

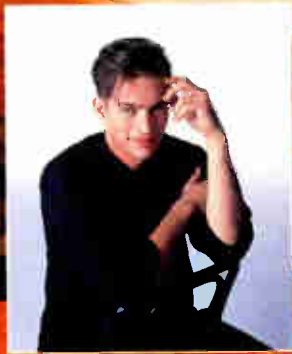
Patch Bay Flexibility · Toscanini Lives Again on CD · Vincent Van Haaff

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THE RECORDING INDUSTRY MAGAZINE

AUGUST 1990, VOLUME 14, NUMBER 8

AUDIO

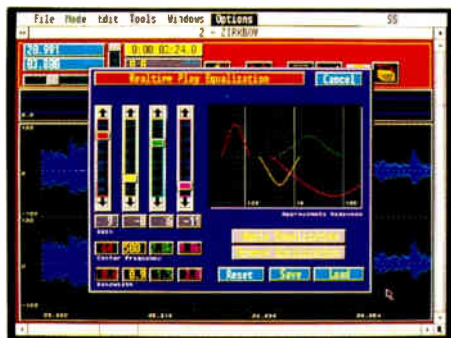
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Cover: Studio A at City Lights Recording in Howell, NJ, features a Neve VR60 console with Flying Faders, Mitsubishi and Studer recorders, and Quested 412E and Tannoy PBM-6.5 monitors. Studio design by Joe Venneri.

Photo: Michael Partenio.



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What do you really need in a digital audio hard disk system? Simple operation, total creative control, a high level of recording and editing power, and lower cost?

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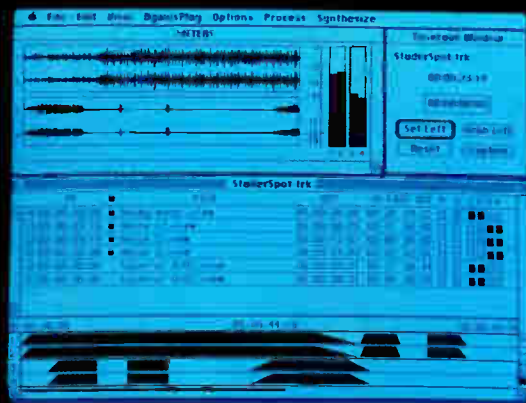
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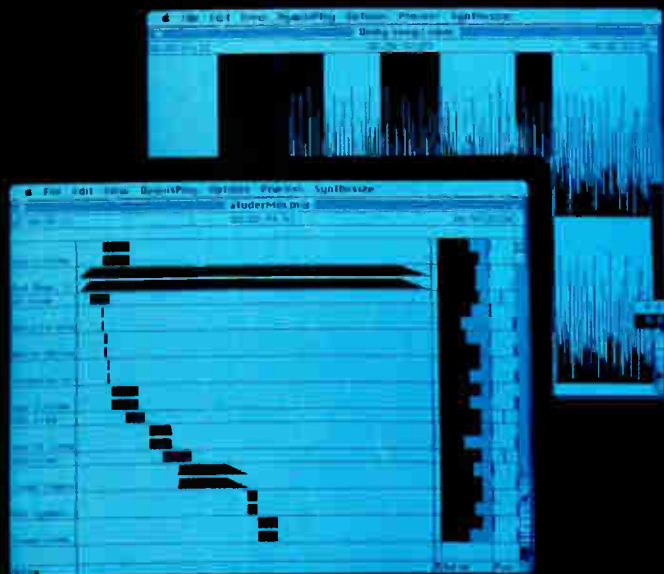
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FROM THE EDITOR

If you were to build a recording studio today, what considerations might affect your design? Would you read all of the books you could find on studio construction and work with your staff and local builders to make the room, or would you defer to a world-renowned studio designer to ensure that your approach is tried-and-true?

Would you create a utility room plan that is ultimately flexible and "interfaceable" with every format and recording style available, or would you opt for a design that is built around one central computer, MIDI-linked, designed for a techno-pilot operator? Would you build a recording room with variable acoustics, large enough to hold any client that comes your way, or would you save the space and try to put all of your bucks into the control room, with perhaps an iso booth for vocal or overdub work?


Would you go with traditional multitrack tape recorders, analog and digital, or would you select from the blinding choice of digital audio workstations and build a tapeless operation? Would you set up with video and post-production equipment to grab your share of the sound for picture or music video market, or would you reduce your costs and focus your energy by going strictly audio?

Would you build in a highly concentrated urban area, within walking distance of the bulk of your clients, or would you construct in that spiritually correct haven in the country, where your clients/guests can find inspiration and take their time while your meter runs? Would you go the route of client comfort, multi-amenities and live-in features, or would you be more inclined to strip down to no-frills, business on the spot, value-based recording services?

Would you lease your major equipment and build your financing package equal to anticipated cash flow from operations, or would you shop resourcefully for the best buys in new and used equipment, trusting that in the end it will all work out?

Building a studio today is no spring picnic. Construction costs are high, equipment capitalization is enormous, competition is fierce and business is anything but booming. Why anyone would want to get into this business surprises many financially savvy individuals. But, for some, there is no other line of work that makes more sense than doing just this. We tip our hats to these intrepid entrepreneurs and wish them the best success in their new ventures. This issue is dedicated to them.

Keep reading,



David Schwartz
Editor-in-Chief

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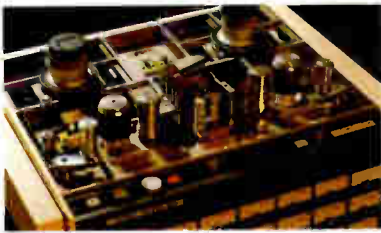
Founded in 1977 by
David Schwartz and Penny Riker Jacob

Because compromise is out of the question



Whoever said, "compromise is the oil that lubricates the business process" apparently wasn't in the studio business. To the contrary, in this unique world where art and business meet, and clients expect the best, compromise may be the fastest way *not* to stay in business.

That's why Otari tape recorders come with something behind the meters.



Otari isn't in the toy business. The MX-80 and MTR-90 sport 2" thick cast alloy deck plates, heavy duty swing arms, and motor shafts designed to handle the exceptional acceleration characteristics of these machines.

Our MX-80 and MTR-90 multi-tracks are used all over the world to produce hit CDs and major motion picture sound tracks, and for good reasons.

For example, if you're involved in audio post, you'll appreciate a

capstan motor that is *designed* to be speed-slewed, plus external control connectors for easy interface to any SMPTE/EBU time-code based synchronizer, editor or machine controller.

