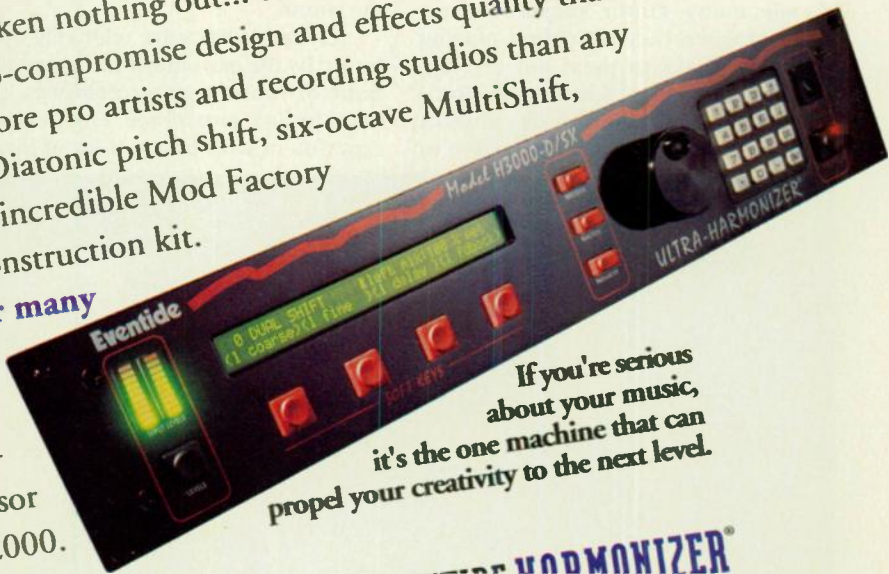


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# The Secret to Miking Guitar Amps

Ribbon mics and proper spacing are part of my techniques for good guitar sound

BY STEVE ALBINI

The sound of the guitar is a fundamental part of any rock band sound. Guitar players spend countless hours (and countless dollars) in search of a satisfying sound. In some cases, this sound alone is enough to define the band's aesthetic. Dedication to tone and sound is what leaves many guitar players unimpressed when they hear their playing squeaking back to them out of playback speakers in a recording session.

Given the limitations physics saddles us with, it is still possible to

record electric guitar in a convincing manner, such that the playback is evocative of — if not quite as loud as — the real thing, but it isn't easy. Successful recording requires adapting different methods and equipment to the job at hand, and the perceptive skills to select appropriate mics and methods.

## DAMAGE CONTROL

For years, the hack method of getting a foolproof guitar sound on tape has been to stick a dynamic mic (usually a Shure SM57 or a Sennheiser 421) tight in front of a speaker cone (often at an angle, for reasons lost to history but honored through tradition) and pump it to tape. If the engineer was feeling a little racy, he might compress the signal — either with an outboard compressor, or by saturating the tape with level.

All these techniques do damage to the sound.

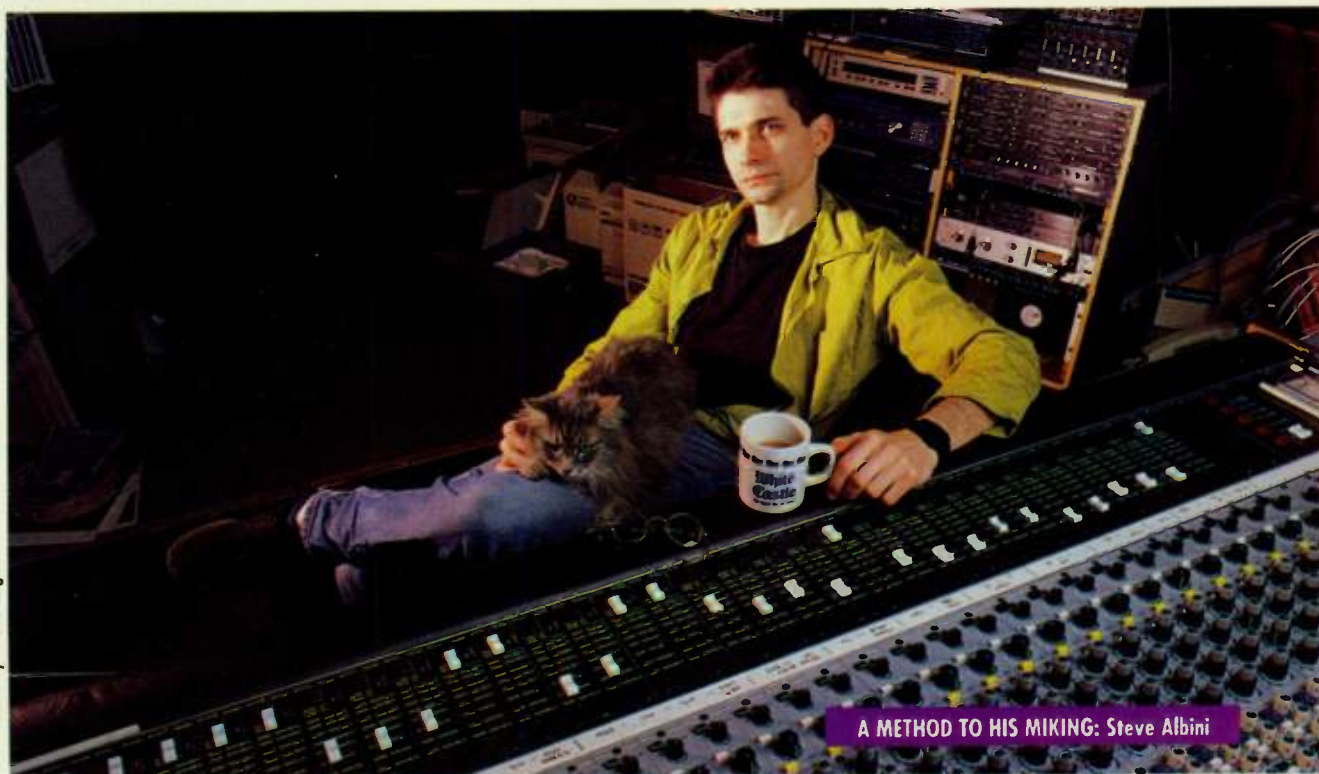
Dynamic mics are relatively unaffected by the extreme SPLs that exist in front of roaring guitar cabinets, and few studios encourage engineers to experiment with fragile mics of higher

quality if there is any risk of destroying them. Dynamic mic diaphragms are relatively heavy, with a good bit of mechanical impedance, overshoot, and ring, so they are far from ideal in compliance and accuracy.

Compression and saturation tend to overemphasize midrange components of the signal; this often flattens the character of the playing, hiding much of the articulation of the performance. These deficiencies are often compensated for with bright EQ, which introduces phase shifts and further skews the frequency response of the recording.

Out in the world, guitar isn't heard that way. Nobody's ear spends much time hovering over the cone of a Marshall cabinet while the guitarist makes wacka-wacka, and compression and EQ are purely electronic (rather than acoustic) phenomena. Little surprise that these methods don't survive critical listening.

Several good alternatives exist. One is to record the guitar in stereo, so it has something of a three-dimensional quality to it when played back. It makes sense,

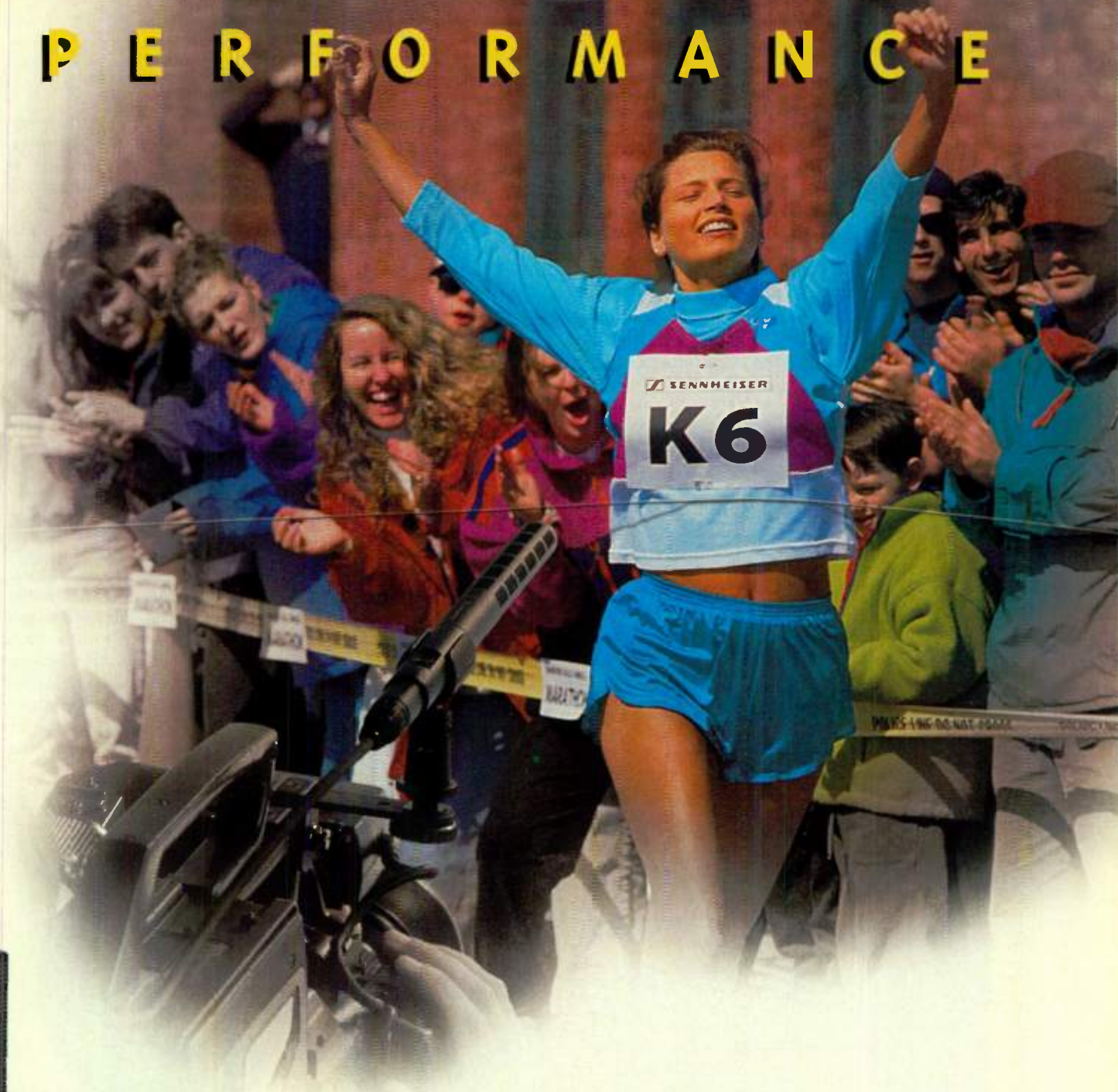


A METHOD TO HIS MIKING: Steve Albini

Photo by Steve Kagan



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as well, to record guitars with some ambient component to the sound, to provide more auditory clues that the sound is an acoustic one. These subtleties taken into account, it is common sense to use high-quality mics with good detail, and with frequency responses tailored to the particular guitar, amp, and cabinet at hand.

If the cabinet sound is bright and brash, there is a risk of the sound being tinny or fizzy when translated through Hi-Fi speakers. Using mics

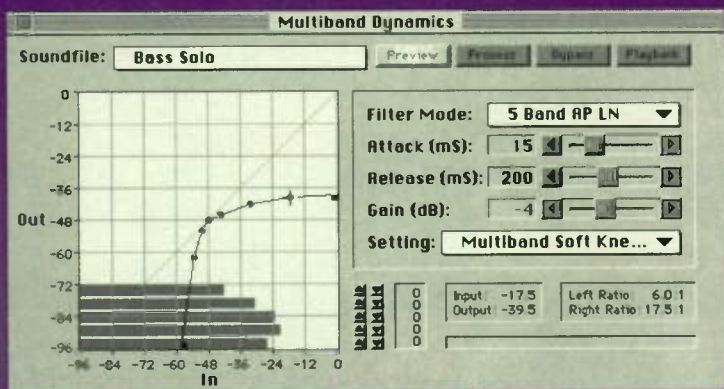
with a smooth, accurate treble character and strong low-end is important. Ribbon mics exhibit both these traits.

The ribbon microphone is one of the oldest, simplest, and most accurate of all microphone designs, and has properties that make it uniquely suited to recording guitar demos. The thin, low-mass metal ribbon is both the mechanical element (it moves with changes in air pressure) and the generating element (the ribbon being suspended in a magnetic gap, its move-

ment generates the current that goes down the wire as music). This arrangement allows the microphone to respond very quickly to transients and subtle modulations in air pressure.

There is very little pitch information coming out of a guitar cabinet at those frequencies, but the cabinet resonance, rhythmic transients, and physical pumping of air can generate a lot of energy down there in the subbasement. Capturing it on tape can make the recording seem more physical, and the careful use of proximity effect allows you to completely tailor the low-end by moving the microphone, sometimes by fractions of an inch.

One caveat about ribbon mics: the ribbons are fragile. Be careful not to swing the mic too quickly through the air or subject it to a blast of wind (say, from the vent hole in a cabinet), or you may tear the ribbon. The ribbons can be replaced, but the cost and nuisance will teach you to take more care. The ribbon can also be damaged by too-great excursion, so audition the mic while the amp is still at full throttle and listen for the unmistakable frying sound of the ribbon bottoming-



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Photo by Bob Weston

**GOOD-NATURED RIBBON: The British STC 4038**



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## TECHNIQUES MIKING

out against its internal screening. Try to orient the mic so that the ribbon is stretched vertically while in use, as this allows results in minimum physical distortion of the ribbon.

Many ribbon microphones are available, both as new stock and on the used market, at reasonable prices. They haven't yet been subject to the inflationary trendiness that vacuum-tube condenser mics have. Perhaps the finest microphone ever made of the ribbon type, the British STC 4038 (now made by Coles Electroacoustics) can routinely be had secondhand in the UK for less than \$500. The new version differs slightly in finish, output impedance, and construction from the original BBC-patented design, but none of the changes have degraded the sound quality. Be sure to have any mics you intend to buy tested, since reribboning is an expense whose inconvenience should be taken into consideration.

Other excellent ribbon mics for guitar recording are the RCA 77, 44, 74 "Junior Velocity," and BK5; the beyer 130, 160, and 500; and the Altec 625a. The beyer mics are currently being made, but the RCA and Altec mics are archaic, though readily available.

If the cabinet has a smooth-to-dull treble character, it becomes important to make sure none of the existing detail is lost in the recording. In a situation like that, the use of a high-quality condenser microphone should be considered, especially one with an electret design or a metallic diaphragm, since they can be of exceptionally low mass. The low-end won't necessarily bloom the way it might with a ribbon mic and there won't be any pleasing irregularities in the frequency response, but for a dry, bright, crisp recording, condenser mics are a good place to start. The metallic diaphragm mics made by Sanken and Milab and the tiny electret capsules on the Bruel and Kjaer 4000 series both seem to be quite flattering in this application, as do some of the Neumann Gefell KMV 582 series tube microphones if fitted with pads and appropriate capsules.

A new condenser microphone, David Manley's CL3 (being sold under the Langevin moniker), is earning its stripes as an excellent and accurate mic in this capacity, even though its large-diaphragm gold-sputtered capsule seems an odd choice for close-

mic use on an amplifier. Its high sensitivity may be a problem if your console has low headroom, but the mic itself exhibits no discernible distortion even with quite loud amplifiers. Its smooth, flat, and extended treble response is particularly surprising considering the styling that clearly mimics Neumann's 67 and 87.

### POSITION POINTS

Mic placement is critical as well. A mic on-center, with its diaphragm parallel to the plane of the speaker voice coil, will give the brightest, most accurate recording of the pistonlike movement of the cone. A mic off-center will be less direct sounding, and will also accentuate the distortion introduced by the ringing, resonating, and buckling (sometimes tearing) of the paper cone. Angling the mic smears and dissipates transients by introducing a phase error over the surface of the diaphragm. This will also cause high-frequency comb-filtering, which will make certain frequencies shrill and others dull.

Using a pair of mics on a speaker in different locations can be more convincing than either by itself. By using different mics tailored for each position, it is possible to generate a very complex, dynamic stereo image from a single speaker. When using combinations of mics in stereo, be sure to check the polarity of the mics, since manufacturers have different polarity standards, and a stereo signal with too much antiphase material can actually sound quieter than a mono signal.

Sometimes the sound quality of a single microphone is perfect, but the impression the monaural sound makes is a little lifeless. In a case like that, try using an inappropriate mic in a distinctly bad location as a stereo partner for the "good" sounding microphone. The contrast between the two in stereo can make the overall impression more flattering. I have several horrible microphones I reserve for this use.

Guitar cabinets are usually heard at some distance. It is usually possible to place a mic a few feet away from a cabinet, and by carefully balancing that sound with the direct mic(s), a more realistic impression can be made. For some reason, dynamic mics with limited frequency response often

*continued on page 104*



*D i g I t D i g I t D i g I t*

DIG IT

*D i g I t D i g I t D i g I t*

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*D i g I t D i g I t D i g I t*

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What are the best audio books in the biz? We asked faculty members at some of this country's hottest recording schools that very question. Their answers are, of course, completely subjective.

And if you are looking for a good recording school to attend, check out *New Ears: The Audio Career & Education Handbook*, compiled and edited by Mark Drews (New Ear Publications). It has all the important information on dozens of colleges across the country. (In fact, the "School Facts" in this article were taken from this book.)

## FIVE TOWNS COLLEGE DIX HILLS, NY

Luke Delalio, Prof. of Audio Engineering

**School Facts:** Offers an Associate Degree in Applied Science and Bachelor of Music degree; 2-year and 4-year programs; accredited by the Middle States Association and the New York

State Board of Regents; affiliated with AES, NARAS, SMPTE, NAB, NAMM, and SPARS.

**Contact:** Tel: 516-424-7000. Circle EQ free lit. #114.

**Title:** *The New Recording Studio Handbook*

**Authors:** John M. Woram and Alan P. Kefauver

**Publisher:** Elar Publishing

**Why:** We like this book a lot. The information is all pretty much on the money and the definitions are clear and easy to understand. The procedures described in the book are amazingly close to the way things are actually done in the studio. One of the things that bothers me about a lot of the other books is that many of them have a lot of technical inaccuracies. In fact, if you were to follow some of the instructions given in a few of them for aligning a tape deck, it would never come out right. Most books don't really give the student any idea of what to do in the studio.

## UNIVERSITY OF COLORADO AT DENVER DENVER, CO

Roy Pritts, Prof. of Music Engineering  
**School Facts:** Offers Bachelor of Science degree; 4-year program; accredited by NASM; affiliated with AES, NARAS, SMPTE, NAMBI, APRS, NAB, NAMM, SPARS, and MEIEA.

**Contact:** Tel: 303-556-2727. Circle EQ free lit. #177.

**Title:** *Handbook of Recording Engineering*

**Author:** John M. Eargle

**Publisher:** Van Nostrand Reinhold (2d Edition)

**Why:** I like Eargle's book for the second year because it is more scientific. The language is a little more elevated; it's written by a scholar. Second-year students are ready for Eargle. They understand the scientific approach better and they appreciate the more technical nature of his writing.

We also use John Woram's *Studio Recording Handbook*. We're very careful not to get the unauthorized version (*The Modern Studio Recording Handbook* by John Woram and Alan P. Kefauver). This fellow Kefauver claims to have cowritten that book with Woram, but John denies that, and says it's just a pirated version of his original work. I think he's more earthy and direct and just a lot easier for the first-year student to comprehend.

## INSTITUTE OF AUDIO RESEARCH NEW YORK, NY

Miriam Friedman, Director

**School Facts:** Seven-month program; accredited by the ACTTS and NYS Ed Dept.; affiliated with AES, SMPTE, SPARS, and MEIEA.

**Contact:** Tel: 212-677-7580. Circle EQ free lit. #115.



Photo by Jon Pickrow

The top recording schools tell the tale of the tomes

BY STEVE SCHWARTZ





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**Title:** *Audio In Media*

**Author:** Stanley Alten

**Publisher:** Wadsworth Publishing

**Why:** This book is extremely well organized and offers separate sections on equipment, production, postproduction, etc. It's also very accessible. The

book was written with students in mind — not engineers — so there's not an overabundance of technical jargon.

**THE RECORDING WORKSHOP  
CHILLICOTHE, OH**

Jim Rosebrook, Director

**School Facts:** Five-week program; accredited by the Ohio State Board of Schools; affiliated with AES and SPARS.  
**Contact:** Tel: 800-848-9900. Circle EQ free lit. #116.

**Title:** *Modern Recording Techniques*  
**Author:** David M. Huber and Robert A. Runstein

**Publisher:** Macmillan Computer Publishing/Howard W. Sams & Co.

**Why:** We've been using it since the fall of last year. I think the new edition of *Modern Recording Techniques* is accessible in its presentation to the beginner student. It also has chapters on recent digital audio technology and MIDI and stuff.

**CONTINUING EDUCATION**

Keep up to date and learn new techniques with these books and videos.

**The Musician's Home Recording Handbook**

By Ted Greenwald; GPI Books

This book gives a good introduction to the world of recording. In it you'll learn what it takes to make a good home studio, as well as the basics of recording techniques, sound, and other audio properties. It also describes some advanced techniques for those who know their way around a board.

**MIDI for the Professional**

By Paul D. Lehrman and Tim Tully; Music Sales Corporation

If you are seriously into discovering all that MIDI has to offer, this book is for you. Every category and type of MIDI device and software is examined in easy-to-follow language, with many illustrations along the way. Some of the topics covered are: algorithmic processors, CD-ROMs, Multimedia PC (MPC), MIDI Show Control, QuickTime, patchbays, SMPTE, and tempo maps.

**Practical Recording Techniques**

By Bruce and Jenny Bartlett; Howard Sams & Co.

This book covers everything you need to know about recording — from the basics of sound all the way through to listening to the final project. Among the topics discussed are: the selection and placement of mics; studio acoustics; digital studio and hard-disk recording techniques; identifying and eliminating hum and noise; working with MIDI; and distinguishing good sound from bad.

**The MIDI Home Studio**

By Howard Massey; Music Sales Corp.

For those of you just getting into MIDI, this book takes you through a step-by-step explanation of how MIDI works. It also provides information on how to hook up MIDI devices and use them.

**Digital Projects for Musicians**

By Craig Anderton, Bob Moses, and Greg Bartlett; Music Sales Corp.

This hefty volume will let you see MIDI in a different way: it tells you how to build or customize 20 MIDI devices. The products you'll build include a chord generator, a MIDI data monitor, a 64-note custom MIDI controller, a keyboard mapper, and a relay driver.

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**Shaping Your Sound Series**

First Light Video Publishing

These videotapes let you see first-hand how to improve your recording techniques. Hosted by recording engineer, producer, and teacher Tom Lubin, the series covers all aspects of audio recording. Titles include *Shaping Your Sound with Microphones; ...with Mixers and Mixing; ...with Equalizers, Compressors, and Gates; ...with Reverb and Delay; and ...with Multitrack Recording*. Also available is a full catalog of the *Master Classes in the Media Arts* educational videos.

**CONSERVATORY OF RECORDING ARTS  
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PHOENIX, AZ**

Kirt Hamm, Administrator

**School Facts:** 15-week-plus-internship program; accredited by the CCA/ACTTS; affiliated with AES and SPARS.

**Contact:** Tel: 602-265-6383. Circle EQ free lit. #117.

**Title:** *Modern Recording Techniques*  
**Author:** David M. Huber and Robert E. Runstein

**Publisher:** Macmillan Computer Publishing/Howard W. Sams & Co.

**Why:** We like it because it starts out from a basic, entry-level perspective and works its way up to a professional engineering text. It has very good explanations of signal flow all the way through to hands-on studio techniques. Our instructors really like the layout of the book.

**L.A. RECORDING WORKSHOP  
LOS ANGELES, CA**

Chris Knight, Director

**Contact:** Circle EQ free lit. #118.

**Title:** *Modern Recording Techniques*  
**Author:** David M. Huber and Robert E. Runstein

**Publisher:** Macmillan Computer Publishing/Howard W. Sams & Co.

**Why:** We think it's the most readable and comprehensive text with the most accurate information. It's also broad-based enough so that someone who is just starting out in their training can understand it, but someone who has already had some in-depth experience won't be bored by it.

**OMEGA RECORDING STUDIOS SCHOOL  
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**School Facts:** Six- to 38-week programs;



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For years, we've designed and built boards for some of the world's most influential musicians and producers. And while they may be drawn to Soundtracs based on smart features, logical design and high quality, the reason they choose our consoles is *sound*. From our top-end Jade production console to the new Topaz 24, a versatile dual-input inline design with either 24 or 32 channels, Topaz is immediately distinguished by our noticeably warmer and smoother EQ (full-band with dual sweep) mids) coupled with exceptional trans-

parency throughout. You can actually *hear* the difference a Topaz can make on your recordings — something you can't do with other consoles. We also included features of critical importance when it comes to focusing on what truly matters in recording and mixdown. Dedicated EQ on all tape returns without compromising your primary equalization. SOLO and MUTE functions on all tape and

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**TOPAZ**  
SOUNDTRACS INC.  
CIRCLE 67 ON FREE INFO CARD

Suggested list price for Topaz 24-channel, \$3,995; Topaz 32-channel, \$4,995. Soundtracs is exclusively distributed in the U.S. by Samson Technologies Corp.

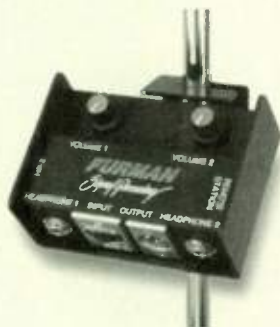


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The **HA-6 Headphone/Monitor Amp** is ideal for the studio without a separate control room. Plug up to six headphones into the front panel, and each musician has his or her own volume control. It does double duty as a 20 watt/channel power amp for playback over small monitor speakers. If necessary, expand it by adding...

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This compact unit contains the same amply-powered 20W/channel headphone amp as the HA-6, but with only one built-in headphone jack. Put it in the control room and attach a chain of HR-2's on the studio floor. It can also do double duty driving small monitor speakers.

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accredited by the MD Higher Ed Comm and VA; affiliated with AES and NARAS.

**Contact:** Tel: 301-320-9100. Circle EQ free lit. #119.

**Title:** *The New Recording Studio Handbook*

**Author:** John M. Woram and Alan P. Kefauver

**Publisher:** Elar Publishing

**Why:** It seems to have been written with the beginner student in mind. Some people coming into these schools really don't have a clue, but they still need to go home and have a book they can relate to. Look at the way a lot of books use a term like overdubbing. We all know what that is. But there are always some students who will go, "Overdubbing?" And Woram knows that and provides a three-paragraph description of overdubbing in his book. The book also has a lot to offer for more advanced students as well.

**Honorable Mention:** *Yamaha Sound Reinforcement Handbook*

## UNIVERSITY OF MIAMI CORAL GABLES, FL

Ken Pohlmann, Dir. of Music Eng.

**School Facts:** Bachelor of Music and Master of Science degrees offered; 4-year and 2-year programs; accredited by NASM; affiliated with AES and SMPTE.

**Contact:** Tel: 305-284-2245. Circle EQ free lit. #120.

**Title:** *Sound Recording Handbook*

**Author:** John M. Woram

**Publisher:** Macmillan Computer Publishing/Howard W. Sams & Co.

**Why:** We like it because it offers a great overview of all the studio gear. It's also a little more high torque in terms of its technical nature. Our students have taken calculus and courses of that nature, and they expect more of a mathematical treatment in their studies. And this book is almost unique in that respect.

## MIDDLE TENNESSEE STATE UNIVERSITY MURFRESBORO, TN

Chris Haseleu, Coordinator of Audio Technology

**School Facts:** Bachelor of Science degree offered; 4-year program; accredited by SACS; affiliated with AES, NARAS, NAMM, SPARS, and MEIEA.

**Contact:** Tel: 615-898-2578. Circle EQ free lit. #174.

*continued on page 102*

CIRCLE 39 ON FREE INFO CARD



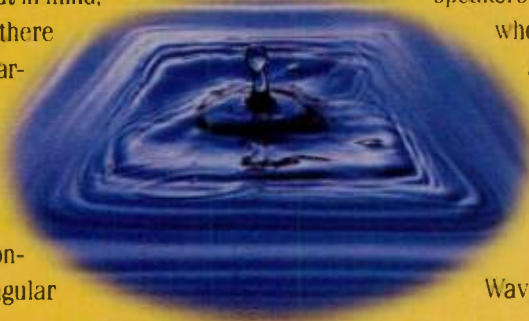
Drop a pebble in the water. It sends out ripples in a circular pattern.

No surprise there. That also happens to be the way sound travels. In circles.

With that in mind, why aren't there more circular-shaped horns?

Good question.

Traditionally, rectangular



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Speakers we aptly call the WaveForce™ Series.

One look will tell you there's a lot more to these



WF 206

speakers than just a whole new horn section. Take the new cross-overs, for instance.

The Wave Force

reflection. Ports are ideally placed and precision-tuned.

The cabinets have large rounded corners to minimize edge diffraction. Ergonomic flush-routed handles maximize ease of handling. A minimal baffle reduces cabinet interference when used in large arrays.

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And as you can obviously see, one size doesn't fit all.



WF 215SB

The WaveForce Series is comprised of five different models. Loudspeakers that cover a wide range of program, stage monitor and subwoofer applications — everything from an uplifting Sunday morning service to a Sold Out Saturday night concert.

Suffice to say, the new WaveForce Series is bound to make a lot of waves in the industry. And we don't mean the kind with corners.



WF 112

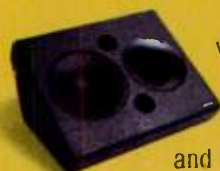
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Mark came up with something we call the Yamaha spherical wave guide. A radical new design that represents a tremendous improvement for sound reinforcement speakers as we know them.



WF 112M

With Mark's help, we also developed new cabinets and crossover designs, and in the process,



WF 115

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World Radio History



# Listen To The Band

How I recorded and mixed The Band's newest release, *Jericho*

BY AARON L. HURWITZ

The Band has always used project studios as part of their recording concept. Their latest release, *Jericho*, is no exception. Eight of the 11 songs on the CD were recorded in home-based studios.

The group presently consists of Levon Helm, drums and vocals; Randy Ciarlante, drums and vocals; Rick Danko, bass and vocals; Garth Hudson, keyboards, sax, and accordion; Richard Bell, keyboards; and Jim Weider, guitar. When it was decided to make another album, the pressure was on musically and technically to make a great CD and to keep as close as possible to The Band's recording tradition.

The decision was made to begin the project at Levon Helm's studio in Woodstock, NY — a spacious barnlike structure with ceilings 30-feet high in some parts of the room, two bluestone walls, and hardwood floors.

John Simon, The Band's original producer and coproducer of *Jericho*, thought it best to rent equipment from a local studio, Neveva Sound. Chris Andersen and I were brought in as the engineers. The basic equipment was a TAC Scorpion board and Stephens 821B 24-track tape machine. The control room is situated above the studio room and there is no glass separation between the two rooms — just open space. I happen to like this type of setup because it eases communication between the players and the engineer and producer.

There can be technical drawbacks to this approach, however, such as monitoring too loud or not hearing exactly what's going to tape until playback. But because of the open setup, the producer and engineer can become part of the music as it is being created.

One of the best ways of tracking with the band is to have all the players in the same room with complete visual contact between them while capturing the vocals live. This was a challenge, since Levon was singing and playing drums and I had to concentrate on keeping the drum leakage to a minimum on the vocal track. I had to try different microphone placements. Most of the time we were tracking two drummers, two vocals, electric keyboards, guitar, bass, and acoustic piano in the same room.

After a few basic tracks, we started doing overdubs and the sessions continued long into the night. Because The Band was recording electric and acoustic instruments as well

as vocals, it became apparent that using 48 tracks would be inevitable. To keep costs down, we would have to use project studios as much as possible until mixing. The mix studio would need two 24-track machines with a computerized console. By the time we completed the Woodstock phase at Levon's studio, we had seven solid tracks that we then moved over to Neveva Sound Studios where we worked on overdubs.

## REMEMBERING RICHARD

Back in '85/'86, right before Richard Manuel (The Band's original piano player and lead vocalist) passed away, he recorded a few of his favorite songs at

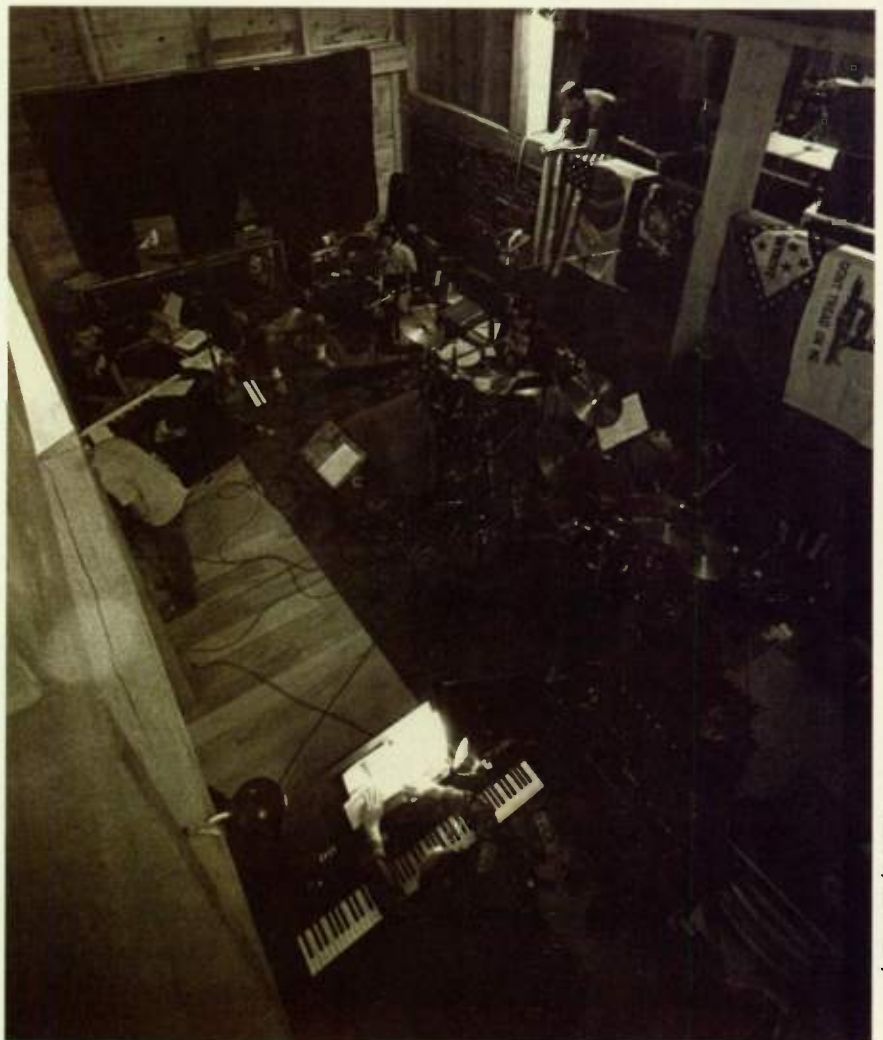


Photo by Elliot Landy

BAND IN A BARN: Levon Helm's spacious project studio.



# THE STUFF THAT LEGENDS ARE MADE OF.

**Talent. Hard work. A little luck.  
And the right equipment. That's the  
stuff that legends are made of.**

Legendary musician, producer, engineer, arranger and songwriter Alan Parsons knows what makes a legend. So we asked Alan to test the new Audio-Technica AT4050/CM5 multi-pattern, large diaphragm studio capacitor microphone.

"To say that the CM5 is a serious microphone would be an understatement," says Parsons. "It's up there with the very best. It gives me a realistic, warm and true representation in the studio."

"My experience with the CM5 and other mikes in the 40 Series has convinced me that Audio-Technica now ranks as one of the very best manufacturers of high quality microphones. The clincher is that the CM5 offers incredible performance for much less than its competition."

Symmetrical direct-coupled electronics in the AT4050/CM5 provide excellent transient response and low distortion.

Featuring three switchable polar patterns (cardioid, omni and figure-of-eight), the CM5 combines warmth and transparency with super-high SPL capability.

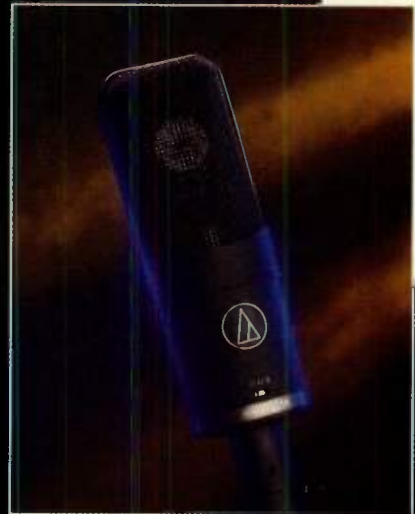
Find out for yourself what Alan Parsons has found in the new AT4050/CM5. Write, call or fax for more information. Audio-Technica U.S., Inc., 1221 Commerce Drive, Stow, Ohio 44224 (216) 686-2600 Fax: (216) 686-0719.



**audio-technica.**

CIRCLE 11 ON FREE INFO CARD

**Alan Parsons and  
the new AT4050/CM5**



*Alan Parsons will be using Audio-Technica microphones exclusively on his upcoming world tour to promote his latest Arista Records release "Try Anything Once." (CD 07822-18741-2)*



Woodstock Recording Studios, an 8-track studio. On those recordings, he did a great rendition of "Country Boy" that we wanted to include on the new album. Those sessions were recorded on a Tascam 80-8 with dbx. The challenge was to make that recording sound like the current tracks. We went to Bearsville Studios and bounced the 8-track recording over to 24 tracks and began doing overdubs.

I asked Jim Stabile, head engineer at Pyramid Recording Studios in Tennessee, to make a 2-inch, 24-track slave reel so that I could go to my home-base studio, NRS Recording Studio in Hurley, NY, to begin working on "Country Boy," as well as the other finished songs. At this point, I had taken over as coproducer with The Band for the *Jericho* CD.

NRS is a well-known project studio owned by producer/engineer Scott Petit. We started finishing the vocals at NRS. I mostly used Neumann U67's going through Demeter preamps directly into the tape machine with no EQ. I recorded Garth Hudson's extensive synthesizer setup through Gaines



Photo by Elliot Landy

**FRESHLY SQUEEZED:** From left to right: Vassar Clements and Garth Hudson.

stereo microphone preamps. Garth's voicings and sounds started adding new textures to the music and helped the songs come together.

Unfortunately, that was not my only dealing with a member who had passed away. A few years earlier, The Band had cut a couple of unreleased tracks for Sony at Beartracks Studios in Suffern, NY. One of the tracks was Bruce Springsteen's "Atlantic City." Stan Szelest, who had replaced Richard Manuel on piano, was one of the keyboardists on the track. Unfortunately, a short while after recording "Atlantic City," Stan passed away. This track was a must for the new CD.

We brought the tape back to NRS

and started overdubbing with the current members of the band. This song was tracked with Dolby SR, where all others were 30 ips with no noise reduction.

But it wasn't over yet: Garth Hudson had recorded Champion Jack Dupree a few years earlier playing piano on another rendition of "Blind Willie McTell." So when we decided to do the new version (which was in the same key), we got the tempo map of the old one to enable us to use Champion Jack's piano parts, since he had died earlier in the year. The first step was to extract his parts from the original, which I did by recording his piano to a DAT. Then I loaded the DAT onto Pro Tools and

# PARAMETRIC PERFECTION

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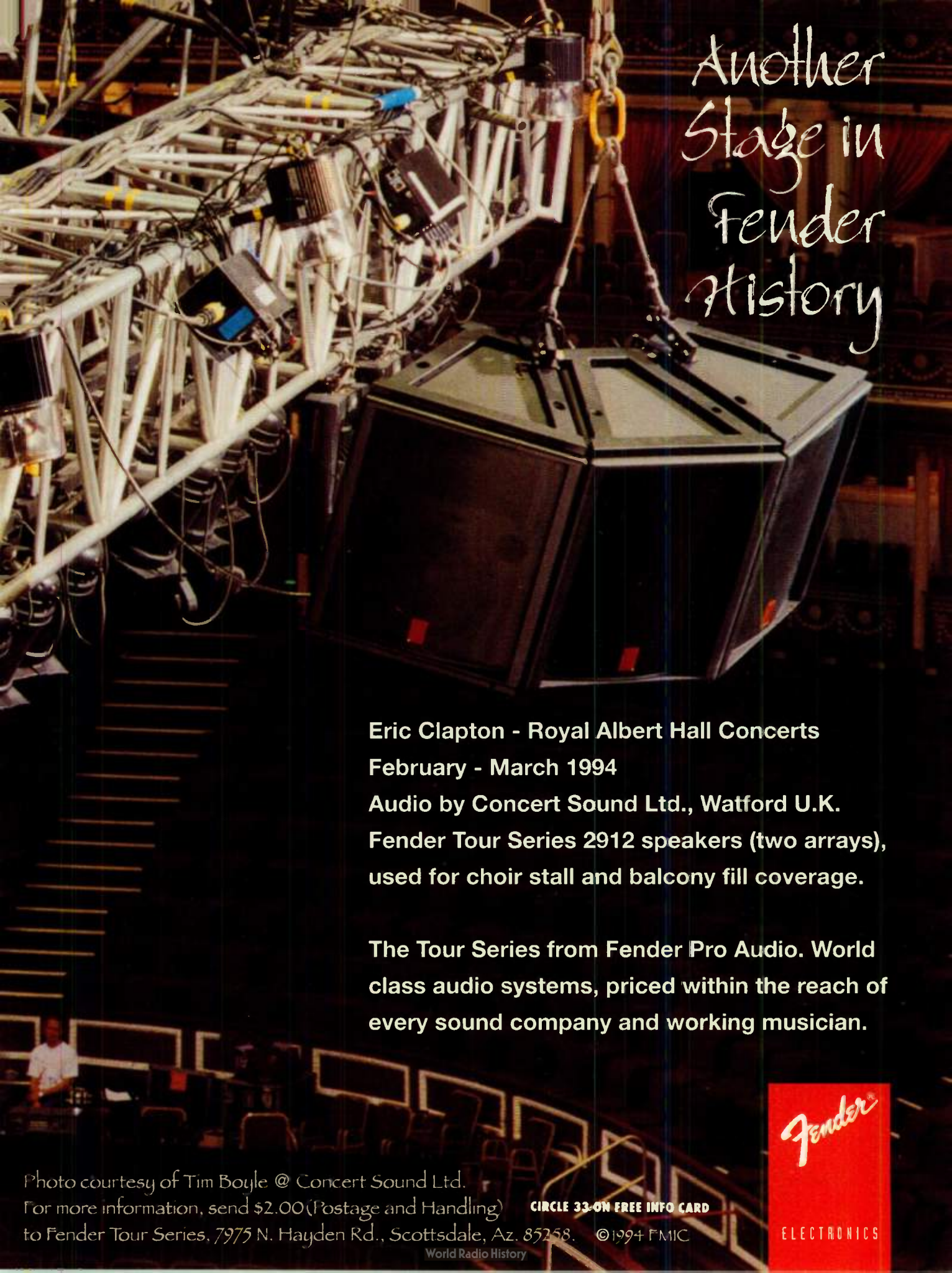
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# Another Stage in Fender History

**Eric Clapton - Royal Albert Hall Concerts  
February - March 1994**

**Audio by Concert Sound Ltd., Watford U.K.**

**Fender Tour Series 2912 speakers (two arrays),  
used for choir stall and balcony fill coverage.**

**The Tour Series from Fender Pro Audio. World  
class audio systems, priced within the reach of  
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Photo courtesy of Tim Boyle @ Concert Sound Ltd.

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World Radio History

**Fender**

**ELECTRONICS**



started working his parts in. Whenever the piano started getting out of sync, I would experiment with offsetting the timecode until the parts worked. Then I recorded the piano onto the multitrack.

To make matters even more complicated, while we were recording, The Band had also been performing live. Two songs, "Blind Willie McTell" and "Blues Stay Away From Me," had been working so well during their shows that we decided to add these songs to the CD. To do this we went to Bearsville

Recording Studios because the band has so much history there and there was no time to set up Levon's studio again. We booked the studio for two days. We moved into Studio B, which is Bearsville's mixing room, and had to make some quick changes. The room is equipped with an SSL SL 6000 Series and a Studer A800. I insisted on beefing up the playback in the studio room. Whenever I am cutting tracks with a full band, I have to have good playback through speakers for the musicians to

hear what they have played and not have to continually come into the control room. We wanted to capture the live Band, sound and we set up two drummers as close together as possible with Levon singing lead. I set up two vocal microphones for Levon, one Neumann U67 on top of the other, the top microphone out of phase with the bottom one. I had him sing into the top microphone. This canceled out most of the drums and I was able to use Levon's vocal track. I had both keyboards going direct and we built a soundproof booth to record Jim Weider on acoustic guitar. Rick Danko was also in a booth where he sang and had the bass going direct.

## THANK YOU EQ READERS!

An open letter from Morris Ballen, Disc Makers Chairman

Dear Friends,

A hearty "thank you" to the readers of EQ Magazine. You've helped make Disc Makers the number one independent CD and cassette manufacturer in the nation! We couldn't have done it without your overwhelming support.

Why is Disc Makers such a successful national company? I think it's because we put as much effort and hard work into your graphic design and printed inserts as we put into your audio quality.

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If you haven't seen our **brand new 1994 full color catalog**, call today for your free copy. We offer the most complete packages in the industry and, best of all, we provide the **fastest turnaround**. See for yourself why serious producers and musicians insist on using Disc Makers.

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### INTO THE MIX

It was now time to mix, and with all the varied tracks and different sounds resulting from recording in so many studios I needed to make it all sound consistent. I called Bob Ludwig, who would be the mastering engineer for *Jericho*. He suggested that I mix through the Apogee 500E filters and only use Sound Tools for edits or fades, and said that he would do the spacing and level changes.

I then went to Lookout Mountain, TN, to Pyramid Recording Studios, to mix. Pyramid has two 24-track Otari machines, a Sony 3000 console, and a good assortment of outboard gear. I rented some vintage gear and some modern tube compressors and EQs. I had to search for the best combinations and stick with them. I experimented with the guitars and finally decided that the Pultec EQP-1A's were working best. Since I used very little EQ when cutting the tracks, I found that the Focusrite ISA worked great on Richard Bell's acoustic piano. To get the vocals clear and warm, I used the API Lunch Box with the Summit DCL-200 stereo compressor. Realizing that I did track most of the vocals with tube microphones (U67's), I used a tube compressor to mix with. The new affordable tube gear is moving in a great direction.

The drums were enhanced on some of the songs with the Alesis D-4 drum module and Bob Clearmountain's drum samples triggered through the t.c. electronics 2290. I never replaced any drums, but used some of these sounds as support.

Despite the numerous studios used and the various "old" recordings, I enjoyed recording and mixing *Jericho* and hope that you enjoy listening to it. **EQ**

AV03941P

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# Don't Mess Surround.

There's a lot of confusion about surround sound recording these days, and as a project studio owner you don't want to mess around with the wrong format. ∞ Cinema surround is fine for the movies, but what about your music? Now you can record with the world's finest music surround sound system, Circle Surround™ from RSP Technologies. ∞ Our patent pending intelligent process will enable you to position instruments, vocals, sound effects and so on, anywhere in the circle in conjunction with a four, or five, speaker surround system. Complete smooth panning of the entire 360 degree sound field is possible. ∞ Circle Surround™ uses no artificial ambience effects, and no schemes to mess up your original source material. Just the best surround sound process available for the most dramatic and realistic music and audio/video surround productions. ∞ Compatible with exist-



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your music, your soundtrack, your audio/video production, in good hands with Circle Surround™ and leave the popcorn at the movies. Give us a call, or visit your RSP Technologies dealer and quit messing around when it comes to surround.



# RSP Technologies

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World Radio History



# Array Series. Designed To Impress Everyone Who Has Heard It All Before.



The competition to produce the "ultimate" sound reinforcement system is fierce. Each new system design brings claims of having *achieved perfection* or touts *this is the one*. Yet, in time, you can expect the very same manufacturers to introduce new models claiming to have further *perfected perfection* or that their *unorthodox* technology has rewritten the laws of physics. Sound familiar? So how do you impress everyone who has heard it all before? Simple.

JBL engineers have drawn upon proven advancements in loudspeaker design and state-of-the-art digital electronics to create Array Series: a comprehensive sound reinforcement system concept with performance second to none. Developed as dedicated array elements, Array Series systems can be easily configured to fill any venue with seamless coverage from a deceptively small package.

Such performance could only be achieved by designing the exact transducers required for the job. The Array Series is the first professional loudspeaker system to use neodymium magnets. The LF transducer's unique motor structure topology also includes proven Vented Gap Cooling (VGC™) and a deep copper-sleeved gap to significantly reduce distortion and power compression.

The 38 mm (1 1/2 in) exit HF compression driver also uses a neodymium magnet structure, a Coherent Wave™ phasing plug and damped titanium diaphragm. The result is effortless and reliable high frequency output with outstanding accuracy. A 45° Optimized Aperture Flat-Front Bi-Radial® horn assures proper matching and summing of multiple Array Series systems.

The 13 ply hardwood enclosure has 45° sidewalls to match the horn coverage in arrays, and is reinforced with integral steel attachment hardware, designed to interface with S.A.E.E.™ flying hardware for quick and secure cluster assembly.

*Pictured above, Array Series installation at the Grand Palace, Branson, Missouri.*

System functions, such as crossover filter points, transducer acoustic center alignment, system equalization and protective limiting are achieved totally in the digital domain by the ES52000 Digital Controller. The ES52000 employs Finite Impulse Response (FIR) filters for zero phase shift and requires no amplifier output sensing cables, so you can expand your system by adding Array Series loudspeakers without having to add additional controllers.

The sum of these parts is Array Series: a complete system providing extremely high power handling, very high sound pressure levels with full dynamic range, low distortion and unmatched fidelity. Truly a system capable of impressing *anyone who has heard it all before*.

Call or write for detailed specifications. Or, for more *immediate* response, you can get current product information on Array Series, the ES52000 Digital Controller and all JBL Professional products, *VIA FAX* by calling (818) 895-8190.



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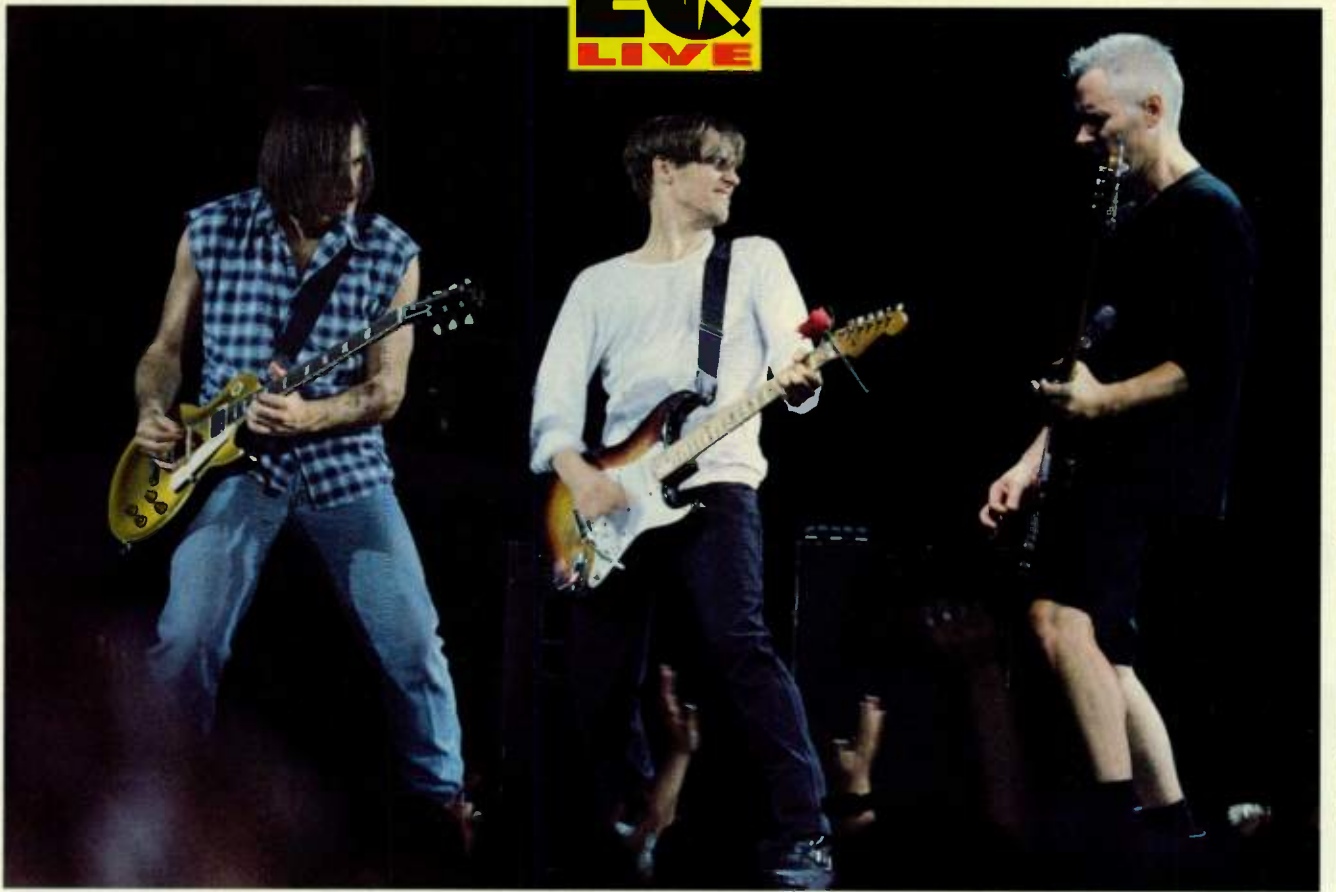
*pages filled with sound reinforcement tips, tales, techniques, and tour tools.*

**MORE LIVE STUFF  
THAN EVER  
PAGE 77**

THE • ART • OF • PURE • SOUND

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## ON TOUR WITH THE ADAMS FAMILY

■BRYAN ADAMS' "So Far, So Good" tour is parked at the Brendan Byrne Arena in E. Rutherford, New Jersey. Bryan's tour is breaking attendance records all over the world. The band has already toured Vietnam, Korea, Africa, Europe, and now, America. When all is said and done, Bryan will have been the first rocker to perform in many of the countries he played this tour. Bryan explains, "I really wanted to bring rock and roll to places where they'd never seen a show before. It's so amazing to see these parts of the world, and even more amazing to play there. There were nights in Vietnam where we played to 50 or 60,000 people and they were just eating it up. They were jumping on the stage, clapping their hands, rockin' out. It was great fun."