For *whatever* you do in audio, both machines share constant tension transport technology for high performance, yet gentle tape handling. You'll also get digitally timed, gapless, seamless, punch-in, punch-out. On the "80," an autolocator with search zero and three cue memories comes built-in. And if you're a purist looking for the highest quality sound



Otari's proprietary integrated circuitry provides superior reliability and reduces service time.

possible, you'll appreciate the transformerless balanced inputs and outputs.

The MX-80 and MTR-90 were designed from the beginning to lock to external controllers, and therefore provide exceptional performance under these conditions. Pictured is the MTR-90's advanced EC-101 chase synchronizer.

And to keep everything where it belongs as you move from one studio to another, something else you have to look beneath the surface to see—a 2" thick, cast alloy deck plate.

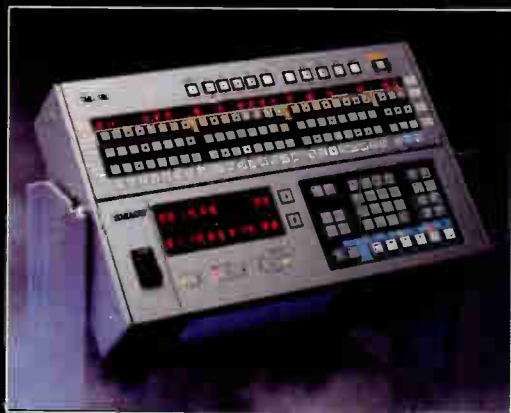
It's not that we don't have our imitators. We do. But to coin an old phrase, beauty is more than skin deep. And someday when you're under pressure to get that track out, and you lock a "90" to your video machine and things happen exactly the way they should. . . Or some early morning after the talent has gone, you sit back and listen to what you've put together, you'll be glad you decided that "compromise is out of the question."

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THERE'S A BIG IDEA BEHIND OUR NEW PCM-3324A



It's the PCM-3348, Sony's 48-channel digital breakthrough. The technology behind our new PCM-3324A.

The PCM-3324A is Sony's second generation DASH 24-channel multitrack recorder, incorporating key technologies developed for the PCM-3348. Like 2X oversampling with digital filters for enhanced sonic performance. Reduced power consumption. And upward compatibility with the PCM-3348.

But as remarkable as the technology of the PCM-3324A and PCM-3348 is, the true beauty of the family of DASH products is that they complement the way music is made. Tracks laid down on the PCM-3324A play back flawlessly on the PCM-3348. And are undisturbed as the

PCM-3348 adds up to 24 more channels of digital audio to the original recording.

Clearly, the creative possibilities are limitless. To explore them, call your regional Sony Professional Audio office: East: (201) 368-5185. West: (818) 841-8711. South: (615) 883-8140. Central: (312) 773-6001.

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PROFESSIONAL AUDIO

World Radio History

CURRENT

Agfa to Sell Tape Business to BASF

If all goes as planned, BASF will take over Agfa-Gevaert's worldwide magnetic tape business sometime in September, following approval by a West German antitrust agency and the boards of both companies. The move would give BASF control of roughly two-thirds of the "non-captive" (independent) professional tape duplication market.

In a prepared statement, Agfa Corp. vice president Maria Curry says she expects the sale to increase the presence of both companies in the audio/video duplication and recording markets. Agfa supplies approximately 15% of the tape used in recording studios; BASF currently supplies recording tape only in Europe.

According to the proposed deal, BASF will move into Agfa facilities in Munich, Berlin and Avranches (France), which now house 1,400 employees. Otherwise, it's business as usual at Agfa, and new product announcements are on schedule for the AES convention in September.

Agfa Corp. is the imaging company of Bayer USA Inc., the U.S. management holding company of Bayer AG, West Germany. BASF Corp. Information Systems is based in Bedford, Mass.

Summer NAMM Attendance Down

One of the most telling announcements coming out of the NAMM Expo '90 held in Chicago in June was that Expo '91 will take place in New York City, and it will include a "Consumer Day." NAMM's Executive Committee decided to make the move in order to "bolster interest and attendance for the annual summer event." Attendance continued its decline of recent years, with the number of exhibitors down from last year's 586 to 418 for the

current show.

While many big names in pro audio were absent, there were a number of product announcements of interest to industry professionals. Eltekon Technologies premiered MicroSound-AT, a PC-based digital audio recording and editing system. It can be customized to provide four channels of digital audio for less than \$5,000. Alesis' presence was noteworthy, with its introduction of the Microverb III, the SR-16 16-bit stereo drum machine and software updates for its Quadraverb. Tascam's venture into the live sound market included two mixers specifically designed for sound reinforcement: the M-1016 and the M-1024. E-mu Systems brought out a new 16-bit stereo sampled piano module, called "Performance," for \$499.

Yamaha Pro Audio introduced the second generation of its Club Series II Sound Reinforcement Loudspeaker Systems. Atari was the only computer company to make a showing at the event. Its booth included third-party developers Dr. T's, Passport Designs, Steinberg/Jones, Hybrid Arts and Digi-design, the latter showing the Atari version of its Sound Tools recording and editing system. Elsewhere in the software arena, Coda Music Software was demonstrating its Finale music notation program for IBM PC/compatibles. Sound Quest showed a Macintosh version of MIDIQUEST, a universal editor/librarian package that supports over 70 MIDI instruments.

More on the summer NAMM show in Craig Anderton's "MI Update" column next month.

Denon, NAB Announce AM/FM Stereo Tuner

The National Association of Broadcasters and Denon America announced that they have signed a contract for Denon to manufacture and sell a high-quality AM-FM radio tuner designed to broadcast industry specifications.