### STRIPPED DOWN IN NJ

This tour could most accu-

ately be described as a less-is-more approach. Bryan and his four-piece band play on a stripped-down stage (see diagram) optimized for running room and maximum party space. This tour features the familiar faces of Bryan's band, including, Keith Scott, guitar; Dave Taylor, bass; Tommy Mandel, keyboards; and Mickey Curry, drums. Everyone's rig was chosen for its ability to produce that giant arena rock sound without sounding muddy.

Tommy leads the equipment pack with a MIDlled acoustic piano miked with two Shure condensers and a Helpinstill pick-up. His rig is controlled with a Sycologic MIDI patchbay. This unit allows Tommy to recall all of the routing and program changes for each song throughout the entire show. Tommy feels that it's an indispensable part of his rig.

Dave and Keith are each playing through a couple of custom cabinets with only a few guitar changes. Guitar effects are mostly left up to the sound man with occasional Lexicon and Boss effects from the stage. Bryan switches between a Fender Strat and a vintage Gretsch guitar.

Drums are miked with Shure, AKG, and Sennheiser mics and are not being triggered. Mickey Curry actually uses two snare drums during the show; his main 7-inch snare for most songs and an 8-inch brass snare off to his left for the huge-sounding power ballads. It's a very effective way to achieve the natural recorded sound.

The band is mixed

through a Soundcraft Europa console with 40 mono inputs and 12 stereo input modules. The system was custom designed by Jason Sound of Vancouver. Acoustics were nothing short of difficult (which is typical of a hockey arena). Tommy Mandel claims that it's like "playing in a cave." Mandel continues, "When we play outdoors, the sound is a lot tighter and, for the most part, I think better. The Meadowlands especially was a giant echo chamber, and you could hear the sound bouncing all over the place." The signal time delay problem of the different venues doesn't affect the band's playing because they have come to rely heavily on

THE BEST OF BRYAN ADAMS HITS THE ROAD WITH A MULTINATIONAL TOUR

BY DAVID FRANGIONI





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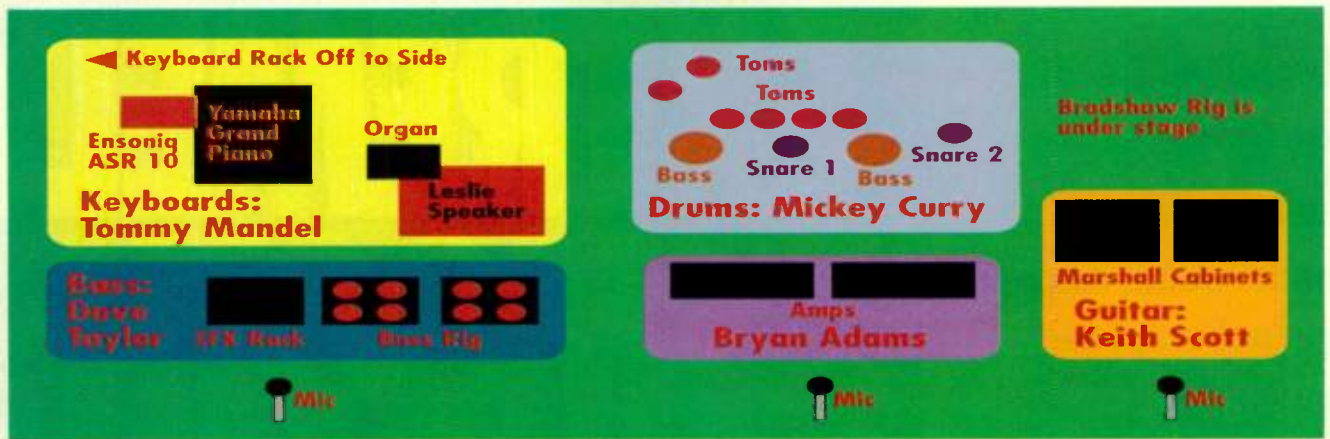
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# EXTREMELY SMOOTH







STAGED EVENT: Adams & Co.'s setup.

their monitoring system and have also "just gotten used to it."

The sound man for this tour is longtime Adams mixer Jody Perpick (for all you trivia buffs, this is the Jody of "Jody got married" in the hit song "Summer of 69"). As for Bryan's vocals, Jody explains, "Bryan

sounds loud, but actually sings soft. It's a real challenge to elevate him above stage sound level. He'll only sing through a Shure SM58 — nothing else. We even tried to trick him by putting a SM87 mic inside of a SM58 ball, but he sussed it out pretty quick! As for lead vocal effects, I use a Lexicon

480L for that huge-but-tight familiar Bryan Adams vocal sound. It really works great on Bryan's voice."

#### DOWN IN BACK

Three quarters of the way through the show, the band actually performs at the opposite end of the arena (primarily for the fans at the

back of the hall). Two songs before they go to the back of the arena, the crew sets up a minirig with a stripped-down drum kit, Farfisa, and a couple of amps. The crowd doesn't know what's coming next when all of a sudden, Bryan and the band are at the back of the hall.

It's rare nowadays

## WHO YA GONNA CALL: GLITCH-BUSTERS

It's minutes before the show is scheduled to start and the computer that runs the light show is down and out! Bryan had asked me to find several programs for him and transfer them to his PowerBook Duo 230. Normally, this would be easy: I'd use a Duo Dock (which Bryan owns, but unfortunately forgot) or Mini Dock, or even the Floppy adapter with floppy dock. (The "Dock" for Macintosh is an innovative system that allows you the flexibility of a PowerBook with the power of a desktop Mac. It consists of a PowerBook Duo that slips into a docking station. The station could have 3 NuBus slots, a 21-inch color monitor, FPU, and hard drive. This gives you the flexibility to seamlessly use two Macs in one.) Of course, none of these items were available and the job needed to be done now. Well, I had a great idea. I'll load all of the programs and related data into my PowerBook 100 via my Floppy adapter (I know what you're thinking, but it's a different adapter than the one necessary for a Duo). After loading them onto my hard drive, I'll then transfer the programs through AppleTalk to Bryan's Duo. Well, my idea worked until the last (and most important) program needed to be transferred. The program would not install on a 680X0-based machine. As most of you are aware, the PowerBook 100 is the only PowerBook that is 680X0-based! This was the worst night I could have chosen to leave my PowerBook 180 at home!!

I asked Bryan if anyone else on the tour had any other Mac besides the two with which we were dealing. He consulted with tour manager extraordinaire Chris Chappel and discovered that Pat Brannon, the light man, had a PowerBook 145B. Evidently, the new generation of stage lighting actually has a Macintosh front-end and Pat uses the 145B (with no backup — shame, shame) as his main axe. It was 7:35 and the show was to start at 7:45 sharp. (There is a 10:30 curfew at the Meadowlands and it is imperative that there are no delays. Overtime costs can soar past \$10,000 per half hour in a sports arena and Bryan typically plays close to three hours on stage.) Pat raced backstage with the Mac and I booted it up. I was stunned. The question mark came up and the computer would not boot. At this point I figured that we could forget transferring the last program until after the show. I called Pat to come and get his Mac. I said to him, "Here's your Mac, we'll have to do the transfer after the show. It isn't seeing a System so we must need the external hard drive that you're booting from at the light board." Right?

Wrong. There is no external hard drive at the light board. The hard drive is in the Mac and seems to have crashed. Oh no. After years of solving Mac mysteries backstage, on the stage, and underneath the stage, I was on the spot. Bryan, Pat, and Chris looked at me. "You can fix this hard drive, can't you? We go on in three minutes." I had one disk with me and it was Disk Tools (don't leave home without it). Immediately, I got the Mac to boot from Disk Tools and we were in business. It turns out that Pat's assistant had accidentally thrown the System Folder in the trash. I dragged the new system from floppy to hard drive, rebooted to see if it worked and discovered that it did. Pat didn't even put the 145B to sleep. He just carried it back to the light board while it was up-and-running and did the show. Amazingly, they were not late and the show went without a hitch.

—David Frangioni



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were any sequencers or taped backup music. Tommy Mandel uses no enhancement other than the keyboard parts on the record. The guitars and vocals sound just enough like the record to satisfy die-hard fans, but live enough to excite concert goers. This show is pure rock n' roll. Straight ahead, go for it, pop music. **EQ**

## JUST THE FACTS

### Cast of characters:

Bryan Adams — Lead Vocals, Guitar

Keith Scott — Lead Guitar, Vocals

Tommy Mandel — Keyboards, Vocals

Dave Taylor — Bass Guitar, Vocals

Mickey Curry — Drums, Percussion,  
Vocals

Jody Perpick — Front of House mixer

Glen Collett — Monitor mixer

Willie Williams — Lighting designer

Pat Brannon — Light man

Mac Mosier — Lights

Lance Stadnyk — Bryan & Dave's tech

Rick Salazar — Keith's tech

Tom Morrongiello — Keyboard Tech

Lorne Wheaton — Drum Tech

Paul Medeiros — Piano Tech

David Frangioni — Computer & MIDI consultant

### Equipment List:

**Mickey Curry** — Yamaha Recording Custom 8-, 10-, 12-, 16-, 18-inch toms with 22-inch bass drums [2], 7-inch birch snare drum, 8-inch brass snare (aux), Zildjian cymbals, Latin Percussion cowbell

**Dave Taylor** — Fender Precision Bass, Gallien-Krueger amp, Electro-Voice speakers.

**Bryan Adams** — Vox amps, Fender Strat, Gretsch guitar fed through a Pete Cornish rack

**Keith Scott** — Fender, Gibson, Gretsch, & Paul Reed Smith guitars, Marshall cabinets, VHT preamp, custom Bradshaw rig, Washburn acoustic guitar, Boss, Lexicon effects, and a Vox wah-wah

**Tommy Mandel** — Yamaha Grand piano w/Gulbrandsen MIDI Mod, Hammond B3 organ, Leslie 122 speaker w/MIDI mod (no velocity) on lower manual and speed control routed to footswitch, Ensoniq SD-1 32-voice synth w/workstation, Ensoniq ASR-10 sampler, Yamaha TX816 thru Simmons SP:822 mixer, Roland MKS-20 to augment piano, Roland D-550 w/Korg volume pedal, Roland D50, E-mu Proteus, Akai S1000 w/ 300 MB Micropolis HD, Sycologic 16 In/Out MIDI patchbay controller w/remote control (atop piano)

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# WOODSTOCK GOES GOLD

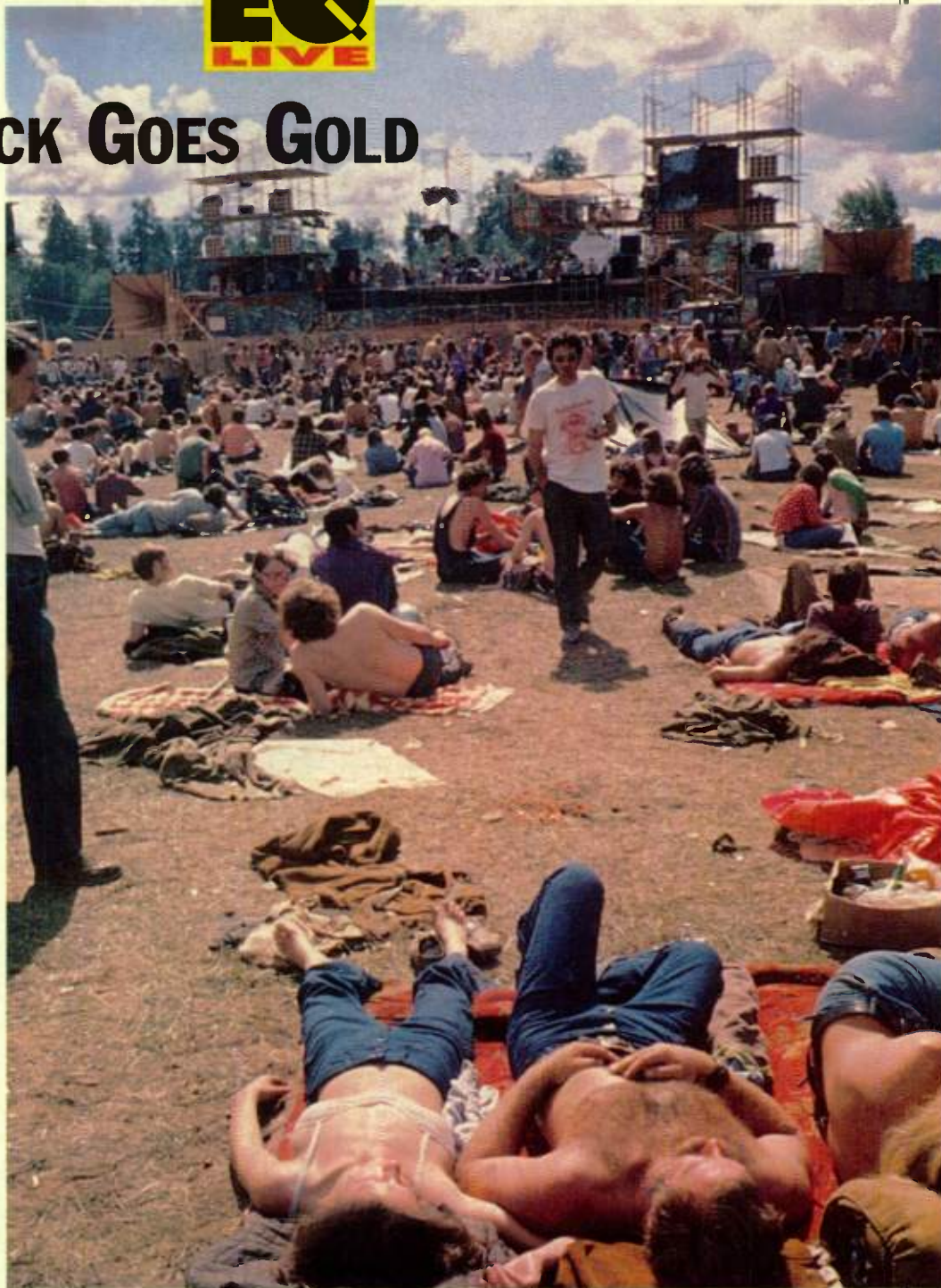
■AS WE APPROACH a new millennium — and a '90s version of the legendary event — history will probably recognize the Woodstock Festival as live sound's most impressive achievement. Woodstock set the standards for sound reinforcement as we know it today. And the fact that 1969 technology was used to successfully cater to the crowd of half a million is no less remarkable than the festival itself.

It was such an important event that this writer can say with pride, "I was there!" And among the many things I'll never forget is the sound — it was everywhere.

Considering the era, one has to ask, "How the hell did they do it?" For miles around — literally — you could hear every artist clearly and beautifully mixed. As it turns out, there was only one person in the world believed to be able to accomplish that aural feat at the time. His name was Bill Hanley and he's still active in the live-sound business. Here's how Hanley accomplished one of the most remarkable feats in the history of live performance:

Stanley Goldstein, who managed the festival's operations, was put in charge of addressing many of the technical challenges, having been an accomplished recording engineer. He had previously worked with Woodstock mastermind Michael Lang at the Miami Pop Festival, and Lang knew that Goldstein had another talent as valuable as his technological skills: he was a master locator of resources — particularly of the human kind.

During the planning stages Goldstein presented his projected audio requirements to the few live-sound specialists who were in exist-



**HIPPIE HAVEN:** Woodstock and its cast of 500,000 made audio history in 1969.

tence in early 1969. When the companies were told that an audience of 100,000 people (it turned out to be 500,000) was to be massed on several hundred acres of farmland and that in addition to amplifying the sound adequately, the multitude of microphones and instrument feeds had to be mixed artfully to complement each act while the whole thing

was simultaneously recorded for an album release and motion picture soundtrack, they were dumbfounded and didn't have the slightest idea of how to address such

a tall order. There were no precedents, and the technology at hand couldn't possibly do it.

Goldstein's research yielded two unanimous con-

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clusions; the first was that it couldn't be done. The second was that if it could be, only one guy could pull it off: Bill Hanley of Boston, who had done Miami Pop and some other smaller festivals.

Hanley built his first crystal radio at the age of five and was an amateur radio operator at ten. As a young adult, after acquiring a comprehensive background in electronics, Hanley took over as the sound engineer for the Newport Folk and Jazz Festivals in the mid '50s. He started Hanley Sound in 1959 and designed his own systems to suit the task. One utilized an RCA Navy surplus amplifier from late World War II that was originally for a battleship PA system. It weighed over 300 pounds and put out 600 watts RMS. For speakers, he modified Altec Voice



**CROWD PLEASER:** David Browne (left) and Mike Shrieve of Santana

of the Theaters. "We got started because nobody gave a hoot about quality or doing big sound jobs for the masses," Hanley states. "I really started the pro sound business. Nobody else was showing up with seven-foot-

high speakers back then." Over the ensuing years, he began to gain a reputation as a wizard. When Bill Graham opened the Fillmore East in New York, it was Hanley who designed and built that system.

#### DOING THE IMPOSSIBLE

In early '69, Goldstein acquired Hanley's phone number from a colleague. "We were the only people in the world that we know of who were doing this kind of thing," says Hanley. "When Goldstein called me I got the impression that he was trying to pick my brain, pumping me for information so he could attempt it himself. I had just been burned by someone else in a similar way and I wasn't about to get burned again. Soon after, they got back in touch with me and we came to an agreement. I met with Michael Lang and we began to prepare. Thirty days before the concert, I went out and looked at the Bethel site to see where we would put the stage. I laid out the stage plans, the security systems for the back of the stage, and started on the plans for the sound system right then." The entire system was installed the day before the concert. The AC power was a three-phase affair, wired in from nearby White Lake. A total of 208 volts was on tap.

"We knew it was going to be 100,000 people or better, but it turned out to be five times that. I had to ooze out all the [SPL] energy I could because of the size of the



**WOODSTOCK WORKHORSES:** The amplifier racks

Photo by Michael Ochs Archives

Photo courtesy of Bill Hanley



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crowd. I managed to contain all that energy by using the column theory: the longer the column, the narrower the beam of sound, horizontally. I contained all that energy and aimed it at the back of the audience." Hanley built tuned 450-pound columns, each housing eight full-range 15-inch JBL K130 woofers. Four cabinets were arrayed on both towers, totaling 32 woofers on each. It took a crane to mount them. One of the towers was approximately 20 feet high, the other about 60. At the top of the towers were open Altec horns with reversed 288 diaphragms to handle the highs.

Amplification was via McIntosh 3500-series 350-watt RMS high-fidelity tube amplifiers, switchable from 1-ohm to 62-ohm impedances. "We also had a couple of Crowns and a couple of Phase Linears that had just come out," Hanley adds. These were used in tandem with the McIntoshes. Ultimately each low-end driver was assigned approximately 50 watts, while Altec Lansing 290's, handling the mids, got 100 watts apiece.

The 290's were housed in separate small cabinets in the arrays, some located above the woofers, others placed below the tweeters.

"In order to get more energy out there, I ended up compressing the audio and bringing it all the way up to the limits of the amplifier," recalls Hanley. Teletronix LA-2A compressors were deployed. Such outboard equipment was installed in stackable racks on wheels.

#### GOING TO TAPE

Hanley also designed and built the consoles used for the live mixing and the recording. The live mixer was fashioned from Automated Processes modules and had 24 inputs and 4 output busses. Its construction began about two months before the concert, and its design "was what was needed. And nothing made at the time would do."

The recording board was made from Langevin equipment — EQ and amplification on each channel, and featuring Geiling potentiometers. It had over 20 inputs and 12 outs. And it



**SUPER SOUND MAN:** Bill Hanley in 1964.

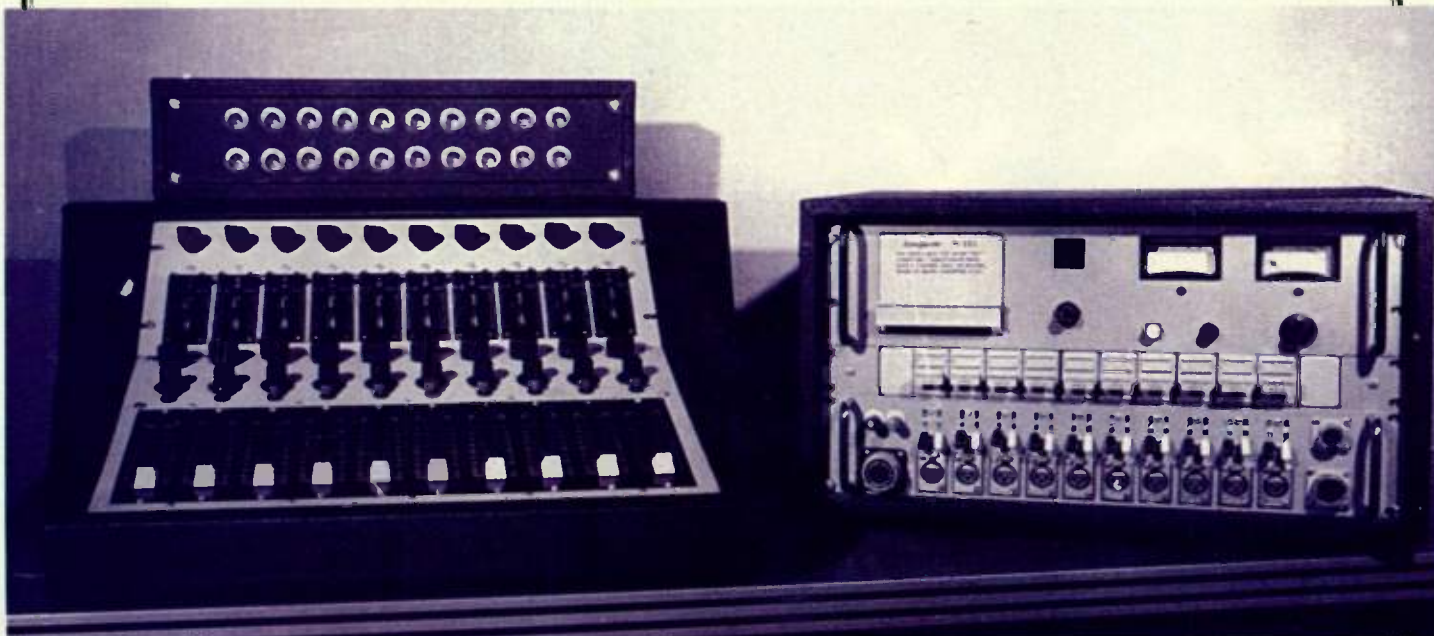
performed at only 3 dB under what the best do today. The console's EQ covered 50 Hz, 150 Hz, 1 kHz, 2.5 kHz, 5 kHz, and 10 kHz in 2 dB steps with slider controls.

There were approximately 20 mics in use at any given time. Acts didn't have a choice as to what their mixing would be. "But they weren't into that then, this was jam city," muses Hanley. All the mics were Shure SM45's with special order transformers. JBL stage monitors were bolted to the floor.

Individual voices and on-site submixes were recorded to two 8-track Scully 280's — parallel-fed

for backup purposes. Lee Osborne and Eddie Kramer assisted Hanley with the recording process. What made recording in those days even more tricky, Hanley shares, is that "you tried to combine things on tracks in such a way that you could later separate them with EQ." Also, such things as drum submixes had to be done on the fly, right to tape.

A quarter of a century later, Hanley reflects on the event: "Every other system broke down the first day. Nothing worked. Nothing except the audio and the water. There was plenty of water." **EQ**



**STATE-OF-THE-ART (FESTIVAL):** One part of the four-part sound console.





## TOURING TOOL KIT: DON'T LEAVE HOME WITHOUT IT

Here are some things that every traveling soundperson should carry:

**An assortment of screwdrivers, and of sockets and hex-head wrenches** — Make sure you have the size tools you need, since odd-sized tools will be difficult to obtain when you are in a strange city. If you are traveling with computers, pack a set of torx-head drivers.

**A volt-ohm meter ("VOM")** — An essential piece of test equipment that can be helpful for anything from testing cables to metering the output of an AC receptacle.

**Soldering irons** — An absolute must for the engineer. This is one tool that you are sure to use at some point on any tour. And don't forget to pack a roll of solder (60/40 tin-lead 18-gauge will work for most applications).

**A "tweaker" or Xcelite "greenie"** — Handy for adjusting trimpots like that meter calibration pot on the back of a dbx 160X compressor.

**Diagonal cutters in two sizes** — 4-inch for circuit board work and 6-inch for cutting mic and audio cable.

**Vise Grip** — A medium-size vise grip is useful for loosening nuts and bolts. It can also be used as an extra hand (to hold a connector or cable) when soldering.

**Heat shrink tubing in various sizes** — Besides serving to insulate wire and aid in strain relief on a cable, the tubing can be used to replace those stupid plastic tips that

always break off of your shoelaces.

**UL-listed electrical tape** — For those times when heat shrink tubing isn't quite right.

**Wire stripper** — Get yourself a good one that is spring-loaded and has some sort of lock that adjusts for different gauges of wire. This is much better than using your teeth, and you'll still be able to have ice cream.

**Spare connectors** — You never know when you will need to repair or make a cable for a show. Your inventory should include male and female XLR's, 1/4-inch TS, 1/4-inch TRS, banana plugs, and maybe even a few TT bantam-type plugs.

**Signetics NE5532 ICs** — These op amps are found in all types of gear, and at under \$2 each, you can afford to bring along a few. In a pinch they can be used as subs for blown out 4558 or 4560 ICs.

**Worklight with extension cord** — Having a worklight will not only let you find the right tool, it will help save your eyesight. Don't forget to hang a Mini-Maglite around your neck with the backstage laminate so that you can find the worklight.

**Obvious stuff** — A hammer; ground lift (use it only if it is *really* necessary — lifting the ground from a piece of gear can cause someone — namely you — to be injured); duct tape; utility knife and blades; linesman's pliers (because you never know when you might have to operate on a club's electrical system); and cable. —Steve La Cerra

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# BIRTH OF THE BLUES

■WHAT DO AEROSMITH, Dan Aykroyd, and former Hard Rock Cafe owner Isaac Tigrett have in common? They are all partners in a new club in West Hollywood called House Of Blues. Behind the funky corrugated-metal front, this \$9 million club has a theater-sized stage (almost 50-feet long by 5-feet high) that overlooks a hardwood dance floor. But the real story in House Of Blues is the sound system. Reportedly costing close to half a million dollars, this 19,000-watt, time-aligned system provides consistent audio coverage throughout all areas of the two-story venue, including the restaurant located in the balcony. System installation is by A-1 Audio in Hollywood, CA. System designers are Ken Newman, David Danky, and Al Siniscal from A-1 Audio. A-1 was recommended by House of Blues production manager Jan Landy of Cash Landy Productions.

## LEVEL HEADED

The sound system installation for House Of Blues had several unusual requirements due to the unique nature of the venue itself. The club is spread out on three levels with the stage and the dance floor on the first, a balcony and restaurant/bar on the second, and a VIP room (containing a bar, dining room, and kitchen) on the third floor. Complicating matters further is the design of the second floor bar: during the early hours of the day, the bar itself acts as a wall that closes off the balcony from the rest of the club. This allows the restaurant on the second floor

to operate undisturbed by any equipment load-ins or sound-checks that are in progress on the first level. For the nighttime hours, the bar splits in half and moves toward the side walls of the building, opening up the balcony for viewing (and listening) into the first-floor club area.

The various areas of the club can source their input from either the live PA, the DJ system, or the Gefen Music system (a computer-controlled CD changer with a music playlist system). Due to the large size of the room, speaker fill clusters are needed at various locations in the club, both upstairs and downstairs. In order to main-

tain intelligibility and cohesiveness with the main PA speakers, some of the fill clusters have to be delayed from the main system. This brings them into time alignment for a listener situated near the rear of the room

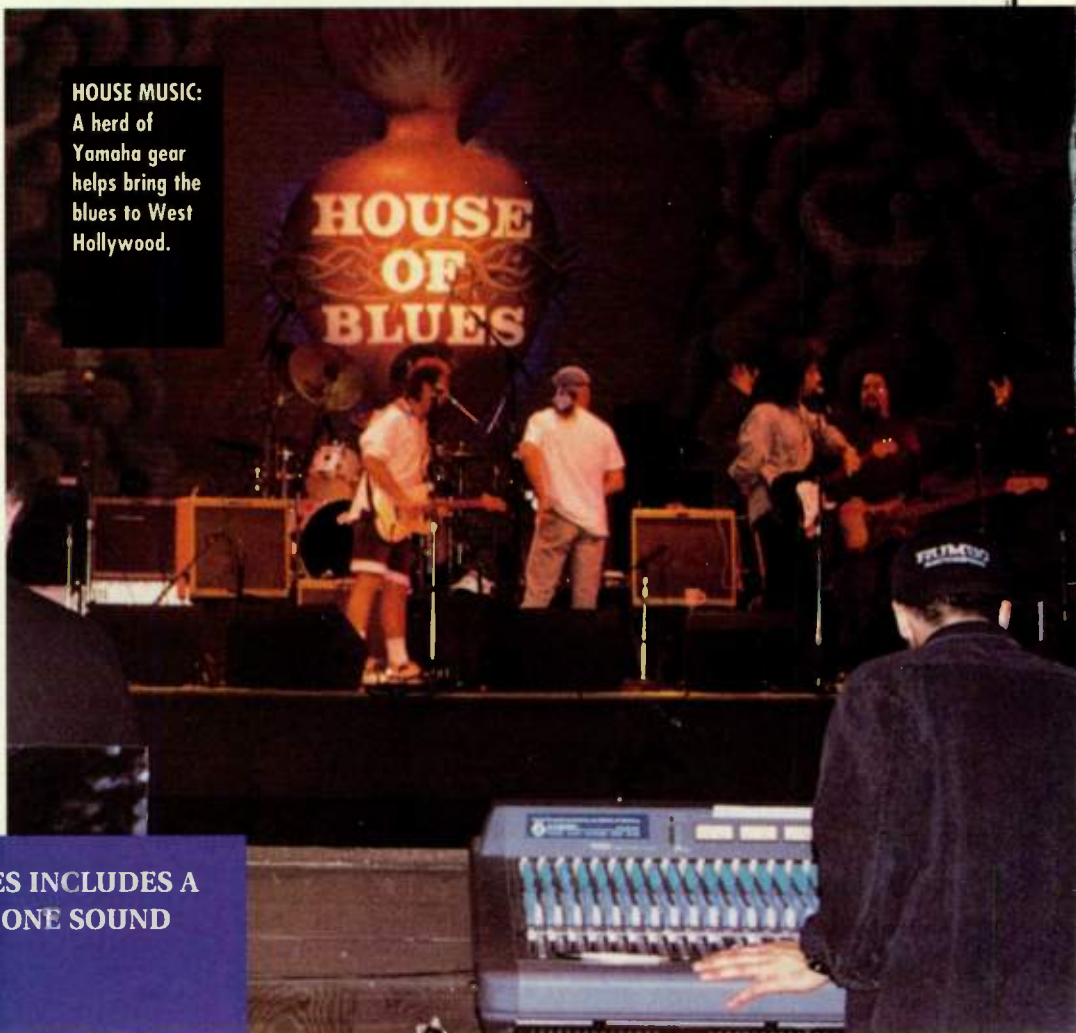
## TRAFFIC CONTROL

The mixing console, the Gefen System, and the DJ console are all fed into a 360 Systems AM-16B, which is a programmable 16-input, 16-output audio switcher. The unit acts as master traffic controller for the entire system, with the ability to reroute audio signals via MIDI program changes (it can also send out MIDI-pro-

gram-change data to other devices). The AM-16B was programmed with various presets that change the configuration of the speaker clusters throughout the club depending on what the needs are at any given time.

The operation of the club could roughly be divided into four "modes," each of which presents specific requirements for the sound system. When the second-floor restaurant is closed off from the first floor (during certain business hours or for smaller acts), there is no need for the upstairs fill and delay speaker clusters to be operating, so they are muted. In this "restaurant-live" mode, the

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**THE NEW HOUSE OF BLUES INCLUDES A SOPHISTICATED THREE-IN-ONE SOUND SYSTEM**

**BY STEVE LA CERRA**



sound-reinforcement console feeds the PA system in the downstairs area only. When the club is featuring a DJ, the same configuration is implemented with the exception that the system is sourced from the DJ console.

When the second-floor wall is opened up, the first-floor PA system alone will not offer even coverage all the way to the front and rear of the balcony sections. Therefore, the PA can be switched into what might be called "theater" mode — the upstairs fill speakers and front- and rear-delay clusters are turned on, thus improving coverage to the second floor areas. Again, the PA system can be sourced from any of the four inputs.



*"DynaTek drives are the most stable part of my system."*

Producer/Musician/  
Vocalist, Trevor Rabin,  
of megagroup YES

## What's All The *Talk* About?

*Talk* is the latest release from mega-group YES. *Talk* recalls the classic YES sound of the 70s and takes it a step further into the 90s.

As the principal song-writer, producer and co/engineer of *Talk*, Trevor Rabin combined analog and digital recording techniques that pushed the envelope of technology to the limit. Throughout this painstaking and demanding project, the DYNATEK TRACK SERIES data storage that Trevor used never failed.

Trevor depends exclusively on DYNATEK TRACK SERIES rackmountable data storage for its ergonomics, versatility and reliability. And when YES takes *Talk* on tour, they'll be using DYNATEK TRACK SERIES to help bring their unique studio sound to live audiences around the world.

*Trevor's talking about DynaTek.*

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# HOUSE WITH A VU

The House Of Blues' sound system reportedly cost around \$500,000 and was designed and installed by A-1 Audio of Hollywood, California.

## Front Of House System

**CONSOLE:** Yamaha PM4000 64 channel

**MAIN SPEAKERS:** Yamaha S1520S w/15" woofer and 3" compression driver [8]

**BALCONY SPEAKERS:** Yamaha S1520S [4]

**AUX SPEAKERS:** Yamaha S1520S [4]

**DELAY SPEAKERS:** Yamaha WF206 [6]; Yamaha S12X [6]

**SUBWOOFERS:** Yamaha SW1820S w/2-18" speakers each [6]

**AMPLIFIERS:** Yamaha P2700 (500 watts per channel @ 4 ohms) [21]

**SYSTEM EQ:** Yamaha Q1131 1/3rd octave (set flat for visiting engineers) [2]; Yamaha YGD2030 dual channel 1/3rd octave (tuned by zone for flat) [5]

**EFFECT UNITS:** Yamaha Rev 5 digital reverb; Yamaha SPX-990 multieffects; Yamaha D5000 digital delay/effects; Lexicon LXP-15 digital reverb/effects; Alesis Midiverb III

**GATES:** Audio Logic MT44 (8 channels) [2]

**LIMITERS:** dbx 160XT [4]

**LIMITER/GATES:** Yamaha GC2020BII Dual Channel [4]

**COMPACT DISC PLAYER:** Yamaha CDX470

**CASSETTE DECK:** Yamaha KX-W952 (dual transport)

**DAT DECK:** Sony PCM-2300

**SNAKE:** Whirlwind 48 channel snake

**SYSTEM SWITCH:** 360 Systems AM16/B

## Stage Monitor System

**CONSOLE:** Yamaha MC3210 (32 input, 10 mixes)

**SPEAKERS:** Yamaha S1520S (used as sidefills) [2]; Yamaha SM1525 (stage wedges) [12]; Yamaha WF215SB (subwoofer used w/SM1525 for drum monitor)

**AMPLIFIERS:** Yamaha P2700 500 wpc @ 4 ohms [14]

**EQUALIZERS:** Yamaha Q2031 Dual Channel, 1/3 octave [5]

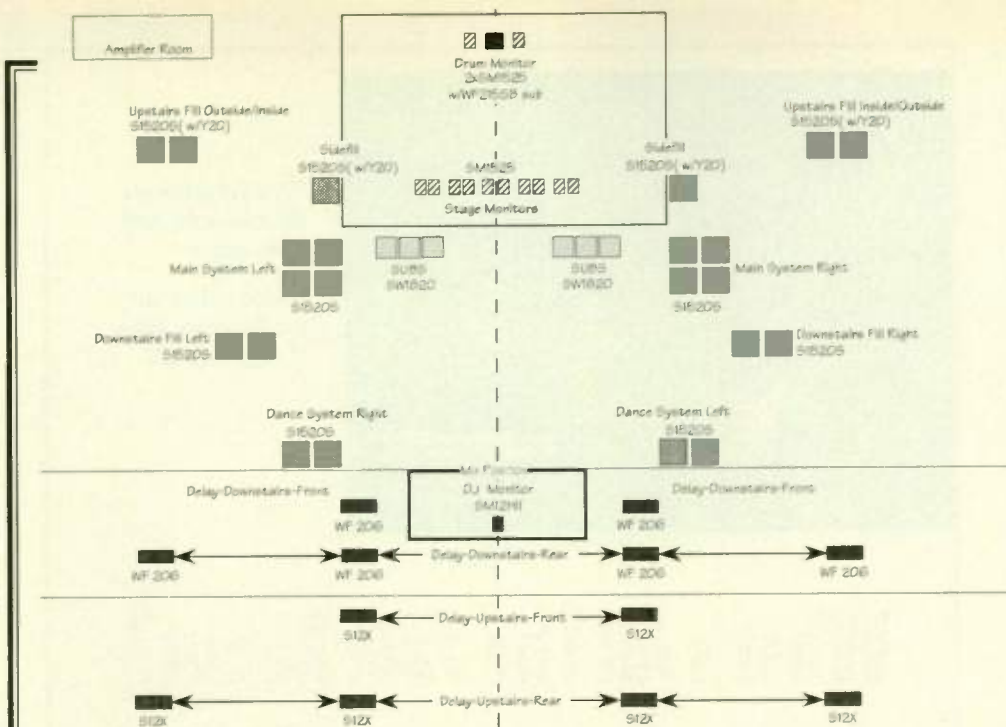
**EFFECTS:** Yamaha SPX-990 Multieffects

**GATES:** JBL M644 (4 channels)

**LIMITER/GATES:** Yamaha GC2020BII Dual Channel [2]

**MICS:** AKG D112; AKG C408 [6]; beyer M88 [2]; Stereo C-Ducer; Sennheiser MD421U [2]; Shure SM-57 [10]; Shure SM-58 [8]; Shure Beta 58 [4]; Shure Beta 87 [2]; Shure SM-81 [4]

**DIRECT BOXES:** Whirlwind Director [10]



**SPEAKERS OF THE HOUSE:** The House of Blues speaker system layout.

## THE FLICK OF A SWITCH

To facilitate the frequent reconfiguration of the system, A-1 Audio has used a little imagination and some really cool digital outboard units. The outputs of the 360 Systems device are fed to the inputs of Yamaha YGD2030, D2040, or C20A digital signal processors, as well as a Yamaha GC2020BII 2-channel (analog) compressor/limiter. The Yamaha DSP's are used to perform a variety of tasks such as room equalization, compression, crossover for triamping, and room delay (all in the digital domain). The delay function allows the upstairs-rear and downstairs-rear fill speakers to be time aligned with the main speaker system, affording listeners in the rear of the club the same quality of sound as patrons in the front areas.

In a room that is constantly changing its size and shape, performing a simple room EQ would be an exercise in frustration — any physical change in the room would necessitate an adjustment in the PA system. In a conventional PA system it might be possible to have various analog EQ units preset to curves compensating for the different room shapes and then patch the units in as needed.

But by taking advantage of MIDI and the ability to write preset curves into the Yamaha units, A-1 Audio has elegantly conquered this problem.

Each of the Yamaha processors offers a number of user-memory slots — all addressable via MIDI program change. In conjunction with the 360 Systems unit, the operator can change the function of the entire system with a single MIDI command. A program change to the AM-16B results in a program-change message being sent to the Yamaha units, thus loading in new presets for them as well. The system input as well as crossover points, output levels, equalization curves, room delay characteristics, and compression parameters can all be instantly recalled to suite the room "mode." If necessary, fill cluster delay time could be programmed for different room configurations. While the YGD2030 1/3rd octave digital equalizers have been programmed with specific curves, a Yamaha Q1131 analog 1/3rd octave EQ is available at the mix position for guest engineers who feel the need to tweak the room EQ.

Given the programmability of the DSP's, A-1 Audio has provided the club with an extraordinarily flexible sound

system. Independent equalization and crossover curves for each system are instantly recallable. The routing capabilities of the AM16B allow "sharing" of certain components in the system. For example, the DJ system has several dedicated full-range cabinets flying over the dance floor. But since the subwoofers can be fed from either the DJ system or the sound-reinforcement system, there is no need to have separate subs (and thus crossovers and amplifiers) for both systems. The 360 Systems unit is programmed to route the subs whenever the system is reconfigured. The unit has even been preprogrammed with various mute-test modes that can be used to isolate speaker clusters for troubleshooting purposes. And by use of the Juice Goose One, the entire sound system is sequentially and safely powered up by the turn of a single key.

Since opening in April, House Of Blues has been receiving rave reviews from people who have visited the club and heard the sound system. The best in blues talent and a great audio system all combine to make House Of Blues a place which is always ready to rock. **EO**



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# RINGING OUT EQ TIPS STAGE MONITORS

THE MAIN CONCERN when dealing with stage monitors is feedback, and by "ringing out" the monitor system, feedback can be held to a minimum.

Before you try to electronically correct a feedback problem, be aware of the physical effects of mic polar patterns and mic and monitor placement. In high SPL situations, omnidirectional mics are going to give you headaches (in the form of feedback and leakage), so try to avoid using them live for vocals. When using cardioid and hypercardioid mics, check to see that the monitor speakers are physically placed in a position where the mics reject sound. Moving a monitor as little as 8 inches can dramatically reduce the amount of feedback.

Ringling out the monitors will require two people: an engineer to operate the monitor console/equalizer(s) and a person to stand on stage and speak into the vocal mics. The basic idea is that the engineer will make gain and EQ adjustments to each monitor mix while the assistant vocalizes into a microphone. It is likely that there will be more than one stage mix (each with a dedicated equalizer), so the ringling-out process will have to be performed as many times as there are individual monitor mixes.

**Step 1:** The engineer starts with all EQ and gain settings at the "0" point and then raises the microphone level to the monitor while the assistant speaks into the microphone. When the gain is increased to sufficient level, the monitor will start to feed back or "ring."

**Step 2:** The engineer stops increasing gain and then uses the equalizer to locate and attenuate the ringing frequency. Often there will be more than one frequency that rings, so it may take some trial and error use of the equalizer to zero in on the fix. A 1/3-octave spectrum analyzer might prove useful for a visual indication of which frequencies are ringing.

**Step 3:** Once the ringing has been eliminated, the engineer can again bring up the level of the stage monitor. If another frequency starts to ring, the EQ unit is again used to find and remove the ringing. In cases where it is difficult to identify the offending frequency, the engineer can sometimes slowly increase the levels of the graphic EQ sliders (one at a time) until the feedback starts to become more pronounced. When boosting a particular frequency control increases the ringing, then the feedback frequency has been identified and can now be attenuated. This technique must be used with extreme caution because excessive boosting of frequencies can cause the monitor system to take off into uncontrollable feedback that would be harmful to both hardware and humans.

**Final Note:** As the gain of the monitor is raised higher, the likelihood of feedback will increase regardless of how much EQ is applied. Usually the SPL where feedback becomes unavoidable will be far higher than the stage performer desires, and the overall gain of the monitor can be brought down. If this is not the case, then the engineer may want to suggest in-ear monitors.

—Steve La Cerra



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# DO (OR DON'T) PROCESS?

■SO-CALLED "PROCESSED" loudspeakers, meaning ones that include an electronic "processor" or "controller," are now available from several manufacturers and have received a great deal of attention in the past few years. Are

these systems the way of the future or just a fad? The answer lies not so much in the technology of processing as it does in the value this technology adds to a particular application. This article discusses processing tech-

nology, its advantages and limitations, and makes some suggestions on evaluating the potential of processed loudspeakers for various types of audio systems.

## WHAT'S THE DIFFERENCE

As mentioned, a processed loudspeaker system includes a "processor" or "controller." This specialized piece of electronics performs certain signal processing functions that have been optimized for a particular loudspeaker system. Without its processor, a processed loudspeaker system won't work as intended, a fact that separates processed loudspeaker systems from nonprocessed systems.

Today's processed loudspeakers are generally packaged systems (woofer and tweeter in one box). While they may differ greatly from one manufacturer to the other, most are designed to provide high performance levels in small enclosures and most offer other benefits such as loudspeaker protection.

Typically, the processor is connected into a sound system just before the power amplifier, as shown in fig. 1. Even though it may have few user-accessible controls, the processor performs signal processing functions such as equalization or limiting. Some of those possible functions are diagrammed in fig. 2 (see page 74).

## MORE DIFFERENCES

Looking at fig. 2, it appears possible to duplicate a processed loudspeaker by simply taking a non-

processed loudspeaker and adding external signal-processing devices. While this might well improve a non-processed loudspeaker system, a processed loudspeaker system is different in at least two ways:

First, the processor's signal-processing functions have been optimized for its own loudspeaker. For example, the processor's electronic crossover probably includes carefully designed microsecond signal delay to "line up" the sound from the woofer and tweeter. This function minimizes comb-filter effects, optimizes frequency-response smoothness, and enhances overall sound quality in a way that is optimized for this particular loudspeaker.

Second, some of the functions in the processor may be "dynamic"; that is, they may change with frequency or level in a way that enhances the operation of the loudspeaker or helps protect the loudspeaker from damage.

Using the processor's crossover function again as an example, in some processors the crossover is dynamic. The crossover frequency shifts upwards at high power levels and back down at lower power levels. In this way, the processor helps protect the loudspeaker system's high-frequency driver from damage during high-power operation. This dynamic crossover frequency shifting is something that could not be performed by a separate generic electronic crossover.

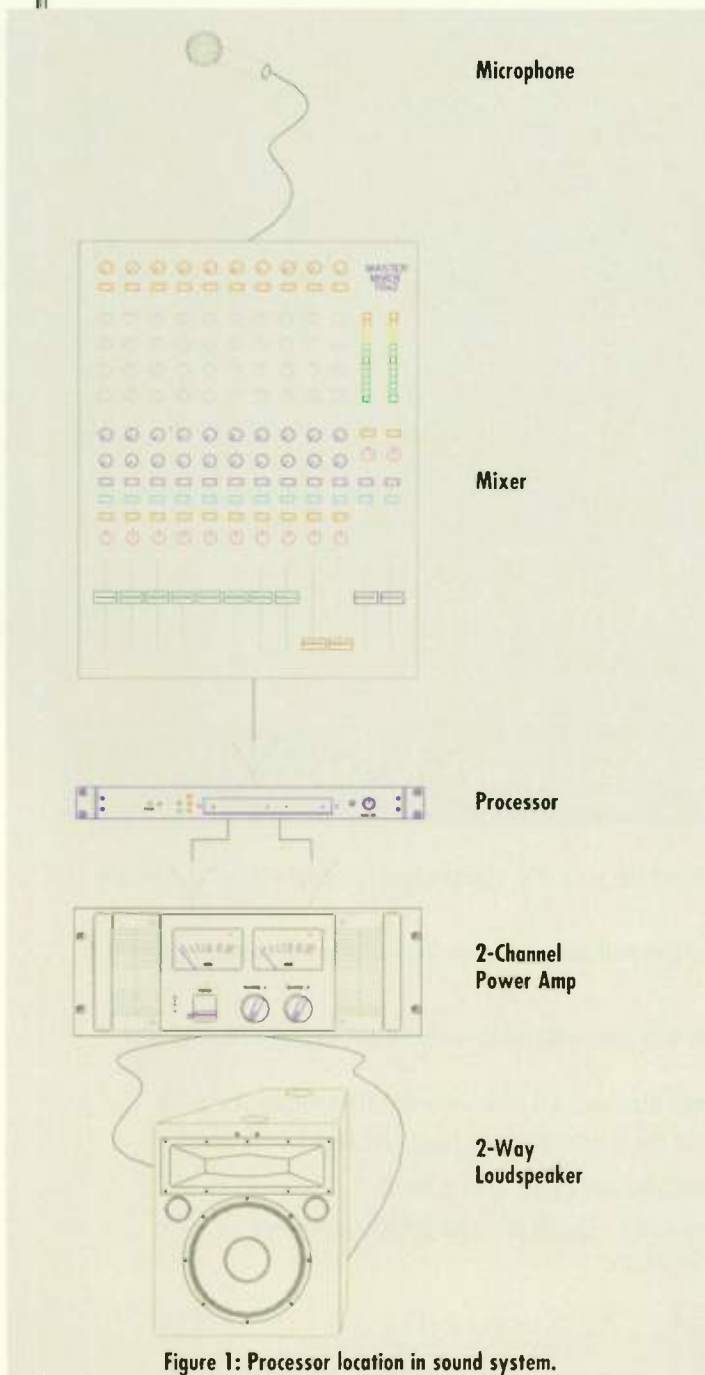


Figure 1: Processor location in sound system.

**IS IT TIME TO TAKE THE PLUNGE WITH PROCESSED LOUDSPEAKERS?**

**BY CHRIS FOREMAN**



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Photo: Harrison Funk

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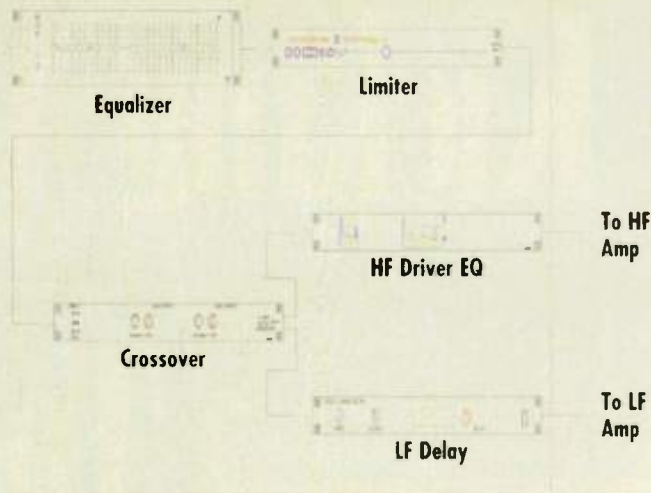


Figure 2: Typical processor functional equivalent.

**SOME APPLICATIONS**

The above examples illustrate some of the advantages of processed loudspeaker systems. These advantages add value because they help processed systems work especially well in certain applications.

For example, the small size and high output level of most processed loudspeakers makes them especially well suited for portable systems (provided they are physically rugged). It also makes them well suited for semiportable systems, such as an auditorium where a concert loudspeaker system is removed and stored between major events.

Small size, along with the trapezoidal shape of most processed loudspeaker systems, makes it possible to array them neatly with good acoustical results. This helps the system designer cover a room evenly while minimizing the system's visual profile. This can be a significant advantage in an architecturally stylish room or in one with an especially low ceiling.

**DISADVANTAGES**

Even with all their potential advantages, processed loudspeaker systems aren't perfect. In most cases, they cost more than similar non-processed systems, and sometimes the processing itself can cause problems.

For example, some processors include a func-

tion that raises the loudspeaker's crossover frequency to protect the high-frequency driver (a dynamic function). When this function takes effect, more of the upper midrange frequencies are routed to the woofer, thereby changing the system's coverage pattern and sound quality over that frequency range. This undesirable side effect must be weighed against the desirable result of high-frequency driver protection. Most processors are digital and, as audio experts have found, digital devices have their own set of limitations. One is dynamic range. A digital processor with the dynamic range of a CD (about 96 dB) will be more than adequate for most applications, but may be less than perfect for a high-dynamic-range application like orchestra reinforcement.

Another digital limitation is throughput delay. This is the time it takes for an audio signal to pass through the processor from input to output. As a rule of thumb, this delay should be 30 milliseconds or less. Longer delays might muddy the sound for listeners who can also hear the unamplified audio — such as performers listening to themselves through a processed stage monitor system or front-row listeners at a barbershop quartet sing-off.

The design philosophy



of processed loudspeakers varies greatly. Some designers use dynamic processing in a liberal way. Others restrict dynamic processing to simple functions like limiting. Some designers restrict user ability to tweak processing functions. Others allow users to adjust to taste. Some designers favor new, high-tech digital processing technologies like DSP (digital signal processing) or Delta-Sigma A/D (analog to digital) converters. Other designers have resisted the processing power of digital and cling to analog technology for its "analog sound."