Development work on the tuner

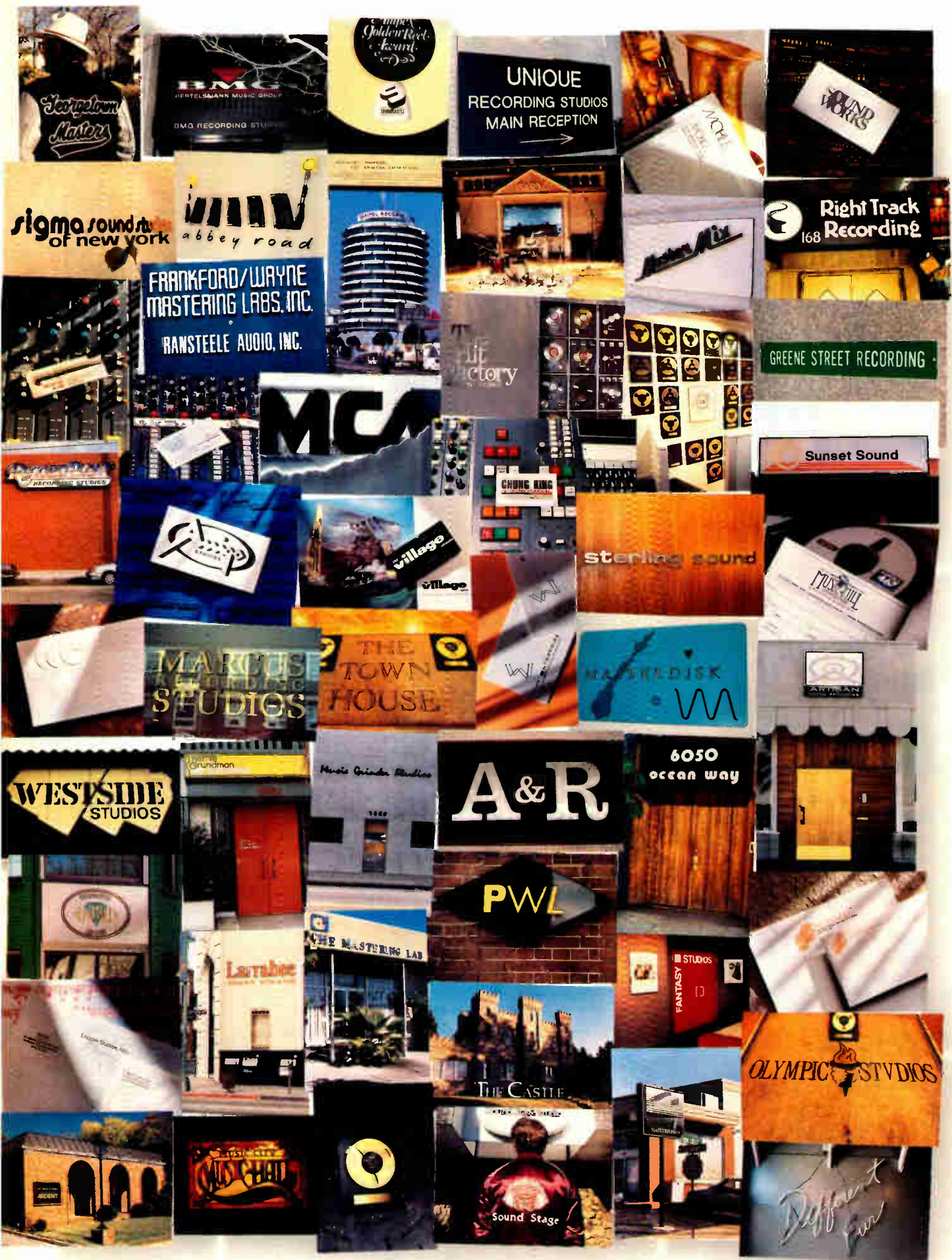
began in 1987, and a prototype receiver debuted at NAB's Radio 1988 convention in Washington, D.C. Features of the tuner will include: National Radio Systems Committee audio circuits; FMXTM to enhance FM stereo fringe-area reception; AM stereo; AM noise blanking; expanded AM band reception (the new 1605 to 1705kHz range); provision for any AM antenna; and 30-station preset memory.

The tuner will be manufactured by Denon's parent company, Nippon Columbia, and will carry the Denon and NAB names. It should be in stores by early 1991 at a retail price of \$475. For more info, contact Susan Kraus or Walt Wurfel at NAB: (202) 429-5350.

Reports and Reviews

The 1990 Consumer Electronics Industry Annual Review is now available, titled "Entertainment and Education: Yesterday, Today and Tomorrow." Compiled by the Communications Department of the Electronic Industries Association's Consumer Electronics Group (EIA/CEG), this updated profile of the \$44 billion retail consumer electronics industry provides some statistics, history and definitions of product categories such as video, audio, home information equipment and personal equipment. For copies, call (202) 457-4919.

"Video Post-Production, Vol. II," is now available from Hope Reports. Volume I was released in April. This second report concentrates on video post capital equipment purchases, which amounted to more than \$.75 billion in 1989; 29% of the purchases were made by post houses. Twenty-seven products are analyzed, three-fourths of which are recorders and editors. The 52-page, two-volume report is available for \$345 from Hope Reports: (716) 458-4250.





MORE STUDIOS GO GOLD ON AMPEX THAN ON ALL OTHER TAPES PUT TOGETHER

EVERY STUDIO PICTURED HERE HAS EARNED THE PRESTIGIOUS

Ampex Golden Reel Award for having recorded or mixed a gold album exclusively on Ampex audio tape. In fact, of all the gold albums released last year—and the year before—most of them were laid down exclusively on Ampex tape. And it's a good bet that most of the others used Ampex for the majority of their work, too. • At Ampex, we appreciate the unique blend of wit and wisdom demanded in the studio business. Running a studio means balancing the passion of art with the reality of money. It means soothing egos, settling arguments, saving souls. It means never compromising your client's standards—or your own. • We've made our own commitment to provide you with the highest quality, most consistent, most dependable audio tape in the world. A tape built with the same practical passion you bring to your business. • For all the details on what makes Ampex tape a pleasure to work with, just call or write for a copy of our new 456 Technical Brochure, and see why Grand Master® 456 is engineered like no other tape in the world.

AMPEX
A MASTER OF ENGINEERING

by Ken C. Pohlmann

SNEAK PREVIEW

SONY'S NEW PRO DAT RECORDERS & EDITORS

They're hardly out of the bag, and they've already taken the country by storm. People everywhere just can't stop talking about them. They're topical, they're controversial, but deep down inside, people love them. Outside stores, lines are a block long with delighted fans, cash in hand. Sure, insiders knew they would be popular, but who could have guessed that they would be so captivating? With-

now were essentially reworked consumer designs. Although nifty little devices, they were never intended for critical work over an extended period, hence a lot of zany nuisances (and some catastrophic) episodes have been reported. Manufacturers are just now catching up to professional demands with a new generation of DAT recorders designed for studio use. They feature time code



out a doubt, they have changed the scene forever and given us a lot to think about. We're talking, of course, about *The Simpsons*.

What? You haven't tuned in yet? You haven't bought a Bart Simpson T-shirt? Jeez, what kind of cultural abyss are you stuck in, anyway? Listen, just go down to your nearest recycling center and turn yourself in; maybe they can use you for spare parts.

Okay, now that we've gotten rid of all the lamesters, we can move on to the second most important social revolution: the development of professional DAT recorders. You see, the machines you've all been using until

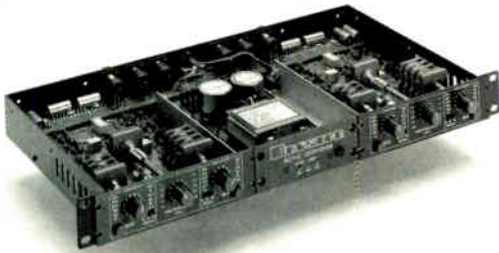
and electronic editing capability.

A case in point is the new Sony family of professional DAT recorders for use in audio recording, TV/radio broadcasting and film/video post-production. A product line will make its debut, and an extensive list of options will provide flexibility in configuring the system. We're talking a parallel remote interface, time code, external synchronization, memory-start, fader-start and high-speed search suitable for automation. All recorders are compatible with consumer DAT. Of course, the technology perks pioneered by consumer models are also available, including 64-times oversampling input filter and 8-times

ANNOUNCING THE BRYSTON TWENTY YEAR WARRANTY

For over a quarter-century Bryston has been committed to designing and producing audio products with reliability, musical accuracy and value as our primary focus. It is widely known that Bryston's policy on the warranty of our products has always been extremely generous if ever required. To further enhance our long term commitment Bryston is instituting a 20 year warranty program as of January 1st, 1990. This, as far as we know, is a first in our industry and as such will further demonstrate our continuing dedication to our customers.

We are able to offer this for several reasons. One is because we consider reliability to be exceedingly important. We have applied techniques and materials in our everyday construction of electronic equipment more



Bryston 10B electronic crossover

typically utilized in the military and aerospace industries. All components used in Bryston power amplifiers are specified for continuous duty at maximum power, with typical safety margins of 250%. Also, the power transistors used in all Bryston amplifiers are 100% tested for safe operating area, both before and after installation in the circuit. They are then taken to a "burn-in" table where they are given a



Bryston 4B amplifier
Power amplifiers range from 50-800 watts

capacitor load, a square-wave input signal, and set at slightly under clipping for a period of 100 hours. During this time, the input signal is cycled three hours on to one hour off, to exert additional thermal stress.

Following the burn-in period, the amplifiers are monitored for DC bias stability for approximately another full day. At this point, they are returned to the test bench for another complete checkout of all operating parameters and functions, at which time a test sheet is made, and included in the packing with the unit. At Bryston, we take very seriously the accurate functioning and long term reliability of our products.

This new twenty year warranty is also retroactive. It includes all audio products previously manufactured and sold under the Bryston name. This warranty is also fully transferable from first owner to any subsequent owners.

Bryston has always been dedicated to designing and producing products that deliver uncompromised performance, outstanding reliability and exceptional value. We believe our new 20 year warranty is one more example of our commitment.

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Tel: (416) 746-0300 Fax: (416) 746-0308
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BRYSTON

—FROM PAGE 14

oversampling output filter.

The lineup consists of three recorders. The flagship is the PCM-7050, intended as the editing system recorder. The PCM-7030 is designed as the player. If loaded with options, it would essentially equal the PCM-7050. The PCM-7010 is the stripped version, suitable for on-air applications, particularly because of its ability to play back 32kHz data—a digital broadcast format.

All three recorders are front-load-

IDs and program numbers plus skip IDs and end IDs can be recorded. Start IDs and program numbers can be added using RMW (read-modify-write) functions; accuracy of one frame can be obtained on the PCM-7050/7030 and 0.3-second accuracy on the PCM-7010. Subcodes can be erased and changed at will. Playback speed can be varied over a $\pm 12.5\%$ range. In addition to using the play button, you can initiate playback with the fader-start function of a mixer. As with existing recorders, Next and Previous keys are available for quick ID searching. Cueing speeds range from

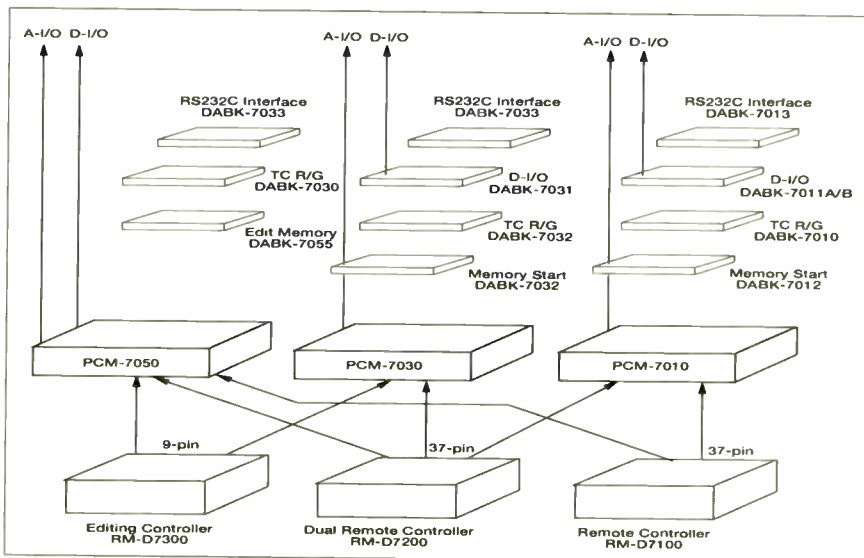


Figure 1: Sony Pro DAT family system configuration

ing and housed in a 3U rack-mounted chassis. They use the standard DAT helical scan, rotary head system; however, a 4-head format is used. During recording and dubbing, audio can be read-after-write for off-tape monitoring. In editing, either the recorder or player can be monitored. Any 60/90/120-minute tape can be used. The fluorescent display includes a SMPTE/EBU time code indicator and an extensive, self-diagnostic fault indicator. Sampling frequency can be set at 44.1 or 48 kHz. Time code and word sync input/output connectors are used for external synchronization. Of course, analog connections are provided through balanced XLR-type connectors.

Audio data and time code can be recorded either simultaneously in the assemble mode or individually in the insert mode. To enhance program locating, DAT subcode can be recorded without affecting recorded audio or time code. Up to 799 start

16- to 1/5-times normal speed using the search dial in a shuttle mode.

Sony offers various options. I'll start with the DABK-7030/7010, a SMPTE time code reader/generator that enables the recorder to operate synchronously with an external video sync signal. When the DABK-7030 is added to the PCM-7030, the recorder can perform time code chase synchronization. In normal mode, playback starts automatically when locked to the received time code. In the rebase mode, the recorder maintains synchronization in spite of variations in the master clock or tape dropouts. The sync offset time can be adjusted from -24 to +24 hours. The recorders can be locked to a variety of reference signals, such as SMPTE drop or non-drop frame, EBU time codes and video sync. When video machines are not used, sync can be achieved via the word clock from a digital audio system.