#### IS THIS THE FUTURE?

With all these different, and confusing, design philosophies, along with a whole new set of potential problems, it's appropriate to ask

the opening question again: Is this truly the future, or just a passing fad?

The answer is that, despite current limitations, the successes of today's systems forecast a bright future for processed loudspeaker systems. Some future loudspeaker systems may even be so integrated with their electronics that they will not work — at all — without these electronics.

But what about today? Is this a technology worth buying now? This answer is more difficult, but it's possible to make some generalizations.

1) Processed loudspeaker systems have potential advantages, but they are not inherently better (or worse) than similar, nonprocessed loudspeaker systems.

This suggests that the

"short list" for a purchase decision should include both processed and nonprocessed loudspeaker systems and the final decision should be made on traditional criteria like performance, price, and dealer support.

2) Certain processing technologies may have real advantages, but because of the variations in overall processor design philosophy, one processing technology is not necessarily superior to any other processing technology.

For this reason, any claim of superior technology should include an explanation of benefits. What value does this technology provide and how does that benefit the application?

3) The high price of most processed systems puts them at the top of the

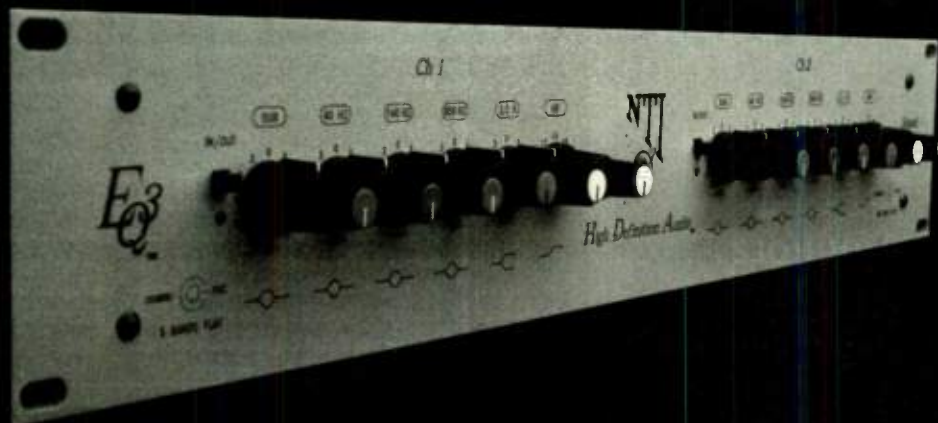
price/value pyramid where the competition from high-performance nonprocessed systems is very strong.

Because the processor probably includes functions like electronic crossover, equalization, and limiting, it may be appropriate to add the cost of similar external devices to the cost of a nonprocessed loudspeaker system when making comparisons. Nevertheless, the high price of most processed systems does not automatically bring high value, so comparisons should be made carefully.

#### WHEN NOT TO BUY

High cost may limit the use of processed loudspeaker systems in some applications. Large central clusters, which are usually designed from separate horns and

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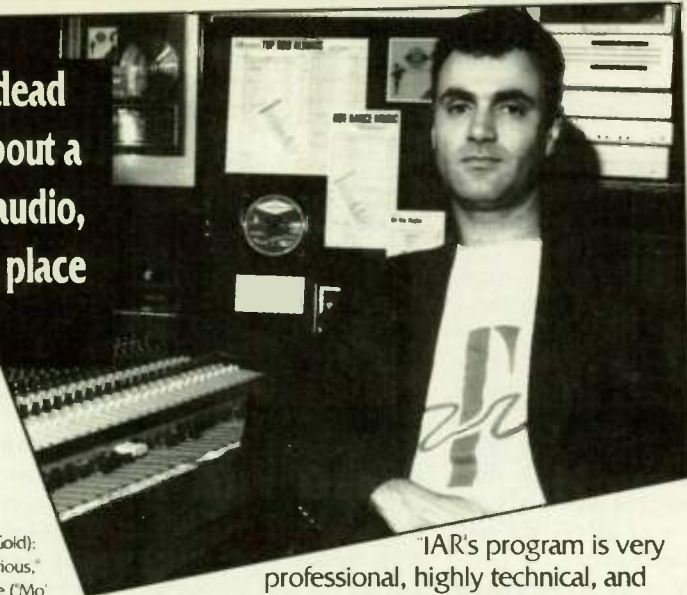


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woofers, are also unlikely homes for processed loudspeakers.

Many clusters could be considered processed because they include microsecond signal delay, electronic crossovers, limiters, and other protection devices, and all of these devices have been carefully adjusted for the particular loudspeaker cluster. However, it would be difficult, if not impossible, to design this same cluster using currently available processed loudspeaker systems since they don't allow the horns and woofers to be separated and offer only one or two choices of horn patterns.

This example points out one final limitation of currently available processed systems: perhaps even more than their non-processed counterparts, they aren't very flexible. Certainly it's possible to array them and combine them to fit many different situations; but, try to add a long-throw horn, and the processor, designed to work with its own particular set of components only, won't accommodate the request.

With these generalizations in mind, look carefully at both processed and non-processed loudspeaker systems before making any purchase decisions. Currently available processed loudspeaker systems offer very real benefits, but traditional, nonprocessed systems may still hold an edge for low-budget systems and for systems that demand the flexibility of separate components.

EQ  
Illustrations by Wade McGregor  
using ShuttleCAD.

Chris Foreman is manager of JBL's Kearney Operations in Kearney, NE.



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## **ALTEC LANSING DTS 645A-F LOUDSPEAKER**

Altec's DTS645A-F Duplex coaxial loudspeaker has been designed to produce high output levels for full range reproduction and consists of the Altec DTS645A-F vented bass horn, two-way loudspeaker system. This speaker offers a very directive output for high intelligibility in even the most reverberant spaces. The enclosure contains a single 16-inch high power, Duplex loudspeaker and a coaxially embedded 1.4-inch compression driver operating into a 60- by 40-degree constant directivity horn. By physically aligning the high- and low-frequency drivers, the DTS645A-F functions as a highly efficient true-point source device. The cabinet is trapezoidal, which allows for flexible arraying. The cabinet is coated with black, textured paint and lined with sound absorbent glass wool. The DTS645A-F features frequency response from 50 Hz to 18 kHz and is capable of producing a maximum output 133 dB SPL. The system provides power handling of up to 300 watts of high frequency and 800 watts of low frequency.

*Altec Lansing, P.O. Box 26105, Oklahoma City, OK 73126-0105. Tel: 405-324-5311. Circle EQ free lit. #121.*

## **APOGEE CRQ-12 PARAMETRIC EQ**

The Apogee CRQ-12 equalizer offers 12 bands of precision parametric filters that can be configured in a variety of

modes for use in sound reinforcement applications. As an example, the 6/12 mode allows the first 6 filters to EQ a central cluster of speakers via outputs 1 and 2 while the second set of 6 filters feeds a cluster of speakers in a different location via outputs 3 and 4. The uniqueness of the CRQ-12 comes in the fact that the first set of filters can be "carried through" to the second set of outputs so that outputs 3 and 4 are actually being modified by both the first and second sets of filters. This would enable the first group of filters to be adjusted for an overall room response (feeding all speakers) while the second group of filters is added in as "fine tuning" for speakers covering an isolated area of a room, such as a balcony. The parametric filters may be adjusted for bandwidth (0.08 to 2 octaves), bandcenter (20 Hz to 20 kHz depending upon the position of the range switch), and a boost/cut range of +15 and -20 dB. EQ In/Out switches are provided for each band, as well as a master In/Out for each channel. In addition to the parametric fil-

ters, each channel has a set of high-pass, low-pass, and shelving filters and mute selectors for the outputs. Manufacturers suggested list: \$2680.

*Apogee Sound Inc., 1150 Industrial Avenue, Ste. C, Petaluma, CA 94952. Tel: 707-778-8887. Circle EQ free lit. #122.*

## **ART RXR ELITE DIGITAL REVERB**

The RXR Elite is a fully programmable digital reverb. Reverb programs are organized in 8 banks (Rooms, Halls, Plates, Chambers, Gates, Reverse, Dual Ambient Rooms, and Dual Ambient Plates) each of which contains 16 user-definable presets. The Dual ambient programs are designed to allow identical processing of the left and right inputs by separate processors that maintain a true stereo image within the reverb program. The rear panel offers inputs and output on 1/4-inch phone connectors, MIDI In, Out, and Thru ports, and a programmable footswitch jack. Other features include MIDI mapping, real-time control of effect parameters, and adjustable high- and low-pass filters. MSRP: \$349.

*Applied Research and Technology, 215 Tremont Street,*

*Rochester, NY 14608. Tel: 716-436-2720. Circle EQ free lit. #123.*

## **ARX MSX 4 MICROPHONE SPLITTER/MSP 1 DUAL POWER SUPPLY**

The new MSX 4 mic splitter solves the problem of how to split a microphone signal to the house and monitor consoles without signal degradation. The 1 rack-space unit's four channels are actively buffered, and the low-noise mic splitter has electronically balanced outputs for main and monitor on the rear panel. The front panel offers electronically balanced split outputs that can be optionally transformer isolated. The unit is externally powered by the MSP 1 dual-power supply that houses two completely separate power supplies in a 1 rack-space enclosure. The MSP 1 has separate AC connectors and fuses for each power supply and can be used to power up to 12 MSX 4 units (a total of 48 channels of splitter).

*ARX, PO Box 842, Silverado, CA 92676. Tel: 800-ARX-SYST. Circle EQ free lit. #124.*

## **ATLAS/SOUNDOLIER THUNDRAPRO 2 SUBWOOFER**

The ThundraPro 2 is a passive subwoofer containing two 8-



**The BBE 362NR Sonic Maximizer**





Crest Audio CA-9 and CA-6

inch drivers that can be used as a hidden in-floor or in-ceiling unit. The design of the ThundraPro cabinet features a vibration-free cabinet that can be installed above suspended ceilings or in between floor/ceiling joists. The cabinet design, combined with the unit's isolation mounting system, significantly reduces sound transmission to the building frame and adjacent rooms. Once installed, the only visible sign of the subwoofer is a grille frame mounted in the floor or ceiling. Suggested applications for the ThundraPro 2 include churches, nightclubs, and high-quality home installations.

Atlas/Soundolier recommends using the ThundraPro 2 with the ThundraPro CXA amplifier/crossover system for best results.

*Atlas Soundolier, 1859 Intertech Drive, Fenton, MO 63026. Tel: 314-349-3110. Circle EQ free lit. #125.*

## AUDIO LOGIC / SERIES

Audio Logic recently premiered its *i* Series of sound reinforcement products, which include the 31 *i* graphic equalizer. All products in the *i* Series feature several improvements. Much of the hand wiring has been eliminated, making the units, says Audio Logic, even more resistant to RF. In addition to more aesthetic designs, the processors now use new Toroid transformers and power supplies. In addition, several higher-quality components are being utilized to enhance signal-to-noise and reduce intermodulation. All Audio Logic *i* Series products feature Audio-Preci-

sion plots on the boxes. Similar to high-end microphones, each box displays an individualized Audio-Precision test with the guarantee that the product inside will meet or beat its specs.

*Audio Logic, 5639 S. Riley Lane, Salt Lake City, UT. 84107. Tel: 801-866-8800. Circle EQ free lit. #126.*

## AUDIO-TECHNICA AT8520 AUDIO COMPARATOR

Audio-Technica's AT8520 audio comparator/tester allows quick, easy checks of mics, headphones, and XLR cables. The unit features two balanced, low-noise microphone inputs with an available 48 volts of DC phantom power. Each channel is selectable for effective A/B microphone testing. A 10 dB pad can be switched in for mics with very high output levels. Dual amplifier sections feed a stereo headphone jack for monitoring. A 1 kHz tone oscillator permits checking stereo headphone level and balance. The cable testing portion allows complete testing of any XLR-type cable for any combination of opens, shorts, or miswired connections. The AT8520 operates on two 9-volt batteries.

*Audio-Technica, 1221 Commercial Drive, Stow, OH 44224. Tel: 216-686-2600. Circle EQ free lit. #127.*

## BBE 362NR SONIC MAXIMIZER

The BBE 362NR Sonic Maximizer combines BBE's unique Sonic Maximizer processing

circuitry with a single-ended noise-reduction circuit. While the BBE process can help add punch and clarity to source material, the noise-reduction circuit can be used to help clean up noise from tape hiss or electronic devices. Possible applications include instrument (guitar, bass, and keyboard) racks, tape copying, and sampling. When used in a PA system, the BBE process can help increase intelligibility while the complementary noise reduction helps reduce system hiss and hum. The stereo unit features -10 dBu unbalanced 1/4-inch and RCA connectors, and both channels can be simultaneously adjusted by a single set of front-panel controls. MSRP: \$349.

*BBE Sound Inc, 5500 Bolsa Avenue, Suite 245, Huntington Beach, CA 92649. Tel: 714-897-6766. Circle EQ free lit #128.*

## BGW MODEL 2200 SELF POWERED SUBWOOFER

The BGW Model 2200 is a self-contained subwoofer/amplifier combination designed for use in a variety of sound-reinforcement applications. The cabinet houses four McCauley 15-inch drivers, each with a long travel ( $\pm 8$  mm) compliance and a power handling capacity of 600 watts. The system is powered by a modified version of the BGW GTA (power amplifier) that is rated at 1100 watts per channel. Because the amplifier has a built-in summing circuit, a stereo output can be connected to one Model 2200. The -3 dB point is stated as 30 Hz and

the user may select the crossover point at frequencies from 63 to 180 Hz with a 24 dB per octave slope. The amp/subwoofer combination also features dynamic limiting circuitry, adjustable input sensitivity (with a locking shaft control), and a four-pole twist lock AC connector. Manufacturers suggested list price is \$4279.

*BGW Systems, Inc, 13130 Yukon Avenue, Hawthorne, CA 90250. Tel: 310-973-8090. Circle EQ free lit. #129.*

## BSS MSR-604-II SIGNAL SPLITTER

BSS has just introduced the MSR-604-II, the sequel to its popular MSR-604. Several key features have been added. New front-panel controls for multiple gain setting adjustment and mic/line switching make operation more efficient. You can now monitor any output via six-segment LED meters (including Clip LEDs on each channel) and a headphone amplifier. A new Listen bus allows headphone monitoring of any channel output. The MSR-604-II may be configured to provide four channels of 1-in/4-out; two channels of 2-in/8-out (which allows for use as a stereo distribution amplifier); or one channel of 1-in/16-out. EXBUS expansion also provides for multiple unit linking. There are multiple level ins and outs at mic or line levels, such as mic-to-line, mic-to-mic, or line-to-line. The unit includes a discrete front-end mic preamplifier and a phantom power supply isolated from the desk to each



mic input. A selection of AC input voltages and DC output voltages are provided. Frequency response is 20 Hz–20 kHz ( $\pm 0.5$  dB) and THD is rated at .01 percent.

*BSS Audio, Unit 5, Merlin Centre, Acrewood Way, St. Albans, Herts AL40JY, England. Tel: +44 (0)727 845242. Circle EQ free lit. #130.*

## **CELESTION** **CR SERIES MONITORS**

Celestion has expanded its CR Series with the addition of the CR-152 and CRi-152 wedge monitors. Both monitors feature a single 15-inch woofer and horn-loaded tweeter. They are both capable of producing 250 watts within a fre-

quency range of 40 Hz to 16 kHz. These 8-ohm enclosures offer a sensitivity of 97 dB and max SPL of 122 dB. Dual 1/4-inch phone input jacks are mounted on a recessed-molded plate on the side of the enclosures, where a high-frequency level control and a second-order high/low pass crossover are also located.

*Celestion, 89 Doug Brown Way, Holliston, MA 01746. Tel: 508-429-6706. Circle EQ free lit. #131.*

## **CLAIR BROTHERS** **R-4 SERIES III** **SPEAKER SYSTEM**

Clair Brothers' R-4 Series III three-way speaker system fea-

# **ELECTRO-VOICE SYSTEM 200**

The new Electro-Voice System 200 Modular Pro Audio includes the Sx200 portable full-range loudspeaker, the Xp200 electronic controller, and the Sb120a (powered) or Sb120 (nonpowered) bass module. All these elements combine to form a completely integrated speaker system, with only a quality power amplifier and mixer needed to complete the picture.

The trapezoidal Sx200 is a 300-watt, 12-inch, two-way, constant-directivity portable loudspeaker featuring high sensitivity (101.5 dB, 1W/1m) above 20,000 Hz. Its components are arranged in a time-coherent vertical array and housed in a Thiele-Small-aligned vented enclosure. Dual Neutrik Speakon input connectors guarantee that high currents from big power amplifiers are delivered to the speakers. Crossover components include mylar capacitors and air-core inductors.

Bass performance, extending below 80 Hz, is provided by an EVM12S Pro-Line woofer. The EVM12S features beryllium copper lead wires, high-temperature materials and a low-mass edge-wound voice coil driven by a large (16 lb.) magnetic structure. Part of the magnetic structure adjacent to the coil is insulated by EV's exclusive PROTEF process that lubricates any rubbing contact and electrically insulates the coil from violent short-term peaks.

The high-frequency section of the Sx200 utilizes a molded-in constant-directivity horn. Its unique, 65- x 65-degree coverage pattern increases intelligibility. The horn's special Varipath throat geometry throws a rectangular pattern rather than the rounded, elliptical pattern of conventional horns, improving coverage in the corners of the audience area.

The Sx200's high-frequency driver is protected against accidental overdrive by EV's PRO circuit. If input power to the driver exceeds the nominal rating, the circuit is activated and reduces power delivered to the driver by 6 dB. The loudspeaker remains in this mode of operation until input power is reduced to a safe level.

The Sb120a amplified bass module is housed in the same compact, stackable, stand-mountable and arrayable enclosure as the Sx200 full-range system. (A nonpowered bass module, the Sb120, is also available.) The Sb120a's integral, 400-watt power amp is optimized for the DL12sb ultralong-throw 12-inch woofer. The DL12sb's shallow-cone, deep-frame geometry provides a very high peak excursion ability of nearly 7/8 inch, for high-impact, punchy bass.

The Sb120a includes a low-pass filter that rolls off response above 180 Hz at 18 dB per octave, for essentially omnidirectional output and increased placement flexibility. A high-pass filter attenuates frequencies below 40 Hz at 6 dB per octave, for infrasonic speaker protection. A combination input connector accepts balanced three-pin XLR connectors, as well as balanced or unbalanced 1/4-inch plugs. A paralleled full-range output allows convenient signal routing.

At the heart of the System 200 is the Xp200 controller. The Xp200 offers a number of features, including a low-frequency profile circuit that enhances low-frequency performance of both the Sx200 full-range systems and the Sb120/Sb120a bass modules. In a side-chain circuit, low frequencies are slightly delayed in time and summed with the original direct signal.

Overall bass output can be increased by up to 12 dB, as would be possible with conventional low-frequency boost. However, combining the delayed and direct signals changes the relative levels of the musical fundamental and its harmonics. The resulting modification of timbre is as dynamic and continually changing as the musical input itself, creating an overall effect far more subtle than a simple bass boost. A variable low-frequency control allows tuning of the bass enhancement to suit many tastes and room acoustics.

The full-range left and right outputs of the Xp200 feature a 40 Hz, 24 dB-per-octave high-pass filter that keeps the bass output of the Xp200 speaker systems very tight and clean by eliminating excessive cone excursion caused by very low, infrasonic frequencies. The mono-summed subwoofer output incorporates 24-dB-per-octave filters that roll off response above 100 Hz and below 37 Hz for a high degree of placement flexibility and infrasonic protection for the Sb120a and Sb120 bass modules. Circle EQ free lit. #132.





tures a new mid-range section design, the Directional Mid-Range Baffle (DMB) System. The new DBM System is not a conventional horn, but a physical extension of the conical shape of the 12-inch mid-range transducer. The R-4 Series III features an 18-inch driver on the low end capable of handling 600 watts. The 300-watt mid-range driver occupies its own sealed cavity, independent of the low-frequency section. The high-frequency section features a 75-watt driver coupled to a 60- x 40-degree constant-directivity horn. Optional rigging hardware is available.

*Clair Brothers, P.O. Box 396, Lititz, PA 17543. Tel: 717-626-4000. Circle EQ free lit. #133.*

## CIRCUITS MAXIMUS COMPANY, INC.

### CMCI ORACLE WIRELESS STAGE MONITOR SYSTEM

The CMCI Oracle offers state-of-the-art wireless technology for use with in-ear monitors or headphones. The system consists of two units: a rack-mount transmitter and a wearable belt-pack receiver. The 2-rack-unit transmitter has four audio inputs, built-in limiting for

hearing protection, an effects loop for external processing, and a universal AC input allowing worldwide operation. Because the unit has 16 user-selectable UHF channels, multiple Oracle systems can be operated simultaneously without interference. The receiver contains circuitry to operate on any of the 16 transmitted frequencies as well as an Auto Mute safety circuit designed to mute the audio in the earpieces in the event that the carrier signal is lost. Separate left and right volume controls and a power on/off switch allow the performer complete control of the belt-pack receiver. The high-quality receiver can be used to drive any in-ear monitors or headphones that the performer desires to wear.

*CMCI, 9017-B Mendenhall Court, Columbia, MD 21045. Tel: 410-381-7970. Circle EQ free lit. #134.*

## COMMUNITY VHF 100 DRIVER

Community's new VHF 100 driver is a proprietary high-frequency unit designed to optimize overall performance in three-way systems. Equipped with a nonmetallic diaphragm and a large diameter, ferroflu-

id-cooled voice coil, the VHF100 is a uniquely shaped low-moving mass device mated to a low-compression phase plug. Installed in every RS880, the VHF100 has also been added to the RS660 and RS220 speaker systems.

*Community, 333 East Fifth St., Chester, PA 19013. Tel: 610-876-3400. Circle EQ free lit. #135.*

## CREST AUDIO CA-6 AND CA-9 POWER AMPLIFIERS

The CA-6 and CA-9 power amplifiers from Crest Audio offer professional performance and sound quality at a reasonable price. The CA-6 is rated (both channels driven) at 350 watts per channel into 8 ohms, 600 wpc into 4 ohms, and 750 wpc into 2 ohms. The CA-9 is rated (both channels driven) at 550 wpc into 8 ohms, 900 wpc into 4 ohms and 1000 wpc into 2 ohms. The CA-6 and CA-9 can be operated in bridged mono for outputs of 1000 and 1800 wpc, respectively, into 8 ohms. The twin tunnel-cooled heatsinks and variable-speed fan maintain the CA's output transistors at a constant temperature to ensure longer life. The units feature Crest's IGM circuit for safe operation into 2-ohm loads and a clip-limiting circuit that helps protect drivers and reduces distortion under extreme overload conditions. Suggested List Prices: CA-6 — \$1250; CA-9 — \$1590.

*Crest Audio, Inc; 100 Eisenhower Drive; Paramus, NJ 07652. Tel: 201-909-8700. Circle EQ free lit. #136.*

## CROWN MACRO-TECH 36 X 12 AMPLIFIER

Crown's Macro-Tech 36 x 12 combines two amplifiers into a single unit making it good for biamped systems and heavy-duty touring. Both channels have separate power supplies. Channel 1 of the MA-36 x 12 has the same specs as Crown's MA-3600VZ. Utilizing the com-

pany's variable impedance (VZ) power supply circuitry, it provides 1800 watts per channel into 2 ohms and is designed to drive bass cabinets. Channel 2 is designed to drive horns and other high-frequency transducers, offering the same specs as one channel of the MA-122, a miniaturized stereo amp that delivers 450 wpc into 4 ohms. Backed by Crown's unconditional three-year warranty, the MA-36 x 12 retails for \$2395.

*Crown, 1718 W. Mishawaka Ave., Elkhart, IN 46515. Tel: 219-294-8000. Circle EQ free lit. #TK.*

## DDA QII MIXING CONSOLE

The QII mixing console from DDA provides LCR (Left-Center-Right) channel panning, making it ideal for performing arts and theater sound applications. A cue/solo system allows priority soloing of signals in either momentary, latching, interlocking, or additive modes, with a master "clear" button for the additive solo mode. The QII is available with 24, 32, 40, or 48 inputs. The 48-input configuration is less than six feet in length. The QII comes with eight mono subgroups, but can be specified with six stereo subgroups, four LCR subgroups or 16 mono subgroups — all directly assignable. Each input channel features extensive 4-band equalization, as well as eight full-time sends. Eight VCA/mute groups are also available with each offering mute safe switching. High-frequency EQ covers 2 kHz–20 kHz, mid/high EQ covers 470 Hz–15 kHz, low/mid EQ covers 70 Hz–2.2 kHz, and low frequency EQ covers 20 Hz–500 Hz.

*DDA/Mark IV, 448 Post Rd., Buchanan, MI 49107. Tel: 800-695-1010. Circle EQ free lit. #138.*

## ELECTRO FORCE 800-SR-4 DIGITAL POWER AMPLIFIER

The Electro Force 800-SR-4



Celestion's CR Series Monitors



power amplifier uses true pulse-width modulated MOS-FET output stages to deliver 275 watts per channel into 8 ohms, or 500 wpc into 4 ohms (RMS, both channels driven). Electro Force claims an operating efficiency of 90 percent for cool operation, low power consumption, and higher reliability without the use of noisy fans (Electro Force claims typical efficiency for a conventional power amplifier is around 30 percent). The unit can be safely operated into any load impedance without thermal shutdown due to its "HSDS" (High Speed Dynamic Scaler) circuitry. The HSDS (High Speed Dynamic Scaler) is a type of speaker protection that automatically senses the load impedance present at the output of the amplifier and scales the output to the maximum safe level. The 800-SR-4 features both 1/4-inch phone and XLR input connectors and five-way binding posts for the output. Road-weary engineers will be happy to know that the Electro Force 800-SR-4 comes in a 2 rack-space chassis that is only 7.5 inches deep and weighs a mere 13 pounds. Manufacturer's suggested retail price is \$1095.

*Electro Force Corp., 727 Oakstone Way, Anaheim, CA 92806. Tel: 800-227-4445. Circle EQ free lit. #139.*

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*Music Technology Magazine*

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fan cooling makes for greater reliability. The units are built into a road case with a removable protective cover that folds out to become a stand. The PX-2208D is \$1890, the PX-2212D is \$2140, and the PX-2216D is \$2400. The model PX-2208, which has a spring reverb, retails for \$1700.

*Fender, 7975 N. Hayden Rd., Ste. C-100, Scottsdale, AZ 85258. Tel: 602-596-9690. Circle EQ free lit. #140.*

### FISHMAN ACOUSTIC PERFORMER PRO

Known for its acoustic pickup systems, Fishman has entered the live-sound market with the introduction of the Acoustic Performer Pro speaker/amplification system. Designed for acoustic guitars, the entire system is compact and weighs under 30 pounds. Powered by a MOSFET power amplifier, the unit is equipped with an 8-inch polypropylene cone driver and 1-inch fabric dome tweeter. The amplification section offers separate tone controls, parallel effects loops for the transducer and microphone channels, and digital reverb that may be assigned to either or both channels. A notch filter is provided to control acoustic feedback, and the system offers a maximum SPL of 113 dB at 1 meter.