The DABK-7031/7011A/7011B are

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digital I/O options designed according to the AES/EBU digital audio interface (XLR-type connector). (The PCM-7050 has AES/EBU as a standard interface.) In addition, these options allow the recorder to be locked to an external word sync signal. The DABK-7011A and DABK-7011B provide unbalanced digital I/O for connection to consumer digital devices, and the DABK-7011B also adds the SDIF-2 interface (XLR-type connector).

The DABK-7032/7012 options provide memory start. They have a 4 megabit memory onboard so the recorder can start with zero rise time. This instant playback is crucial for on-air and sweetening applications. DABK-7033/7013 provide an RS-232C computer interface. A recorder can thus be placed under computer control, for use in any automated playback system. The DABK-7055 for the PCM-7050 recorder enhances editing by providing memory search/rehearsal and crossfading, with editing accuracy to 1 ms. The RM-D7100 is a wired, parallel, 37-pin remote controller for transport functions. The RM-D7200 similarly controls two recorders for simple editing. The RM-D7300 uses a serial 9-pin interface on the PCM-7050/7030 to provide comprehensive remote control over editing functions, and it permits automatic editing. A complete system configuration, with options, is shown in Fig. 1.

The RM-D7300 together with a PCM-7050 and PCM-7030 would form a complete system, providing assemble and insert editing. In the latter, insert in/out points are placed in a 16-Mbit memory using a search dial, and specified for the player and recorder. Memory rehearsal can modify the points before automatic editing. Each edit point is crossfaded electronically, with crossfade times variable from 0 to 300 milliseconds, in 1ms steps. Fig. 2 shows an editing system layout; editing precision is also 1 ms. A lesser system using PCM-7030s and a RM-D7300 would yield single-frame accuracy, while a budget system using PCM-7010s and a RM-D7200 would provide one-second accuracy.

I know that the cash is burning a hole in your pocket, but these recorders will probably not be available until January 1991. Until then, you'll have to satisfy yourself with fleeting glimpses at the AES conven-

tion and elsewhere. Going way out on a limb, I could estimate the prices as follows: PCM-7050, \$11k to \$17k (depending on options); PCM-7030, \$7k to \$12k; PCM-7010, \$4k to \$8k; RM-D7300, \$5k. Don't quote me. My

code onto the DAT tape. It was that breakthrough that has made pro DAT possible. Unfortunately, we'll have to defer revealing those technical secrets until next month. Hey! Stop whining. That's only 30 days away. As

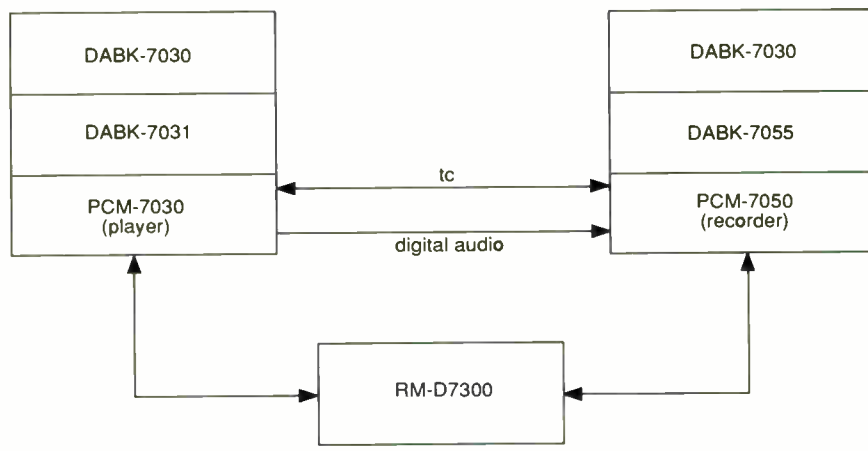


Figure 2: Editing configuration

radar hasn't picked up a portable DAT with TC yet; it's still further down the road, or else very stealthy.

Beneath the front panel glitter, of course, is the more interesting question of how manufacturers succeeded in squeezing the all-important time

Bart Simpson would say, "Don't have a cow, man." ■

Ken Pohlmann is currently in Hollywood, auditioning to do Maggie Simpson's lines for the upcoming fall season.

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by Stephen St. Croix

WHAT IF, INDEED?

Hello, boys and girls. If you will think back to last month, you will remember that our hero, the recording industry, was left poised on the edge of disaster—the very event was the horizon of the black hole of standardization. It was then that I promised to report on the SPARS shootout on May 19 in Nashville.

For those who may have had such a heavy homework load in the last month you forgot I said I would do this, I remind you now. I did. I will also remind you that one of the points of last month's column (See? A column with a *point*, and you don't remember it!) was that the work one does on anybody's digital workstation, workplace, editor, DSP machine or whatever is much more important than the machine itself. But, of course, you already knew that.

Warning One:

Warning, Warning, Warning. Another automotive analogy is approaching out of the east.

If your digital disk recorder/editor hits a brick wall at 55 miles per hour, you can get it fixed or even replaced. Pretty much the same thing as when your car crashes.