*Fishman Transducers, 340-D, Fordham Rd., Wilmington, MA*

01887. Tel: 508-988-9199. Circle EQ free lit. #141.

### FURMAN SOUND ACD-100 AC POWER DISTRO

Furman, a leading name in rack power accessories has introduced the ACD-100 AC Power Distro. Designed into a 2 rack-space enclosure, the ACD-100 is a power distribution system that can handle an input of up to 100 amps and distribute that input to five 20-amp circuits. Each circuit has a status indicator and a high-inrush-type circuit breaker capable of handling the surge that typically occurs when a power amplifier is turned on. The unit is available in versions for 120V, 240V, or 208V three-phase power. Suggested List Price is \$499.

*Furman Sound, Inc., 30 Rich Street, Greenbrae, CA 94904. Tel: 415-927-1225. Circle EQ free lit. #142.*

### GENERALMUSIC POWERCASE MIXERS

Generalmusic manufactures the Powercase series of mixers. The portable cases with sliding metal covers permanently house the mixers for maximum protection. Balanced XLR and 1/4-inch connectors, individually switchable phantom power supplies for each channel, 7-band EQ, and a





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dual digital effects module are some of the features in the Powercase mixers. Powercase 12 has four mono and four stereo channels, and features 150 wpc amplification. Powercase 16 offers eight mono and four stereo channels with 250 wpc amplification. Both units are equipped with a digital signal processor, the DSP plus. The dual stereo effect module has two separate sections: a reverb section, with Hall, Room, Vocal, Plate, and Early Reflections; and Multi-Effect section with five different effects: echo, delay, chorus, flanger, and phaser. DSP Plus features an LCD display with rows of 16 characters for showing presets and their parameters, MIDI sockets for external control, and three easy-to-use controls for step-by-step programming. A comprehensive master section is on-board and optional rack flanges are available.

*Generalmusic, 1164 Tower La., Bensenville, IL 60106. Tel: 708-766-8230. Circle EQ free lit. #143.*

## KLARK TEKNIK DN3600 EQUALIZER

The new DN3601 is a slave derivative of Klark Teknik's DN3600 programmable equalizer. Like the DN3600, the DN3601 slave is a programmable, digitally controlled, 2-channel, 1/3-octave, 30-band graphic equalizer. It can be controlled by a master DN3600, suitable computer, or other MIDI control devices. Up to 64 DN3601 units (as well as a mixture of DN3600's and

DN3601's) may be linked in a single MIDI loop via the Pro MIDI Interface on the unit's rear panel. Slave units may be addressed individually or as a group by a master DN3600, and they respond to standard MIDI program messages.

*Klark Teknik/Mark IV, 448 Post Rd., Buchanan, MI 49107. Tel: 800-695-1010. Circle EQ free lit. #144.*

## MEYER SOUND MSL-5 LOUSPEAKER

The MSL-5 from Meyer Sound is a high power (110 dB continuous SPL), high-definition loudspeaker system designed for large-scale music reinforcement and PA applications. The enclosure comprises an all-horn integral loudspeaker design and the cabinet is constructed as a 30-degree arrayable section with two proprietary, 12-inch cone, low-frequency horn drivers in a vented horn-loaded enclosure and three 2-inch throat (4-inch diaphragm), high-frequency horn drivers. The cabinet is fitted with handles and with rigging lift rings having a 2000 lb. maximum load capacity that are bolted directly to an internal steel frame. Designed specifically for use with SIM System II, the MSL-5 requires the Meyer M-5 Control Electronics Unit, and its standard configuration comprises two loudspeaker cabinets. The M-5 is optimized for the MSL-5 and is aligned at the factory. It uses Meyer Sound's SpeakerSense circuitry to protect the MSL-5's components from overheating or excessive excursion. It also



**Nady 950GS Wireless Mic**



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incorporates the company's MultiSense function, which allows the unit to accommodate two amplifiers through separate Sense inputs. The circuit tracks the power amp with the greatest output voltage swing to control the system protection limiters. Also provided is a Safe/Autosafe switch that affects the action of the protection limiting circuitry.

*Meyer Sound, 2832 San Pablo Ave., Berkeley, CA 94702. Tel: 510-486-1166. Circle EQ free lit. #145.*

## MIDDLE ATLANTIC PRODUCTS

### RSH CUSTOM RACK SHELF

Designed to facilitate rack mounting for virtually any component without its own mounting ears, Middle Atlantic Products' new Model RSH custom rack shelf is custom cut to meet size requirements for components of all descriptions. As cut to a desired size, the RSH leaves no unsightly gaps between equipment. Adjustable rear brackets provide secure mounting of the component to the ventilated shelf bottom to enhance cooling. Dimensions for most components are kept on file at Middle Atlantic's headquarters and manufacturing facility. For applications requiring a custom-rack shelf for a unit not on file, the proper dimensions can simply be sent via fax.

*Middle Atlantic Products, 8 N. Corporate Dr., P.O. Box 29, Riverdale, NJ 07457. Tel: 201-839-1011. Circle EQ free lit. #146.*

## NADY SYSTEMS

### 950GS WIRELESS SYSTEM

Nady Systems has added the top-of-the-line 950GS UHF wireless system to its foremost-selling line of wireless mic and instrument systems. The 950GS is available with up to 40 user-switchable channels on the receiver, handheld mic

transmitter, lavalier transmitter, and instrument transmitter in selected groups within the 475, 790, 810, 920, and 950 MHz ranges. The 950GS is a true diversity unit featuring state-of-the-art frequency synthesis with user selectable channels arranged in groups for easy access. The receiver mounts in a single rack space and is available with Nady's HT-60 handheld microphone transmitter or the company's new, all-metal, Surface Mount Technology (SMT) lavalier mics and instrument transmitters. Nady's patented compensating noise reduction circuitry delivers 120 dB dynamic range. Retail prices start at \$2749.

*Nady, 6701 Bay St., Emeryville, CA 94608. Tel: 510-652-2411. Circle EQ free lit. #147.*

## P.A.S.

### FT-1 SPEAKER SYSTEMS

The new Professional Audio Systems (P.A.S.) FT-1 is a compact full-range coaxial

speaker system with built-in hardware for flying or pole mounting. The 1-inch HF driver, P.A.S. CXL-1580C 15-inch woofer and high-power passive T.O.C. crossover allow the FT-1 to achieve phase response from 100 Hz to 10 kHz with better transients and less feedback.

*Professional Audio Systems, 660 North Twin Oaks Valley Rod., Suite 101, San Marcos, CA 92069. Tel: 619-591-0360. Circle EQ free lit. #178.*

## PEAVEY

### RSM 2462 COMPACT MIXER

Peavey's RSM 2462 is a compact mixer that offers 24 input channels in a rack-mountable package. The eight mono channels each feature low-noise mic preamps as well as individual phantom power switches. Eight stereo input channels are designed to accept line level inputs. Controls available on both the mono and stereo channels include a mute switch, 60mm

fader, input trim, stereo PFL/solo, direct outputs, and a pre-fader TRS patch point. Six auxiliary sends may be configured for either pre- or post-fader operation and the sends masters each have a PFL/solo switch for monitoring purposes. The master section features a total of six stereo returns, two of which are designed to accept the outputs from a stereo tape machine. The master L/R outputs are balanced on XLR jacks as are the outputs for auxiliaries 1 and 2. Two ten-segment LED meters can be used to monitor the L/R output or any bus or channel, pre- or postfader.

*Peavey Electronics Group, 711 A Street, Meridian MS 39302. Tel: (601) 483-5365. Circle EQ free lit. #148.*

## PHONIC

### PCL 3200 COMPRESSOR/LIMITER

Phonic has launched a new compressor/limiter with gate to its line of signal processing equipment. The PCL 3200 fits

## TGI WAVEFRONT SYSTEMS

The W1, W2, and W3 Wavefront Systems from TGI were recently launched in North America. The W1 is designed to be a high-performance, compact trapezoidal loudspeaker. The system is aimed at applications where both high output capability and small size are required. The W1 features a high-power 10-inch bass driver and a 1-inch exit compression driver.

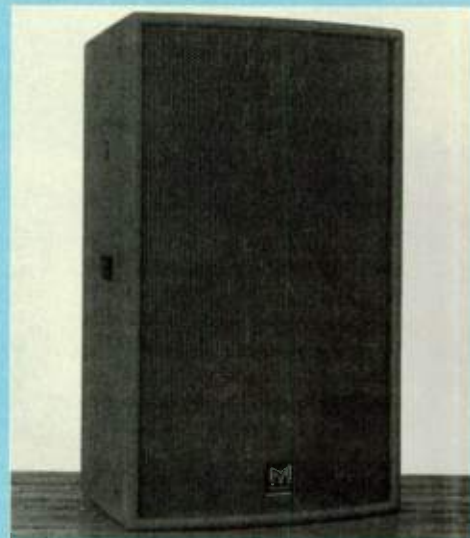
The W2 system is fully functional active or passive at the flip of a switch. The two-way enclosure uses high-power drive units to achieve the maximum SPLs possible from this compact enclosure. It features a high 12-inch bass driver and 1-inch exit compression driver.

The W3 system is a three-way full-range system. This enclosure is just 28 inches high. The W3 features a 15-inch bass driver, 6.5-inch mid with a proprietary toroidal waveguide, and a 1-inch exit compression driver.

Both the W2 and W3 utilize MANN flying hardware for safe and reliable performance in flown applications. All Wavefront enclosures are constructed with Baltic Birch.

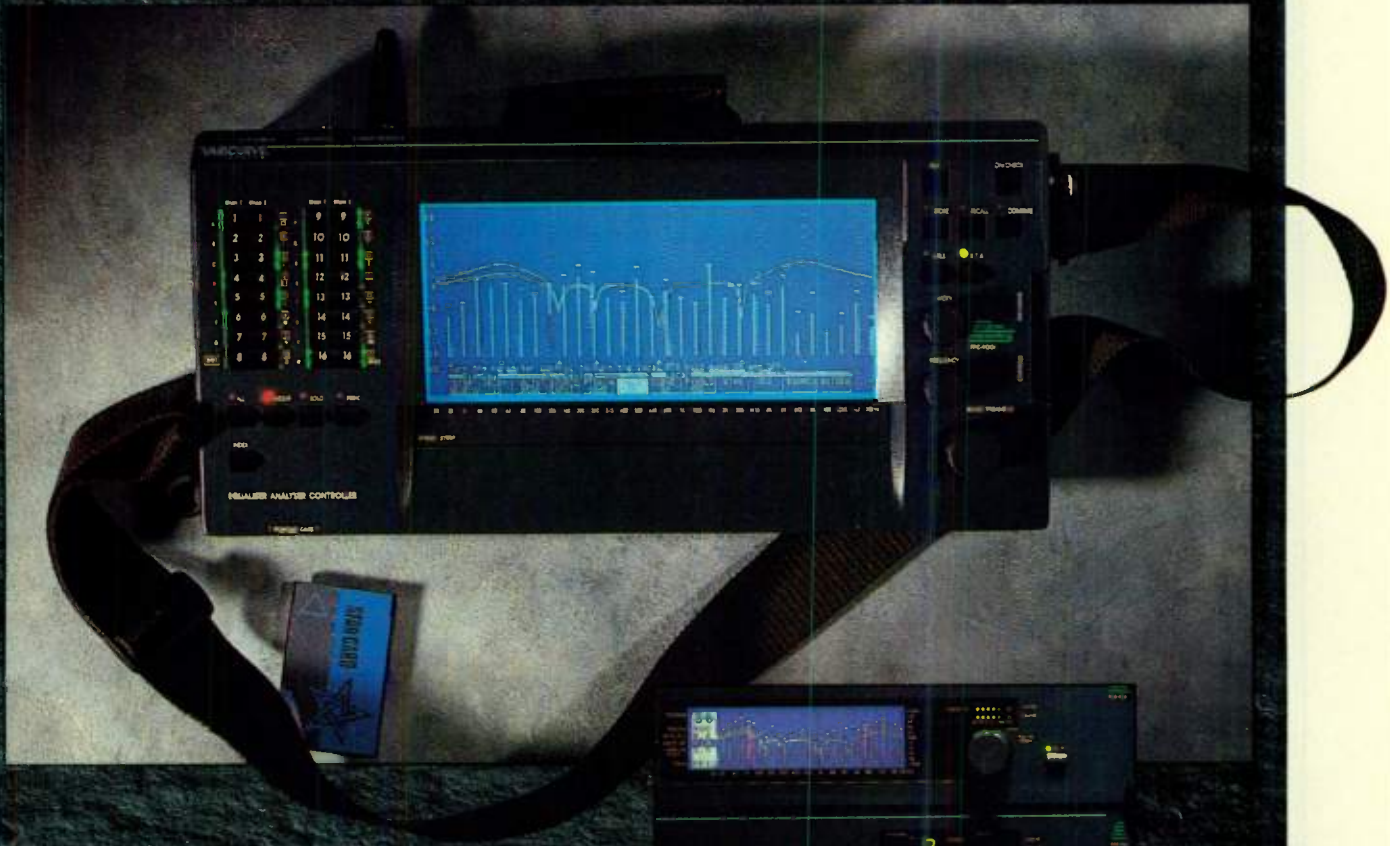
Also in the Wavefront series are the WS2 subwoofer featuring birch construction, two 15-inch high output drivers, and the WX3 controller designed to maximize the overall performance of the series. The WX3 can be configured either as a two-way stereo or three-way mono device.

For more information, contact TGI, 300 Gage Ave., #1, Kitchener, ON Canada N2M 2C8. Tel: 519-745-1158. Circle EQ free lit. #149.





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in a single rack space and operates as either two fully independent mono compressor/limiters or master/slaved for stereo operation. The PCL 3200 has been designed with variable compression ratios and new attack release circuitry. LED bar graphs offer easy monitoring of input and output signals and gain metering. Ins and outs feature balanced 1/4-inch jacks. The compressor/limiter section gives you independent control over threshold, compression ratio, attack time and release time in either hard knee or soft knee operational modes. Sidechain support through 1/4-inch jacks on each channel allow connections to equalizers for optimum convenience. Suggested retail is \$279.

*Phonic, 16902 Milliken Ave., Irvine, CA 92714. Tel: 714-253-4000. Circle EQ free lit. #150.*

## QSC AUDIO

### QSCONROL CONTROL SYSTEM

QSControl is QSC Audio Products' MediaLink-based audio control system. QSControl, as in "cruise control," connects QSC EX-Series amplifiers to a MediaLink network for complete remote control and monitoring. The QSControl system uses VNOS (Visual Network Operating System), Lone Wolf's MediaLink software interface, to create customized control panels and network configurations. With VNOS, QSControl operates a variety of utilities including Virtual Venue and Automatic Node Addressing. The QSControl system allows remote monitor and control of up to 254 nodes per subnet via a Macintosh, PC, or touch panel computer. The QSControl components consist of: the QLink Interface Card, the QBridge protocol converter, and the QHub fiber optic distribution hub.

*QSC Audio, 1675 MacArthur Blvd., Costa Mesa, CA 92626. Tel: 714-754-6175. Circle EQ free lit. #151.*

## RAMSA WZ-DM30 DIGITAL MULTIPROCESSOR

Ramsa's WZ-DM30 is a 1-input/4-out digital multi-processor. It features compressor/limiters, graphic EQ, 4-way crossover network, and 4-band parametric equalizers. All controllable parameter settings can be stored in 16 event memories in each mode and can be retrieved instantaneously. The WZ-DM30 can be connected to external MIDI equipment. It features 20-bit digital floating A/D and MASH D/A converters to provide a dynamic range of 110 dB. Retail price is \$3600.

*Ramsa, 6550 Katella Ave., Cypress, CA 90630. Tel: 714-373-7277. Circle EQ free lit. #152.*

## RANE GE-60 EQUALIZER

Rane's GE 60 is a stereo Interpolating Constant-Q equalizer that is housed in a three rack-space unit and features 1/3-

octave graphic design. The two separate channels of 30 band Interpolating Constant-Q filters have 45mm slider controls. Sweepable high- and low-cut filters are included, along with input level controls, LED overload indicators, and LED-indicated hardwire bypass. Active balanced inputs and outputs are available simultaneously on 3-pin, 1/4-inch TRS and terminal strip connectors. Rane's Interpolating performance means that when two adjacent bands are boosted or cut to the same level, the response of the equalizer peaks (or interpolates a response) at a frequency centered between the filters. Retail price is \$849.

*Rane, 10802 47th Ave. W., Mukiteo, WA 98275-5098. Tel: 206-355-6000. Circle EQ free lit. #153.*

## RENKUS-HEINZ SR 5/6 AND 5/9 SPEAKER SYSTEMS

The Renkus-Heinz SR5/6 and SR5/9 are full range 2-way

speaker systems. They deliver 60 Hz to 18 kHz up to 128 dB SPL. They feature Renkus-Heinz's Complex Conic Horns, dual 1-inch high-frequency drivers, and a heavy-duty 12-inch woofer with a 4-inch voice coil and 400 watt power rating. The loudspeakers are said to handle 600 watts of power. The SR5/6 offers long-throw 60- x 40-degree V coverage and the SR5/9 has a 90- x 40-degree V pattern. The TSC controllers used with the SR5's feature electronic crossovers and new protective circuitry that prevents overload damage without introducing distortion. They also provide loudspeaker equalization and loudness compensation. The speakers are also available with a built-in passive crossover.

*Renkus-Heinz, 17191 Armstrong Ave., Irvine, CA 92714. Tel: 714-250-0166. Circle EQ free lit. #154.*

## RSP TECHNOLOGIES REANIMATOR

The Reanimator from RSP

# STEWART POWER AMPLIFIERS

There are currently six models in Stewart Electronics' line of professional power amplifiers. All feature Stewart's Switch Mode Power Supply that allows the units to provide more wattage in a lighter, more compact package.

The three newer models in the series are the PA-1000 (shown), PA-1400, and PA-1800. Coupled with the Switch Mode Power Supply, all three new units feature Class H amplifier topology. This architecture is designed to ensure rock-solid bottom end and to run 2-ohm loads continuously.

The PA-1000 occupies a single rack space and produces 225 watts x 2 into 8 ohms, 420 watts x 2 into 4 ohms, 580 watts x 2 into 2 ohms, and 1000 watts x 1 into 4 ohms bridged. The PA-1000 includes both XLR and 1/4-inch TRS inputs, as well as binding post and 1/4-inch outputs. It weighs just 11 pounds and retails for \$1099.

The PA-1400 occupies two standard rack spaces and produces 390 watts per channel x 2 into 8 ohms, 650 watts x 2 into 4 ohms, 880 watts x 2 into 2 ohms, and 1400 watts x 1 into 4 ohms bridged. It includes XLR, 1/4-inch TRS, and barrier strip inputs and binding post outputs. The unit weighs 16 pounds and retails for \$1399.

Model PA-1800 occupies two standard rack spaces, produces 450 x 2 into 8 ohms, 775 watts x 2 into 4 ohms, 1050 watts x 2 into 2 ohms, and 1800 watts x 1 into 4 ohms bridged. It also includes XLR, 1/4-inch TRS and barrier strip inputs, and binding post outputs. It weighs 17 pounds and retails for \$1699.

All Stewart PA amplifiers carry a five-year parts and labor warranty.

For complete details, contact Stewart, 11460 Sunrise Gold Circle, Ste. B, Rancho Cordova, CA 95742. Tel: 916-635-3011. Circle EQ free lit. #155.





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Technologies is a stereo compressor that can also be operated as a dual mono unit. The unit features a dynamic enhancement circuit that compensates for the loss of high frequencies that RSP feels typically occurs during the compression process. The enhancement circuit does not alter the signal until compression takes place, so no additional noise will be added to the signal. Separate controls for each channel include threshold, ratio, attack, release and output level. Three color LED displays indicate gain reduction and output level for each channel. HUSH noise reduction can be applied independently per channel or can be bypassed if the user desires. The unit may be operated at either -10 dB or +4 dB levels. Manufacturer's suggested retail price is \$599.

*RSP Technologies, 2870 Technology Drive, Rochester Hills, MI 48309. Tel: 313-853-3055. Circle EQ free lit. #156.*

## SABINE

### ADF-1200/2400 WORKSTATION

The ADF workstations from Sabine are 18-bit digital signal processors that combine the company's patented FBX Feedback Exterminator technology with a series of digital filters.

The ADF-1200 is a mono unit that offers 12-band digital parametric filtering, programmable noise gate, real-time frequency analysis, and a host of other features. Unlike analog filters, the ADF series digital filters cause little or no phase shift and can be as narrow as 1/10 octave. The front-panel LCD display can show user menus, graphic display of filter plots, real-time frequency analysis and real-time display of the FBX filters. Also available to the user is a digital delay (up to 340 ms) that can be programmed in feet, meters, or seconds with 0.1 ms resolution. The units store one factory and eight user presets, and offer a five number password to prevent unwanted tampering with preset values. The ADF-2400 is a 2-channel unit that can be configured as either a stereo unit with 12 digital filters per channel or a mono unit with 24 filters per channel. Suggested retail prices: ADF-1200 — \$1695.95; ADF-2400 — \$2627.95

*Sabine Musical Manufacturing, Inc., 4637 NW 6th Street, Gainesville, FL 32609. Tel: 904-371-3829. Circle EQ free lit. #157.*

## SENNHEISER

### WEM250 MONITORING SYSTEM

Sennheiser's new WEM250 is a wireless in-the-ear stage monitoring system. RF filtering and shielding in both the transmitter and receiver ensures a reliable RF link with the ability to operate over 50 UHF channels simultaneously. The dual transmitter can operate as a single stereo or two mono mixes. It's rack mountable (1U) and features LED bargraph indicators for audio as well as headphone monitoring. Internally the transmitters can be switched to 16 different frequencies. A single antenna transmits both frequencies. The EK2014-TV receiver is smaller than a pack of playing cards. A DC converter ensures consistent audio quality and RF range throughout the life of the batteries. And the all-metal housing is both rugged and shields the internal electronics from outside interference.

*Sennheiser, 6 Vista Dr., P.O. Box 987, Old Lyme, CT. 06371. Tel: 203-434-9190. Circle EQ free lit. #158.*

## SHURE BROTHERS SC WIRELESS SERIES

The new SC series from Shure is a line of VHF wireless microphone systems that have been designed specifically for use in installations by sound contractors. The company's MARCAD diversity technology is used to increase sensitivity, improve reception of the transmitted signal, and to decrease the likelihood of dropouts. A five-LED "Battery Fuel Gauge" meter tells the user how much battery life is available, with an indication for when the battery is in need of change. Eight position switches on the transmitter and receiver allow the user to easily fine tune the units for maximum reception and minimum interference. Also featured is the Tone Key Squelch that helps to prevent unwanted noise from entering the sound system when the transmitter is off. By allowing the power on/off switch to act as a mute switch, the TKS eliminates the popping sound

that normally occurs when a wireless transmitter is turned on or off. The system can be purchased in a variety of configurations including a dual receiver (in a single rack space) or a single receiver (1 rack space) with front-mounted antenna. MSRP: SC 2 Beta 87 (handheld) — \$1000; SC14-93 (lavalier) — \$800.

*Shure Brothers, Inc., 222 Hartrey Avenue, Evanston, IL 60202-3696. Tel: 708-866-2200. Circle EQ free lit. #159.*

## SOUNDTECH X234 AND X345 ELECTRONIC CROSSOVERS

SoundTech is offering two electronic crossovers for use in portable live sound applications. The X234 and X345 have 24 dB per octave filters. The X234 is a two-way stereo crossover that can be used in a three-way mono configuration. It has both balanced XLR and unbalanced 1/4-inch inputs and outputs. Crossover frequency selection ranges from 60 Hz to 13 kHz. The X345 is a stereo three-way crossover that is switchable to a four-way mono mode. It's fitted with XLR connectors and features the same 60 Hz to 13 kHz range. In addition, both units feature a mono subwoofer section that make the X234 into a three- or four-way unit and the X345 into a four- or five-way crossover. The subwoofer section has frequency selection from 60 Hz to 250 Hz. The output of this section is a summed mono signal. Signal-to-noise is -104 dBm, THD is .004 percent and frequency response is 20 Hz to 20 kHz. The X234 lists for \$350 and the X345 is \$400.

*SoundTech, 255 Corporate Woods Pkwy., Vernon Hills, IL 60061. Tel: 708-913-7772. Circle EQ free lit. #160.*

## SOUNDTRACS MEGAS II STAGE CONSOLE

The Megas II Stage sound-



The BGW Model 220 Subwoofer



reinforcement console is the latest model from Soundtracs of Britain. Four different frame sizes (30, 38, 46, and 54) can be loaded with both mono and stereo input modules and a maximum of four matrix modules to provide an 11 x 8 matrix, plus up to four dual group modules, providing eight audio groups. Standard on the Megas II Stage are six mute groups, input metering, and full VU metering on groups and masters.

*Samson Technologies, 262 Duffy Ave., Hicksville, NY 11801. Tel: 516-932-3810. Circle EQ free lit. #161.*

### STAGE ACCOMPANY PPE 2410 PARAMETRIC EQ

Stage Accompany's PPE 2410 is a sophisticated programmable, 2-channel, 4-band parametric equalizer that provides control of all variable settings. The memory offers storage, recall, and comparison of up to 64 different settings. Once you've programmed an optimal EQ for a certain instrument or set of speakers, you can instantly retrieve it. Center frequencies are visible on a highly accurate 5-digit display. By sweeping a narrow boosted peak you can detect resonances and identify the frequencies at which they occur. Three-digit displays are provided for input level, cut/boost level, Q factor, output level and for preset banks and registers. Input and output signal levels are displayed on LED bars with peak hold. The unit also offers microprocessor control and a lock-out function.

*Stage Accompany B.V., Anodeweg 4, 1627 LJ Hoorn, The Netherlands. Tel: 31-0-2290-12542. Circle EQ free lit. #162.*

### SYMETRIX 602 STEREO DIGITAL PROCESSOR

The Symetrix 602 is a stereo digital processor. Operating entirely in the digital domain, it integrates three processing

blocks into one unit: parametric EQ, multidynamics processing, and time domain effects — all simultaneously. The 602 features digital in and out (AES/EBU and S/PDIF), analog stereo line level ins and outs, a dynamic range of over 100 dB, and real-time MIDI implementation. The 3-band EQ features peak/shelf and notch filtering. Also at your command are notch filtering, an AGC/leveler, a downward expander, dynamic filter noise reduction, deessing, and stereo digital delay with modulation and feedback. "Glitch-free" nonzipping algorithms are coupled with seamless on-the-fly editing and program changes. There are 128 read-only presets for voice, instruments, and spatial manipulation. You may store your own programs (up to 128) as well. Entire contents of memory may be dumped via MIDI to floppy or hard drive. In addition, the 602 offers 18-bit 64x oversampling A/D converters and a 24-bit data stream.