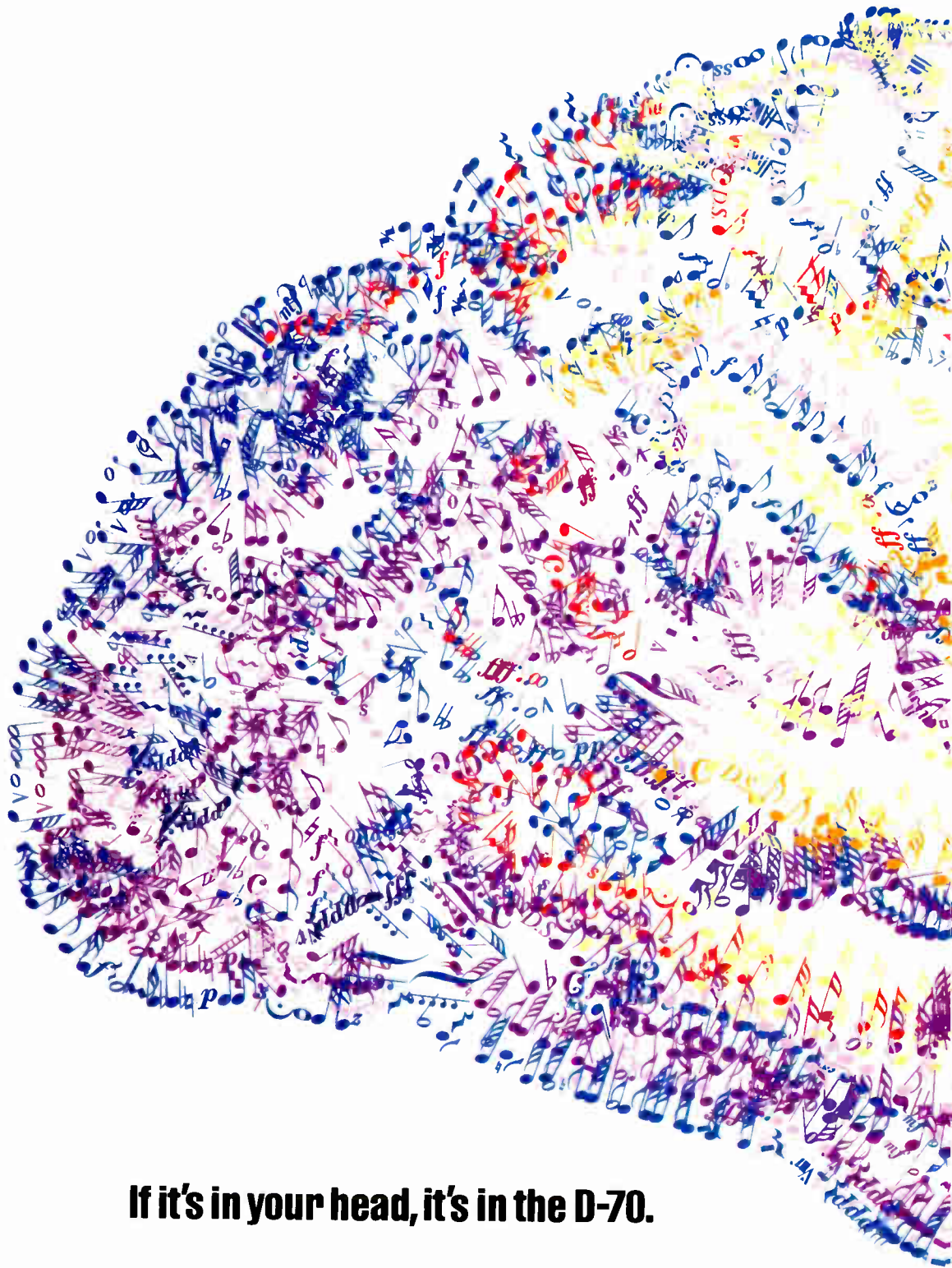
It's the data in your machine (or the passengers in your car) that you can't afford to lose.

Let's see now. You can back up the data in your recorder, and you can airbag the passengers in your car. Both of these moves are meant to ensure survival of what is important: the software (or firmware if the passengers go to the gym a few times a week) and not the hardware.

There is, however, an important difference here. Your saved passengers can simply get into another car, of a different make, while your saved data can only be put right back into the very same machine it came from, or another exactly like it.

This, along with obvious other reasons, is why we need real file transfer capability, or at least intelligent file translation shells, and not





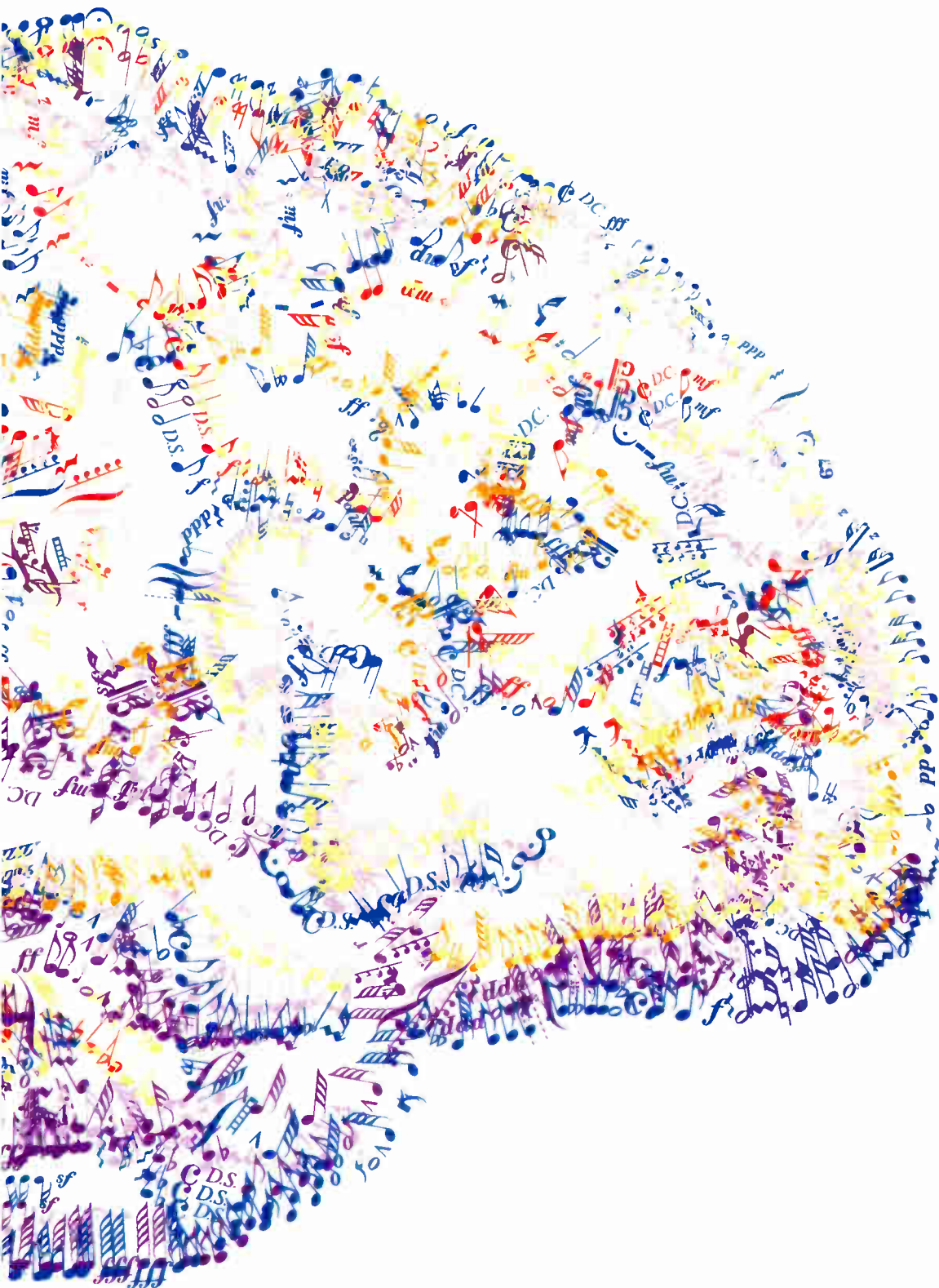
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the simplistic "oh, you can get the 2-track final product off our Exabyte, I think" that we hear now.

Okay, so how did all this come out at the SPARS meeting in Nashville?

Warning Too:

Remember that I am personally involved in developing one of the more elaborate digital recorder/editors. I designed the operational concepts and human interface (including screens and motorized fader hardware control surface) for the new Symetrix 40-track machine.

While some of you might feel that I should refrain from any and all discussion within the arena of digital disk recorders/editors due to my potentially biased position, I have thought it over, and I don't think so. If I clearly state my position up front, explain that I am involved, and then tell you what I think, then you can sort it all out without too much trouble.

At least you know that I am definitely interested in, and very involved with, the entire subject. Being a systems designer for such machines (the Symetrix is *not* my first one) and an end-user who operates a digital multitrack facility, I *am* involved. If you read my stuff, you probably read it because I am a bit off the wall, and because I am actively involved in what I write about.

So...

The Symetrix digital recorder/editor won't be shipping until the September AES. So as I write this column in May, we are officially still in the coveted vaporware status. You can see this makes it very easy for us to blatantly vocalize our desire that every effort be made to come up with some sort of functional standard for intermachine file transfer.

On the other hand, while most other manufacturers claim that they also wish for this to take place, they get very quiet when asked to actually *do* something about it.

Very quiet.

Well, once again, the major players met at the same place, at the same time, for a variety of reasons, at the May SPARS conference. On Saturday, we all showed our stuff, either shipping or coming attractions. We all gave our speeches, each carefully explaining why we were clearly the best and the only suitable answers to

the user's needs. We each demonstrated our respective systems.

Some of these demos were awesome, some interesting, some reruns, and a few were actually embarrassingly inept, stupid and off-base. Grade school science projects have been presented with more authority and professionalism than a couple of these demos were. It was *almost* funny.

On the other hand, at least three companies showed stuff that really made you feel that the future had arrived. Some of these demos made you feel like rushing right out and doing a couple of difficult projects on these machines later that same night,

just for the thrill of solving age-old problems in minutes.

On Sunday we all sat at a round table and fielded questions. One of the questions was...file transfer. I was on this panel at the round table, and as I had been told a month ago by another *Mix* editor to watch for significant advances in this area at this meeting, I waited for the others' responses with baited breath.

Raw 2-track digital file transfer is not the question here, of course. Almost all these machines can be forced to listen to any other machine in some way or form, by AES/EBU or SDIF, or something. The problem

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arises when you try to transfer eight, 16 or 40 tracks, and maybe even the *edit and automation* information along with these tracks.

I am sorry to report that not much has changed. Evolution, *not* revolution. Maybe even backward evolution. The appearance of increasing numbers of optical storage alternatives may have actually slowed the approach of real intermachine file transfer. Now some are talking about magneto-optical or other laser storage schemes for backup and archiving, instead of the almost-became-the-

Several
manufacturers
hissed and moaned
about the same
old problems of file
transfer.

standard Exabyte.

This is one reason why standardization is so difficult: It is a very dynamic world. Things like storage technologies sometimes change as fast as you can learn how to implement last week's hardware.

Anyway, several of the manufac-

turers hissed and moaned (neat, huh?) about the same old problems of file transfer, and they didn't even seem too interested in the concept of a standard "lowest common denominator" type of standardized translated file transfer.

This idea of a standard format for file transfer works very well for CAD files and many other situations that are actually quite similar to our industry's problem. I frankly have trouble seeing what the problem is.

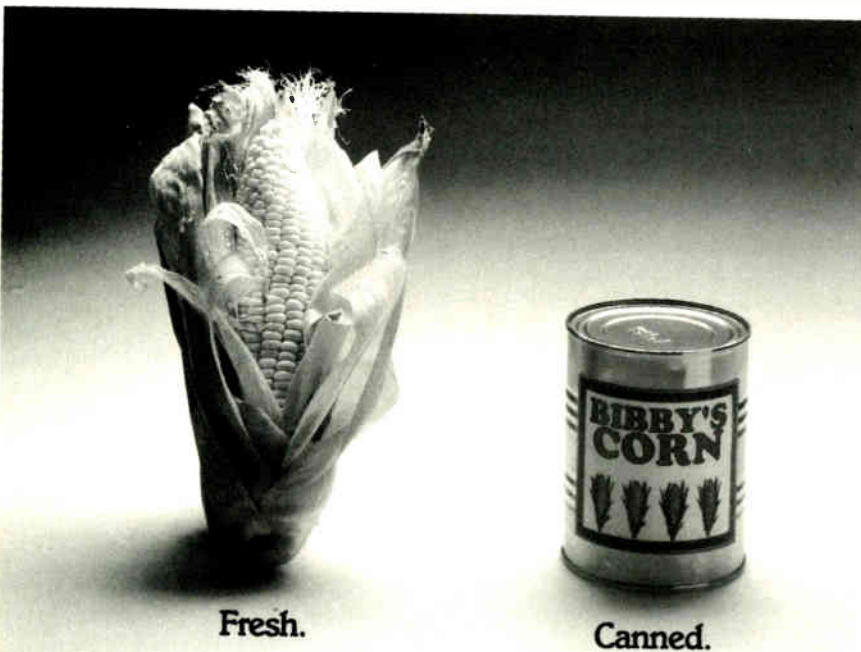
While it is true that machine A's automated EQ data may not be supported by machine B, and machine C's crossfade files may be scaled differently than machine D's, this concept of a file translation program could deal intelligently with all that. If B can't read A's EQ stuff, then the translation shell should know this and ignore it. If D has a different crossfade approach than C, then the shell (the *D input* subsection of the shell, of course) should give the user doing the import a choice of ignoring the data and flagging the crossfades so they may be redone by hand once the file is imported, or rescaling the data automatically for a best-fit translation to the target (D machine).

A slightly complex solution for a very complex problem, but at least it is a workable answer, which can evolve as it needs to. Come on, guys, let's do something. We have been talking this over since the day when the *second* manufacturer sold its first machine and incompatibility was invented, again.

Joke: Hey, boys and girls, if you read this column out loud and backward at 78 wpm, you will hear a hidden secret message just for you special cult types; mainly you DEVIL (Digital Editors Virtually Insure Leadership) worshipers. Have fun, and buy bonds.

Oh, yes, in no way does Stephen St. Croix endorse satanism or any other twisted perversion where living things are tortured for amusement. ■

It is true that contributing editor Stephen St. Croix has his fingers in a lot of pies. Sometimes he bakes his own pies if he can't find one he likes. Don't let his sweet tooth scare you; he vows to blatantly display any biases, as he has done to date, and to report candidly on which pies impress and depress him, from home-baked to Sara Lee.