*Symetrix, 14926 35th Ave., Lynnwood, WA 98037. Tel: 206-787-3222. Circle EQ free lit. #163.*

### TELEX FMR-450 WIRELESS MIC SYSTEM

Telex's FMR-450 is a high-performance UHF wireless microphone system that operates from 524 MHz to 746 MHz. It is designed to operate up to 50 simultaneous systems, using handheld or belt-pack transmitters. The FMR-450 includes patented Pos-i-Phase true-diversity circuitry for highly stable RF performance. Telex's proprietary Pos-i-Squelch II provides greater overall system quieting, and the new compander design results in a signal-to-noise of greater than 110 dB. Other features include a specially matched, 1/2-wave collinear ground-independent antenna system. The receiver features RF, audio and diversity LED indicators, and a transformer isolated balanced mic

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level output with attenuation control. The receiver is 1/2-rack-space wide and 1-rack-space high. An optional rack kit allows two receivers to occupy one rack space. The micro-pack transmitter is housed in an all-metal case that measures 3.5-inches x 2.25 inches x .75-inches. The transmitter features a silent-on switch and separate mic mute, overload/low battery LED, removable antenna, and

gold-plated LEMO mic connector. It will operate for 12 to 14 hours on a standard 9 V alkaline battery and also supports 8.4 V NiCd batteries. The handheld transmitter offers a choice of four head options. Retail price is \$1399.

*Telex, 9600 Aldrich Ave. S., Minneapolis, MN 55420. Tel: 612-884-4051. Circle EQ free lit. #164.*

## TOA F-305 SERIES LOUDSPEAKERS

Housed in polypropylene enclosures, the new F-305 Series loudspeakers from TOA, are of a three-way bass reflex design and can be used in a variety of applications. Frequency response is between 50 Hz and 20 kHz. The system

contains an 8-inch woofer, a 2.5-inch dome tweeter, and a super dome tweeter. Frequencies are divided at 2 kHz and 15 kHz, sensitivity measures in at 90 dB (1W/1M), nominal impedance is 8 ohms, and power handling is rated at 150 watts, continuous program. Other features include special protection circuitry to safeguard against overload, magnetically shielded internal components, and push-type input terminals that are connected in parallel with 1/4-inch phone jacks. The speaker's internal diffusion baffle may be rotated 180 degrees to obtain a quasi-symmetrical arrangement of the drivers, while allowing for vertical positioning.

*TOA, 601 gateway Blvd., Ste. 300, South San Francisco CA 94080. Tel: 415-588-2538. Circle EQ free lit. #165.*

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Pickering, Ont. L1W 3Y8

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## VALLEY AUDIO 730 DIGITAL DYNAMIC PROCESSOR

The 730 Digital Dynamic Processor from Valley Audio offers six dynamics modes plus digital volume control and stereo width adjustment. Multiple input models also offer keying, mixing, and external sync input. Modes include: compression, enhanced compression (with gain makeup), limiting, expansion, deessing, Dynamap (8-section companding), and static (digital volume and stereo width). These modes can be combined for complex dynamic effects. Clock frequencies at 32 kHz, 44.1 kHz, and 48 kHz are provided, 20-bit digital I/Os from AES/EBU, S/PDIF, and optical are supported, and the analog models (730AD or 730ADD) convert at 18 bits. There are 594 banks for storing presets and options include: auxiliary RS-422 digital input, remote fader parameter control, RS-232, and MIDI.

*Valley Audio, 9020 W. 51st Terrace, Merriam, KS 66203. Tel: 913-432-3388. Circle EQ free lit. #166.*



## VEGA

### VEGANET WIRELESS SYSTEM

Vega has introduced the first wireless system with network capabilities. The VegaNet equipment brings wireless microphone technology into networking, graphical user interfaces, and multimedia. Earlier this year, Vega's parent company, Mark IV audio Group, signed a licensing agreement with Lone Wolf for MediaLink networking technology. This technology has been adapted by Vega to provide real-time control and monitoring capabilities for wireless mic systems in an open-architecture network. The new system consists of a network-enabled UHF receiver, the R-662B, and modular network interface equipment. When connected to a Lone Wolf MediaLink network, it provides complete computer-based wireless monitoring and control capabilities for medium-sized and large wireless installations. The interface hardware includes the NE-8 mounting frame accommodating up to eight NE-2 interface modules. The frame includes an integral wide range 120/240-volt power supply. Each NE-2 module can interface two receivers to the network, allowing as few as two and as many as 16 network-connected receivers per frame. Interchangeable Lone Wolf network I/O daughter cards are supported, allowing connection to several different network mediums, currently including glass fiber, plastic fiber, and RS-232 cable. Blank modules are available to close off unused module slots.

*Vega/Mark IV, 448 Post Rd., Buchanan, MI 49107. Tel: 800-695-1010. Circle EQ free lit. #167.*

## WHIRLWIND

### DA-2 AMPLIFIER

The DA-2 distribution amplifier from Whirlwind is a single-rack space 2-channel device. It offers four outputs per chan-

nel. Each output has its own level control and clip-indicator light. Input signal is monitored by a signal-present LED and a clip LED. There is a headphone circuit that can be switched to monitor either channel. A switch combines the two input signals and applies the mono-summed signal to both channels, making the DA-2 a 1-in/8-out DA. All audio connections are made through actively balanced line-level XLR connectors, and an output transformer location box is available as an option. Frequency response is 20 Hz–20 kHz ( $\pm 2$  dB) and maximum input level is +20 dBm.

*Whirlwind, 100 Boxart St., Rochester, NY 14612. Tel: 716-663-8820. Circle EQ free lit. #168.*

## YAMAHA

### H SERIES AMPLIFIERS

Yamaha's H Series amps include a high-efficiency design that increases the series' power supply margin. Twin variable-speed fans help cool the unit, and further thermal and shorting protection is provided as well. The amps also feature a dual mono mode, as well as stereo and bridged modes. Front-panel indicators display power status, internal temperature, muting, clipping, and presence of input and output signals. Soft-start circuitry avoids power-on thumps. The units also feature a choice of balanced connectors, a ground-lift switch, and post connectors. All three amps also boast 31-position, decibel-calibrated detented attenuation controls, and a recessed power switch on the front panel. The H7000 provides 75 wpc, the H5000 allows for 550 wpc and the H3000 allows for 350 wpc, all into 8 ohms. S/N ratios are 110 dB, 108 dB, and 106 dB, respectively.

*Yamaha, P.O. Box 6600, Buena Park, CA 90622-6600. Tel: 714-522-9011. Circle EQ free lit. #169.*



## EUROPEAN TOUR CHECKLIST

PREPPING FOR a European tour is in some ways distinctly different from prepping for a tour of the United States. The big difference in touring Europe (especially Eastern Bloc countries) is that it is not so much a matter of cost as of equipment availability. So there are some things that are best taken care of before you leave.

**Equipment Carnet** — If you (or the band members) are flying your gear, you will need to send a list to the cargo carrier identifying the contents (by every brand, model number, and serial number of each flight case, and the estimated replacement value of the equipment it contains). Smaller pieces of gear, such as a 3- or 4-space rack, may be allowed by certain airlines as baggage or even excess baggage. There is usually a fee for excess baggage, so check with your particular airline.

**Equipment List** — It is far cheaper to rent the gear on the European continent than it is to fly it over. Fax a list to the rental company or promoter way ahead of time (three to four weeks) so that you will know if certain gear is unavailable. A cool idea would be to rent your favorite effect units and bring the programs along with you (true of any tour situation). This is where the Lexicon MRC has a leg up on the competition — bring your MRC and rent an LXP-1 (or -5 or -15). Or you can bring MIDI sys ex dumps with you on a floppy disk. You could pack a MIDI data filer in a suitcase or bring along a laptop computer to retrieve the data.

**Stage Plot** — If a picture is worth a thousand words, a stage plot is worth two thousand. This is a bird's eye view of the band's stage setup. It shows location of each musician, microphone and monitor. If you fax this ahead to the sound crew, they can position monitors and mic stands where you want them, before you get there.

**Input List** — If you are not bringing your own mics and direct boxes, then fax a list to the sound company that charts every input you will use. List the channel, the source, the mic(s) you want for that instrument, and any special notes. Don't forget to list direct boxes and special requirements such as connecting effect units to input channels.

**Airport Pickup** — Make arrangements for someone to meet you at the airport and get you to the hotel (or first gig). It would be a great idea if the person you are meeting at the airport had some of the local currency for you. If not, be sure to change some money at the airport. The rates won't be the best — but at least you'll have cash.

**Spares** — Bring plenty of extra guitar and bass strings, drumsticks, and drum heads. If you are bringing any tube processors, don't expect to be able to find replacement tubes; have a spare set with you.

—Steve La Cerra



# POWER TRIO FOR GUITAR



RECORDING rock guitar is not without its headaches. Go direct, and you lose all the wonderful voicing that an amp provides. Go through a stack of watt belchers and you'll probably have to deal with unwelcome hum and noise (and possibly the police if your neighbors are trying to sleep). And if you're a guitarist, lugging around a bunch of amps to get different sounds is a pain in the neck.

In one of those interesting twists of synchronicity, three products intended for the recording guitarist showed up for review. Each carves out its own niche and does its job well, but they get where they're going by very different routes. [For a take on recording guitars through amp miking, check out Steve Albini's story on page 34.]

## ROAD TEST

AN IN-DEPTH REVIEW OF THREE DIFFERENT D.I. BOXES DESIGNED FOR THE EFFECTS-HUNGRY RECORDING AND TOURING GUITARIST

BY CRAIG ANDERTON

### TECH 21 SANSAMP PSA-1

The PSA-1 (\$795) is a FET-based, single-rack-space "guitar and bass amp emulator" that re-creates a wide

SansAmp Rack is that the effects loop is now stereo instead of mono, so the outputs (XLR balanced and 1/4-inch phone unbalanced) have been upgraded to stereo, too.

The PSA-1 accepts an optional momentary footswitch (SansAmp sells

user-preset blocks, as well as write-protect the user presets.

The SansAmp is a quality box. The knobs are quantized into 256 steps for excellent resolution; you get a more analog "feel" as you work the knobs, even though they're under digital



variety of different tube and vintage amp voicings. The sound is similar to that of the SansAmp Rack (reviewed August '92), but the similarity ends there: the PSA-1 is the first SansAmp product that includes patch memory (50 factory and 50 user-programmable) and MIDI control.

You can't change parameters in real time via continuous controllers (although SansAmp says an update is planned), but the MIDI implementation does allow for program mapping, system-exclusive data transfer for patches or the program map, and channel select. Another difference between it and the

one for \$24.95) that lets you loop through a user-programmable number of programs (for example, if program 20 is selected and the loop is set to 5 programs, pressing the footswitch repeatedly loops through programs 20, 21, 22, 23, 24, 20, 21, 22, 23, 24, 20, etc.). The "swap" function is another useful trick: you can reverse the factory and

control. You can switch between programs without glitches, and programming is easy — twiddle the knobs until you get a sound you like, then save it to a particular program number (no LCDs, menus, or calculator keypads!). There's a built-in AC cord instead of a wall wart, and that no-bull '50s look that seems to be part of the SansAmp personality.



From top to bottom: Tech 21 SansAmp PSA-1; ADA MP-2; Lexicon Vortex.



If you need to get the sound of lots of different amps, the PSA-1 delivers. What I particularly like about SansAmp products is how transparently they do their job; the sound is rich and natural, without the mechanical edge of some multieffects. Furthermore, the factory patches really show off what this baby can do. All in all, this is the kind of unit that makes you want to play — and if that's not the bottom line, I don't know what is.

*Tech 21, 1600 Broadway, New York, NY 10019. Tel: 212-315-1116. Circle EQ free lit. #170.*



## ADA MP-2 PREAMP

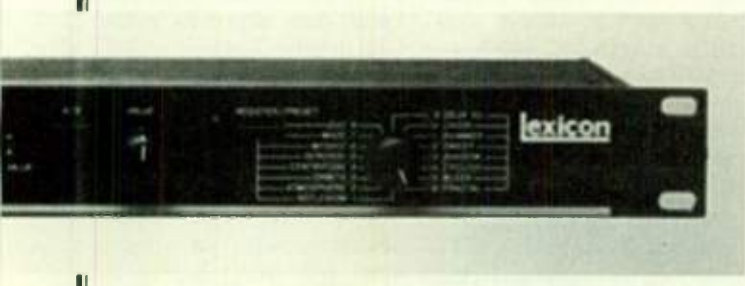
But what if you want real tubes instead of tube emulation, and also need compression, wah, chorusing, and a more extensive MIDI implementation? Meet ADA's MP-2 (\$999.95). The company's MP-1 pretty much defined the "tube-

preamp-with-MIDI" combination; the MP-2 builds on that success by adding a bunch of features — some significant, some subtle — that keep ADA's latest offering competitive with anything else out there.

Despite the extra sophistication, the MP-2 is easy to program thanks to an ergonomic combination of multiple membrane switch buttons and a logical LCD menu structure. The first unit I received for review was a prototype without a manual, and I still managed to figure out 95 percent of what it could do.

Available effects are tube preamp with 10 different tube voicings, compressor, 4-band tone control, 9-band graphic EQ, wah-wah, tremolo, stereo chorus, and a master "room compensation equalization" knob that lets you tailor the tone of all programs to work with particular room characteristics. (I predict you'll see other units copy this idea in the years ahead.) Programs can be stored in 128 user memory locations; there are also 39 factory presets.

This box is also no slouch on interfacing: it has front and rear panel 1/4-inch inputs, cabinet emulation stereo outputs (XLR with mic/line and ground-lift switch along with phone jacks), "on-stage" 1/4-inch stereo outputs for feeding a power amp, stereo (or dual mono) effects loop (with instrument/line switch), and MIDI in, out, and thru. The MIDI implementation



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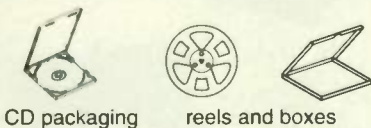
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is particularly user-friendly. It includes a MIDI monitor and other functions designed to overcome the average guitarist's MIDI-phobia, as well as a semi-hidden "expert" mode where you can tailor the response to multiple MIDI controllers in a very precise way. However, none of this is in your face; if you want to ignore MIDI completely, you can.

Soundwise, the MP-2 (unlike some tube preamps I've tested) has the highly desirable characteristic of breaking up smoothly and gently when it goes into distortion. This makes it well suited to subtle vintage overdrive sounds as well as the "blow out your speakers" family of headbanger effects. There are none of the artifacts associated with DSP-based units; this is one multieffects that's definitely clean enough for the studio.

It's also worth mentioning ADA's MIDI Pedal Pack (\$299.95), a companion unit that offers a program-change footswitch, a continuous controller expression pedal (with the option to add a second one), and a quad footswitch that sends out switched MIDI controller information (as with the pedal, you can add a second module, thus controlling up to eight switch-controlled parameters).

Overall, the MP-2 is a solid piece of work that's unusually quiet, smooth, and versatile, and that offers that distinctive tube character. If you need to set up a total guitar sound (amp voicing, effects, and MIDI) quickly and still have it sound great, check out this box.

ADA, 420 Lesser Street, Oakland, CA 94601. Tel: 510-532-1152. Circle EQ free lit. #171.

## LEXICON VORTEX

Next question: what do you get for the guitarist who has everything (or for the studio that wants that "one extra box" to make it stand out from the crowd)? Lexicon's Vortex (\$479) is the latest in the series of budget-yet-cool processors that includes Alex and JamMan (reviewed February '94), and although it is at heart a delay-with-modulation device, the 26 effects algorithms score extremely high for originality. For example, "Cycloid" uses filtering and echo to create unusual spatial modulation. "Bleen" (where did they get these names?) does detuning and weird echo with amplitude modulation on the feedback.

There are 32 ROM and 32 user-programmable programs, each arranged as two 16-program banks (each program has both an A and a B effect). You can use one, the other, or "morph" between them; this is basically a fancy way of saying you can cross-fade all parameters from one effect into another (even if they're completely different programs) over a range of 10 ms to 10 seconds, which can give some wild sounds. Aside from that, Vortex owes its inspiration to the PCM-70, which was intended to be a no-holds-barred digital special effects generator (the reverb was added on later in the design process). Editing is simple: select a parameter with one knob, then adjust its value with another knob.

Setting up is easy too. Vortex does true stereo, dual mono, or dual mono/stereo out, and (thanks to a blend control) can be used as an in-line device or with an effects loop. Just don't expect to



plug in a guitar directly — the low input impedance will degrade the sound — and accept that you'll need to add another "wall wart" to your barrier strip.

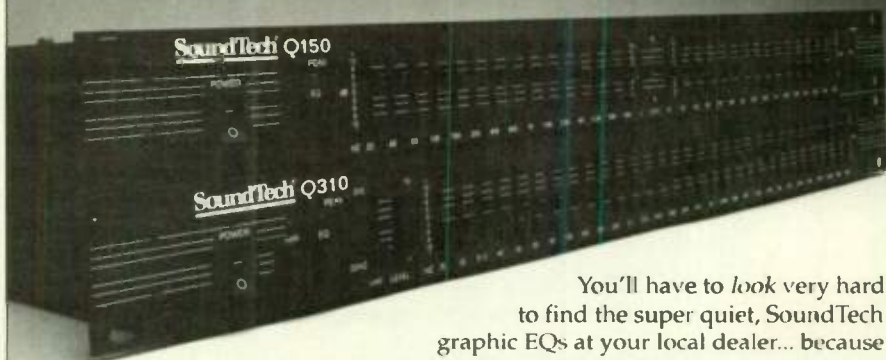
Vortex is somewhat interactive owing to envelope control, where various effects parameters are tied to the dynamics of your playing, and to a tap function. As you tap out a tempo using the dual footswitch provided with the unit (the other switch can initiate a morph), all tempo-sensitive parameters are resynchronized on the fly. Another footswitch jack allows for a second footswitch that selects between bypass and stepping through programs in various ways. There are also provisions for a footpedal, so you can vary one of 14 parameters in real time or do foot-controlled morphs. All in all, this is anything but a static effects box; you can really work with it.

Although Vortex is not difficult to learn, there are many options and mastering it can't be done in a day. But this isn't a box for everyone — it's a seriously warped signal processor that gets some truly beautiful, as well as bizarre, sounds. If you already have the basic guitar sound down and want to expand your options into the twilight zone, Vortex will give you quite a ride. **EQ**

*Lexicon, 100 Beaver St., Waltham, MA 02154. Tel: 617-736-0300. Circle EQ free lit. #172.*

*Musician/author Craig Anderton wishes that life had looping capabilities so you could do things you liked over and over again and an undo command.*

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CIRCLE 73 ON FREE INFO CARD



## Sony HR-MP5 Signal Processor



**MANUFACTURER:** Sony, 3 Paragon Dr., Montvale, NJ 07645-1735.  
Tel: 201-930-1000

**APPLICATIONS:** Signal processor for project studio applications that provides standard effects as well as esoteric ones.

**SUMMARY:** Sony has gone for quality over quantity; it usually avoids digital "harshness."

**STRENGTHS:** 48 kHz sampling with 18-bit conversion; efficient, graphically creative user interface; very good factory presets; includes unexpected extras.

**WEAKNESSES:** HR-MP5 distortion and overdrive sound buzzy instead of tubelike; MIDI real-time control doesn't recognize velocity; as with most other boxes, some hiss on very complex patches.

**PRICE:** HR-MP5 or HR-GP5: \$695; HR-RC5 foot controller: \$249 **EQ FREE LT. #: 173**

SONY IS THE KIND of company that could probably take over the project studio market if it wanted to, but until now, it has concentrated on other worlds. However, the continuing interest in project recording must have caught Sony's attention — the HR-MP5 and its guitar-oriented sibling, the HR-GP5, are clearly aimed squarely at the project studio.

Instead of jumping on the "high-quality/single-function" or "questionable-quality/lots-of-effects" bandwagons, the half-rack HR-MP5 offers two effects "blocks," allowing two simultaneous, but quite high-quality, effects. Some of these are as expected —

swept/tapped/modulated delays, several different flavors of reverb (including a "ducking" reverb where the reverb level can either increase or decrease depending on the input signal level), panning, compressor, equalizer, etc. — whereas others are more esoteric, such as subharmonic generation, ring modulation, dynamically responsive filtering, intelligent mono pitch shifting that follows preset or user-modified scales, vocal cancellation, and delays that sync to tempo. Other useful effects are wah, attack delay, phaser, rotary speaker simulator, tremolo, vibrato, and extremely good flanging. Several effects, including compression and delay, are available in both blocks.

This is useful when processing two mono signals, or when enhancing stereo information with a stereo signal.

You can't assign effects to the two blocks (they have their own roster), but this isn't really an issue. Things are arranged as you'd like: one block has the more delay and dynamics-oriented effects, whereas the other has the reverbs, limiter, and gate, etc. However, if you wish you can reverse the block order in a series configuration, use a parallel configuration, or do independent processing on two mono signals instead of going for stereo.

For further flexibility, many "single" effects actually include several submodules, a two-band EQ is available for each block regardless of what other effect is selected, and many parameters can have individual settings for the right and left channels.

### SOUNDS GOOD TO ME

The sound quality is a tiny bit shy of pro level, but given the price, the fact that it comes so close is a very pleasant surprise. Sony has opted for quality over quantity, which is apparent as soon as you listen to the effects: smooth reverbs; digital clarity, but with a "warmth" that sounds distinctly undigital; delays that don't get gritty with regeneration; and compressors that avoid "that giant sucking sound."





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**SCHOOL BOOKS**

continued from page 44

**Title:** *Audio In Media*

**Author:** Stanley Alten

**Publisher:** Wadsworth Publishing

**Why:** Our classes serve both recording industry and radio/TV students. So we needed a text that crossed over and addressed both aspects of sound, not just music recording. That's primarily what we like about it. It's also pretty straightforward, with all the big words in bold print.

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**Contact:** Tel: 407-679-6333. Circle EQ free lit. #175.

**Title:** Various manuals

**Author:** In-house staff

**Publisher:** None

**Why:** We write our own. We've come to realize that no one publishes or edits textbooks quickly enough to really stay in tune with what's going on in the industry. So, we actually produce all our own audio textbooks for our students. We've found that by taking this approach, we can keep them very course-specific and we're also able to update them monthly — thanks to our in-house desktop publishing setup.

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Peter Miller, Director

**School Facts:** Audio Institute of America has been offering a home study audio engineering course for better than 20 years.

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**Title:** *Audio Institute of America Training Manual*

**Author:** Peter Miller and Staff

**Publisher:** Audio Institute of America

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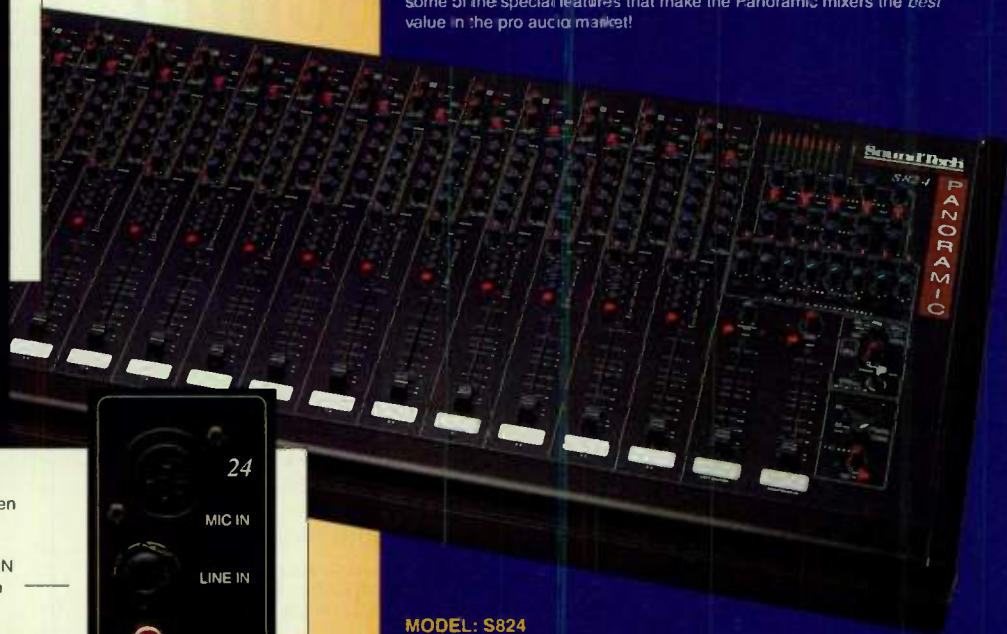
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## MIKING GUITARS

continued from page 38

work well in this application; perhaps because their narrow bandwidth doesn't interfere with the clarity in the treble region or the balls in the bass region.

For an extremely big, ambient sound, use a large, reflective room and distant mics for natural room reverb. The bigger the room, the wider the ambient mics can be spread, and the wider the stereo image that can be recorded. Any good condenser microphone with an extended low-frequency response is usable for this application, but special mention should be made of the Calrec/AMS Soundfield microphone, which was designed expressly for ambient stereo recording. Should your budget afford you the luxury of working with this outstanding microphone, the flexibility of its electronics and its exquisite clarity will leave you wondering how you ever made records without it.

It is often possible to excite the ambient space with a small extension speaker, with the main cabinet in a more controlled environment being closely recorded. This allows you the option of switching between the ambient and dry sounds, without the cheap sound of an electric reverb giving the game away.

Recording a single guitar take in a flattering manner has an added benefit: it will help you resist the temptation to double-track guitars. As a very occasional embellishment, doubling can sound distinctive. Used as a substitute for good technique and tone, it quickly becomes another tiresome cliché, making recordings amateurish and clumsy.

Free your microphones and your ass will follow. **EQ**

*Steve Albini is a Chicago-based recording engineer who has recorded albums for Nirvana, PJ Harvey, the Breeders, the Pixies, the Wedding Present, The Jesus Lizard, Superchunk, and about 1000 bands you've never heard of. He has also been a member of the bands Shellac, Rapeman, and Big Black. His other interests include cooking and billiards, and his favorite color is a kind of cold slate grey.*



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# Days of Future Formats

What — if anything  
will win the new  
MiniDisc, DCC, and  
recordable CD  
format wars?

BY MARTIN POLON



No issue is more in question in the audio industry than that of a recording format to follow the Philips audio cassette. Although ostensibly a consumer audio format issue, the personal and project owner or operator has at least as much riding on the outcome as any audio enthusiast — quite possibly a whole lot more.

For the studio professional, the use of small-dimension consumer format audio recording equipment serves a number of purposes. First, it can provide a final storage medium for mixing down to 2-track, as with DAT. Second, it provides a handy format for client copies, demos, and other take-away versions of the mix. Third, it can serve to increase the consumer demand for recorded music — thus helping to increase the demand for studio services.

The current format war to replace the cassette has delivered no clear winner at this time, but it has deliv-

ered several possible losers. Let's examine the evidence:

1. In a recent survey of consumer audio equipment advertising in newspapers and magazines and of concurrent audio-related editorial material into spring of 1994, less than 1 percent of the space devoted to audio electronics was dedicated to MD (Mini-Disc) and DCC (Digital Compact Cassette).

2. Many record stores that had devoted prime retail space to MD and DCC upon release have since rethought their posture and either removed these products to a less important location in the store, freeing the space for fast moving CD and cassette titles, or else reduced the size of the stock or removed DCC and MD altogether.

3. Audio industry experts are announcing that the DAT is DOA (dead-on-arrival) in the consumer audio 1990s. At the January 1994 Winter Consumer Electronics Show (CES), several well-known experts and spokespersons for major Japanese audio equipment makers delivered somber pronouncements as to the passing on of DAT system hardware for home recording. Curiously, these same manufacturers are avoiding reporting what dealers readily acknowledge — that DAT sales are still for the advanced audiophile marketplace. In fact, some stores that specialize in DAT have moved their clientele up into so-called broadcast and recording-studio quality DATs at twice the price point of consumer gear. Needless to say, the DAT has become a successful studio classic for large studios as well as small ones.

4. The same pronouncements as to the demise of DAT indicate that recordable CD (CD-R) will be delivered stillborn to the consumer marketplace. The assumption offered at the CES is that since the MD players utilize a four MiniDisc clip that allows CD-changerlike performance, there is no need for the larger and bulkier trunk-mount CD changer. As to the inability of recordable CD to survive introduction to the consumer market, there is a

less clear prognosis from audio industry seers. In fact, if the manufacturers are able to scale the current \$2000 price wall, recordable CD may well succeed in the home and the personal/project studio.

5. Dolby-S cassette decks, especially in the multimotor, multiple-head models, are beginning to pick up steam and could challenge any new format. This is especially true with the number of record releases utilizing Dolby SR, which is the professional progenitor of Dolby S, outnumbering or equaling those done in the digital domain for all five of the last five years, worldwide. BMG and Warner have been releasing their prerecorded cassettes in the Dolby S format since the end of 1993. There are over 45 models of consumer cassette recorders equipped with Dolby S from the several Japanese manufacturers on the market at this time.

A recent study of audio hardware sales to focus on the success or failure of the MiniDisc and DCC has turned up some interesting numbers. For example, at one of the top consumer audio equipment retailers in a major East Coast city, a dozen MiniDisc units with recording features have been sold during the last six months. On the other hand, there are two dozen DAT machines on back order, with nearly 50 others sold off-the-floor during the same time period.

Make no mistake about it, each of the Japanese equipment makers will survive financially with whatever products it takes to do so. Whether it is CD-R, DAT, DCC, Dolby S, MD or some other newer format, the big equipment makers will commit to a winner and have, in fact, already hedged most — if not all — of their bets on the future consumer audio recording standard. **EQ**

*Martin Polon is the principal of Boston-based Polon Research International (PRI). PRI forecasts the electronic entertainment industry for the financial community.*



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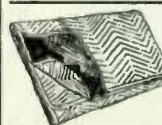
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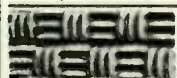
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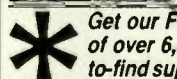
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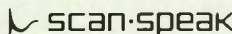
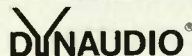
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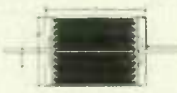
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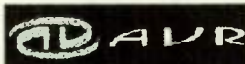
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# Geometry and Dimensions, Part 1

How much,  
what shape,  
how large...?

BY JOHN STORYK AND  
BETH WALTERS



Again, we begin this column with one of the most frequently asked questions of would be project studio owners: "How big should my studio be? How much height do I need? What's the best shape for my room?" The answers to these questions have traditionally been proclaimed to be complicated and at times unanswerable. They don't have a single correct answer, but they definitely have answers. To begin, let's (again) take a brief tour through some elementary acoustics.

## OVERVIEW AND ACOUSTIC PRIMER

1. At the most advanced level of analysis, a listening environment's size and shape is indeed a complex question.

2. It can be argued that there is no single best room size.

3. It can also be argued that for each project studio owner, there is a unique universe of room sizes that will do the job well. We have discussed studio programming and ergonomics. Room geometry should follow the determination of a project's architectural and equipment program

– not the other way around!

All studios used for recording and playback in enclosed spaces (that's basically all of them) will have sound propagated from several transducers (typically speakers or instruments or both) and then received by other transducers (such as microphones or our ears) after traveling on varying paths throughout the room. That's the short version of what is happening in a studio environment.

We are reminded that sounds behave differently at different frequencies — although all sound travels at the same speed. All frequencies and their corresponding wavelengths multiplied together, *always* equal a constant: namely, the propagation speed through the medium (in this case air) — i.e., the speed of sound. Thus the simple formula  $F \times W = C$  ( $F$ =frequency;  $W$ =wavelength;  $C$ =speed of sound

(1130 ft/sec)). Lower frequencies have longer wavelengths, while higher frequencies have shorter wavelengths. Since we can observe frequency, we can measure it. We don't actually observe or "see" wavelengths, though. They are more of mathematical concept, but are the link between what we hear and the size of the environment we are in.

As with certain other sciences that observe the nature of material things in our world, the movement of sound can be described as wave or ray phenomena.

## WAVE ANALYSIS

Sound waves conform to the peaks and valleys of corresponding changes in sound pressure in our atmosphere. This is a simplistic definition of sound itself. The mathematics and geometry of wave motion are analogous to rocks

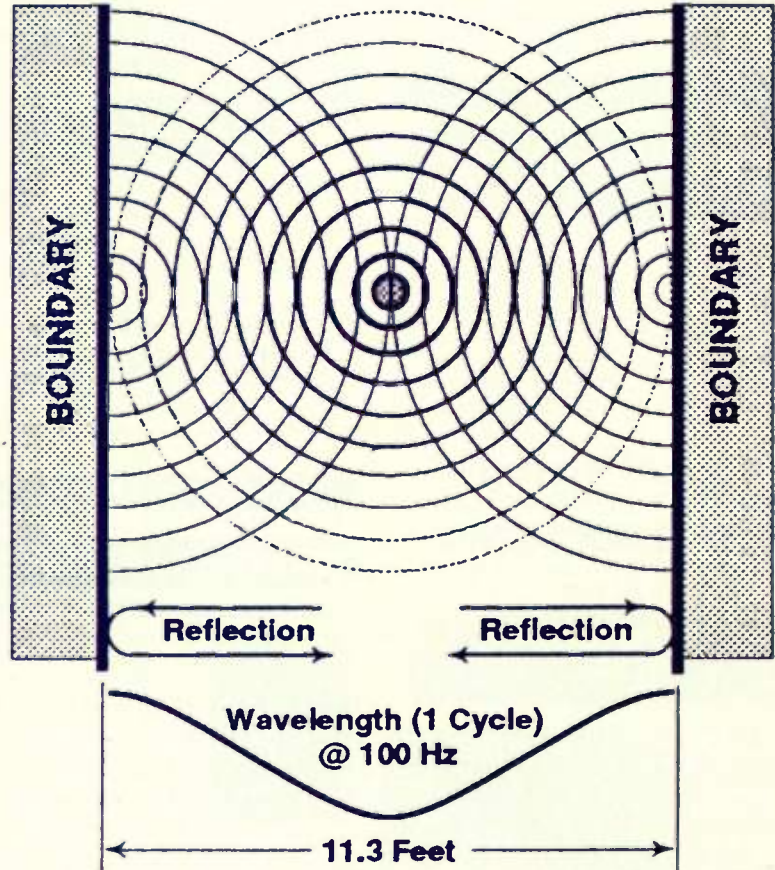


Figure 1



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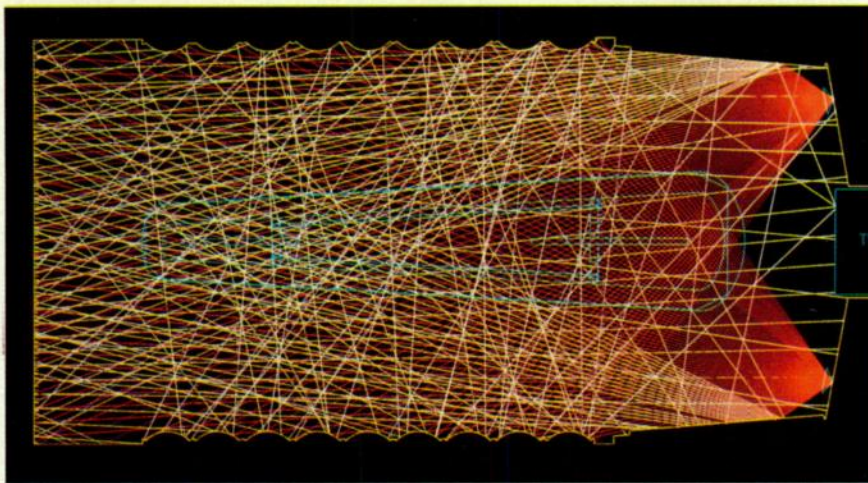


Figure 2

falling into a pond and creating waves that then move outward with a particular strength, frequency, and behavior. As those waves hit the boundaries of the pond they “turn back” (reflect) on themselves and other waves. Much of this behavior has little to do with the size of the rock, and rather more to do with the nature of the boundaries of the pond.

In studio acoustics, as the sizes of the wavelengths (remember the simple formula relating frequency to

wavelength) become similar in size to the rooms that the tones are being excited in, it is wave analysis that has more and more effect on the reinforcement and nonreinforcement of those tones. (See fig. 1: Wave Generation and Cancellation.) This exciting of the fundamental and lower harmonic tones as a function of comparing corresponding wavelengths to important dimensions in a room is *modal analysis*, resulting in the calculation and plotting of eigentones —

commonly called standing waves. At these lower frequencies, how these various eigentones compare with each other (in particular the exact spacing between them) will for the most part “forecast” how a space will affect or “color” music propagated in that space. That’s a mouthful, but is actually a pretty simple description of a rather complex phenomenon.

As wavelengths get shorter (i.e., as frequencies get higher), wave phenomena still take place. However, because the wavelengths are so short compared to the spaces we are dealing with, sound propagation can better be described in terms of geometric and statistical acoustics. Geometrical acoustics essentially calls for sounds behaving like rays of light: bouncing in and out of reflective surfaces with the entering angle at a surface (boundary) being equal to the exiting angle. We have often observed that directionality in acoustics increases as a function of frequency — i.e., that we can literally move in and out of the sound source when walking in front of high-frequency speaker drivers, while sound emanating from a low-frequency sub seems to “be everywhere.” These rays of sound, behaving in a fixed geometric fashion, approach a surface angularly and are reflected, absorbed, and diffused back into an environment via that boundary (see fig. 2: Ray Analysis of Sound). It is the nature of that boundary that determines the exact extent of the returning sound energy. Boundary surface characteristics are often given as an absorption coefficient (essentially the inverse of reflection) and are always frequency-dependent. Recent research will soon produce more complex coefficients (also frequency-dependent) such as a newly considered scattering coefficient that takes into account absorption, reflection, and diffusion.

Even in the simplest of spaces, it is easy to visualize there being literally hundreds and hundreds of ray paths bouncing off walls, floors, and ceilings in all three dimensions. The exact paths become quite complex very quickly. ETC’s (energy vs. time curves) resulting in characteristic EFC’s (the more commonly displayed energy vs. frequency curves) are the true signatures of acoustic spaces. It is often useful to employ statistical

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Songwriter, vocalist, and keyboardist Michael Pinder, formerly with the Moody Blues, is famous for his pioneering use of the Mellotron. The hauntingly beautiful sounds of this instrument became the trademark of the group's early works.

Mike is back in the studio, and has just released a new CD called "Off the Shelf."<sup>1</sup> Mike's new CD "has a jazzier, more sophisticated flavor than his music with the Moodies, while retaining... 'that heavenly atmosphere.'"<sup>2</sup>

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<sup>1</sup> Mike's CD is available exclusively through Higher & Higher, P.O. Box 829, Geneva, FL 32732. Send SASE for information.

<sup>2</sup> From Higher & Higher, an independent fan magazine focusing on the Moody Blues, Winter/Spring 1994



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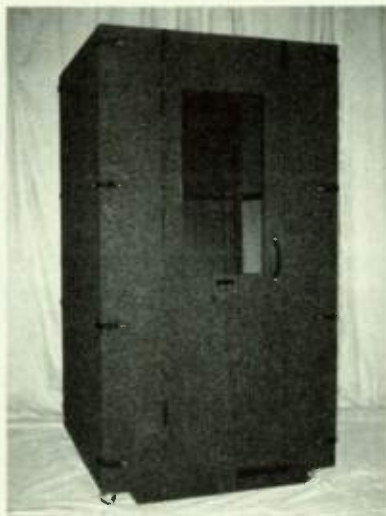
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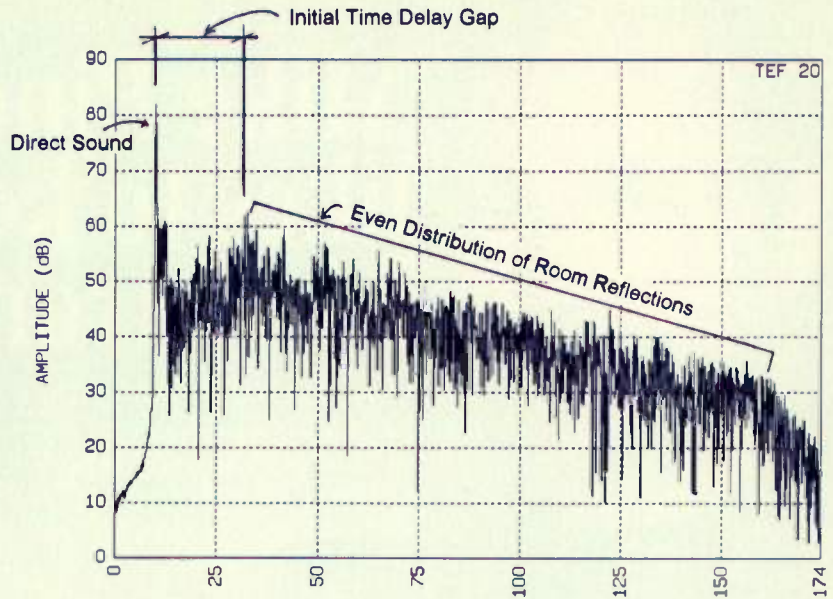


Figure 3

analysis in predicting time domain characteristics in varying frequency ranges. The common indicator of this is reverberation time (RT60) — technically the amount of time it takes a propagated sound to decay 60 dB in a space. It is essentially the slope of an ETC display (fig. 3: Energy Time Curve — ETC for a Well-Designed Medium-Sized Control Room). In many environments, this RT60 calculation will quite accurately predict this time domain number and give us a reasonable idea of a room's "time signature." We can use this to compare the space with other spaces. RT60 is proportional to room volume and inversely proportional to total room absorption; or  $RT60 = V/At$  (where  $V$  = room volume and  $At$  = Total Room Absorption). The formula becomes useful with a constant and thus:  $RT60 = .049/At$  actually becomes the room surface area times the coefficient of absorption for

that surface treatment (i.e.,  $S \times c$ ). In fact we have many surfaces; thus  $At = (S1 \times c1) + (S2 \times c2) + \dots$  for as many different surface areas as there are.

Call me if you want to have some fun with this!

One last concept: the Hinge Frequency. This is the frequency at which wave analysis stops and ray analysis begins (as a function of increasing frequency). As you extend the eigentone spacing chart, you will notice that as frequency increases, the spacing (i.e., density) of eigentones-per-octave increases. This continues to a point at which it really doesn't matter anymore — thus the hinge frequency. The reverse takes place with ray analysis. In fact, the hinge frequency is more subtle — sort of a location where two effects enter and exit (see fig. 4: Hinge Frequency Diagram). For typical audio control rooms it is 250 to 350 Hz.

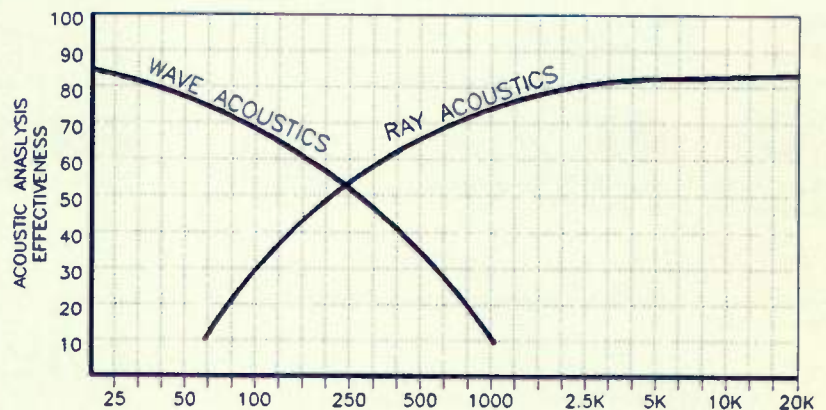
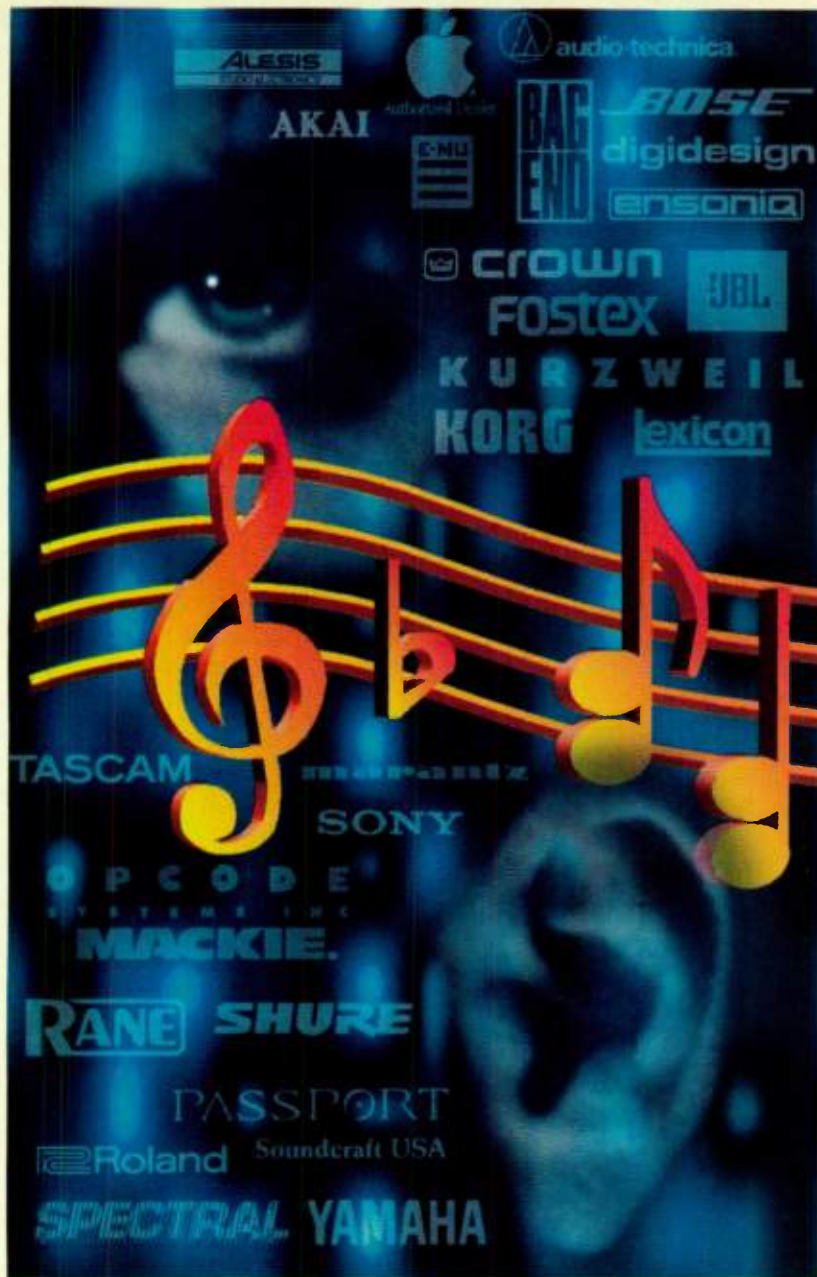


Figure 4





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## S THE BOARD

ed from page 122

way to make the changes happen at the proper time is to mute the fader that has the correct level and effect for the verse and unmute the fader that contains all the proper settings for the chorus. A 48-track mix can quickly consume all the knobs on a 72-or-more-input console. If the EQ and effect sends were automated, then all I would have to do would be to enter the new settings for the chorus and store them in memory. When the chorus comes, just press a button.

The ultimate console, then, would be one that allowed you to store not only settings for fader position, but EQs, pans, reverb sends, gates, and limiters, and also stored the settings for external signal processing devices. Oh, and as long as we are assembling our dream console let's make it all digital.

A few of the consoles on the market allow you to fulfill parts of your dream. Euphonix allows full automation of almost every knob on the console, and will control external gates and compressors and external MIDI devices. A Euphonix console is analog and costs

around \$300,000. GLW (Harrison) has the Series 12 console with fully automated everything. Again, the console is analog and the price is up there. AT&T has DISQ, the all-digital console in a box. It does everything except windows and costs even more. By the time you buy the SSL to use as a control surface you have passed the \$500,000 mark at about Mach 2.

There are automation packages for some of the project-studio-level consoles, but in my dreams I want more than fader-only automation, and I want it to be all digital.

### YAMAHA TO THE RESCUE

Yamaha has had an all-digital console for a few years in the form of the DMP-7, an 8-input digital mixer with moving faders and resettable EQ and effects. Yamaha later introduced the DMR-8, which also contained a digital 8-track recorder. The price of the combination was around \$20,000.

New from Yamaha now is the ProMix 01 (see the June '94 issue), an 18-input digital console with moving-fader automation of the snapshot kind. Besides the faders, the entire console is automated: EQ, gates, limiters — you name it. Sounds like "Total Recall" to me. To top it all off, there are two built-

in digital effects processors (and three stereo compressor/gates) that can be fed signals digitally from within the console. There is an external analog effects loop for connecting existing out-board gear, and all inputs have 20-bit analog/digital converters. For mixing to DAT there is an SP/DIF digital output to keep everything in the digital domain.

The kicker is that this little console has a list price of under \$2000. This is about the same price as analog semipro mixers without the automation. I think that a lot of people will sit up and take notice.

MIDI automation companies like Opcode are working on programs to turn the ProMix 01's snapshot automation into fully continuous SMPTE synchronized automation. These packages should be out at about the same time as the mixer.

### WINDING DOWN

I didn't mean to get so carried away, but whenever I see a piece of equipment that can increase productivity this much, it is worth it to me to spread the word. Eight-track digital tape decks, then DAT and recordable CD, and now digital consoles. All we need now is a vending machine that dispenses hit songs. **EQ**

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Jul/Aug 94



# Time to Automat?



A trip from bad sandwiches to Yamaha's new mixer

BY ROGER NICHOLS

**N**o, that's automate. An Automat is where you go to buy bad sandwiches out of vending machines. Automate is what you do to faders on a mixing console to save you time so that you can go to the Automat.

Why have I brought this up, you ask? Well, because I have been looking around at all the new project studio mixing consoles hitting the market and have noticed that most of them have some type of automation available as an add-on. I first asked myself, "Why do these little consoles need automation? This is hardware for the big studios that have \$400,000 consoles and are mixing records for artists with million-dollar budgets." Then I answered myself, "You idiot! Everybody can benefit from automation. The project studio can probably bene-

fit even more from automation than the big ticket studios." I then got in a fistfight with myself in front of a mirror. I lost, but you should have seen the other guy.

Automation comes in basically two flavors. The one most common to big studios is continuous, timecode-based automation, the type where the levels change dynamically as the mix proceeds. Vocals ride up and down, guitar solos get even louder, and bass lines attack your being like a log splitter. The second type is snapshot automation, which works like "presets" on a synthesizer module. When you recall a "preset," all the parameters jump to the correct settings for the particular sound. With "presets" for a mixing console, the levels move to their previously saved positions.

So why does anyone need automation?

Good question. In a project studio you are probably dealing with project-quality musicians recording project-quality music onto project-quality multitracks to be mixed into project-quality demos to be sent to A&R guys whom you want to pick your project over everybody else's for the next million-dollar-budget album deal. It seems to me there is more pressure here than there is cutting the real record after you get the deal. You need all the help you can get.

Your best buddy suggests that things would go a lot more smoothly if you had automation for the faders on your console. Your first response is, "Big deal, all I have to do is line each fader with a piece of tape and put different colored marks that correspond to the different tunes." When working on "Kind of Blue," place all of the faders on the blue marks. Next comes "Lady In Red," and the faders go to the red marks. Sooner or later you are going to run out of colors to use, or the level of a particular instrument is going to change in different parts of the song. What a mess. Little red circles for the verse, squares for the chorus, triangles for the solo, or was it footballs for the solo?

What if you could press a button and all levels for the song you are

about to work on are set just the way you saved them the last time you worked on it? What if when you got to the first chorus the fader levels changed to reflect the balances you worked so hard to get on the background vocals? What if you wanted to compare the mix that the guitar player had up last week with the one you had up yesterday? All you have to do is recall the settings, just as you do when auditioning different reverb sounds with your multieffects unit.

Some people think that the only time you need to concentrate on a good mix is when it's time to make the tape to send to the record company exec. Not true. In my opinion the most important time to get a good mix is when you are recording. The mix is what the musicians listen to when they are playing. The mix is what they rely upon to determine the dynamics they use when playing, and their blend with other instruments. Without a good mix, it is an uphill battle to get the overdubs to fit the way they are supposed to. If the mixing console has snapshot automation, the perfect mix you spent so much time getting last week is just a button press away.

A big difference in the mix can completely alter the mood generated by the tune. Having a consistent mix from day to day makes it easier to maintain the feeling of the tune, which in turn makes it easier to come up with the right parts to record. When the recording is easier, it also gets done more quickly.

## NOT SO FAST MOVING FADER BREATH

As long as we have the faders automated, why don't we automate everything else? How about the reverb sends so that the reverb levels are the same as they were last time. How about the EQs? Yes, how about the EQs. When mixing big-budget projects on big-dollar consoles with lots of faders, I have found myself splitting a signal from the multitrack machine so that it shows up on more than one fader. Sometimes three or four faders. The reason for this signal splitting is that in various parts of the tune I want different EQ and different effects on a particular instrument. If the EQ and effect sends are not automated, the best

*continued on page 120*



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