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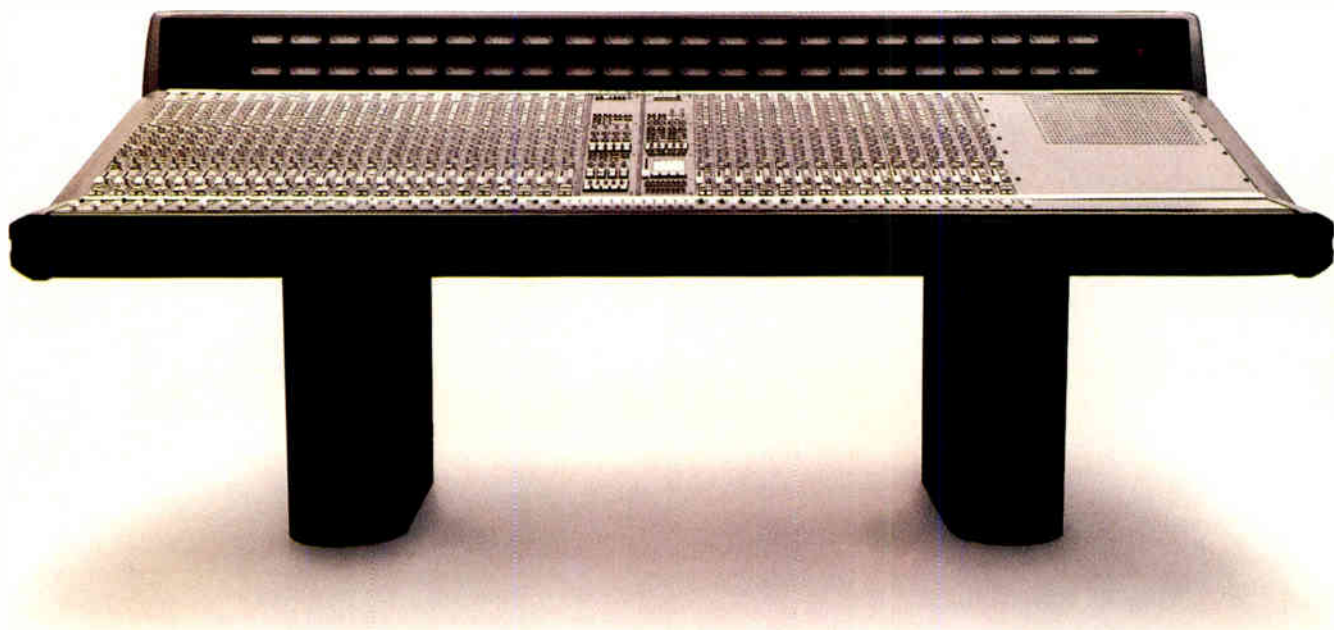
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World Radio History

by Mel Lambert



VINCENT VAN HAAFF

THE ART AND SCIENCE

For most of us, designing recording and production environments still remains a black art. Technical concepts that appear to be relatively simple might require a great deal of subjective interpretation. The simple fact is that few individuals have the sufficient skills required to make it as recognized studio designers in this industry.

As one of the leading lights in this highly specialized field, Vincent Van Haaff has created an enviable reputation as an innovative and creative studio designer. A classically trained architect, Van Haaff says that he became disillusioned with what he re-

fers to as the "structured formalism and institutional rigidity" of the architectural profession in his native Holland and set out to make his name in the music business.

He worked first at a series of New York studios in the early '70s before ending up at Kendun Studios in Burbank, Calif., under the watchful eye of facility owner and industry guru Kent Duncan. "Within a couple of weeks of working with Kent and his Sierra Audio studio design division," Van Haaff recalls, "we began to share ideas about the ways in which a facility should look and sound. I soon had the opportunity to combine

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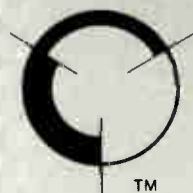
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my knowledge of architectural acoustics with my passion for music recording. I shall always be grateful to Kent for the opportunity he gave me to develop my ideas."

During the past 13 years, Van Haaff's company, Waterland, has worked with, designed and built some of the most admired West Coast studios. The formidable list of clients includes Conway Recording, Rusk Sound, Monterey Sound, Village Recorder, Blue Canyon, Ground Control, Skip Saylor Recording, Can-Am Studios, Encore Studio, The Complex, Mad Hatter Studios, Post Logic, Music Grinder, SoundWorks West, Trebas Institute of Recording Arts, 525 Post Production, and what to many is his crowning achievement, the multi-room complex at A&M Studios in Hollywood.

Mix: How would you summarize the fundamental role played by a studio designer?

Van Haaff: I can best summarize my basic philosophy with the expression, "Where art and technology meet, there are choices." Designing a state-of-the-art recording environment—the control room and studio—requires that I make certain choices based on the limitations of our technical knowledge of the way sound behaves in a closed space, and the aesthetics of creating an acoustic space in which people can develop a musical performance. And the renovation, upgrading or building of a new studio requires that all of the people involved recognize the options available to them and make appropriate choices.

Often that process involves walking a fine line between diplomacy and psychology. A studio designer has to extract answers to questions that the client may not realize are important, and then use those parameters within the multidimensional equation whose solution is the final design of a practical recording studio.

Mix: Do you continually refine your ideas and develop solutions from assignment to assignment?

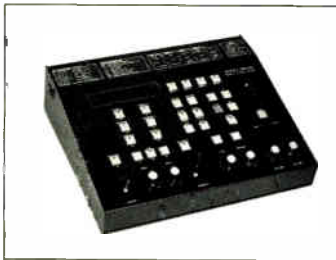
Van Haaff: Most definitely. I also learn from my peers. It is highly egotistical to consider that one man knows all there is to know about acoustics. We all develop during our lives and refine our skills.

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I take full responsibility for the whole project. There are many fixed parameters I have incorporated into my rooms, and each one I build helps me extend that continuum. It has been an interactive and iterative process.

Mix: How do you first evaluate what is required of you as a designer?

Van Haaff: First of all, I have lunch with the client, maybe see their house, talk around the project and get to know them professionally. During that first meeting I'll get a strong idea of their technical and sonic requirements. Here in L.A., studio owners have very strong opinions, and there are definite trends in design and acceptable studio appearance. There is a fine line between deciding that a project is going to produce a viable result that I can stand by and one that the client will be happy with.

Inevitably, in any group effort there are going to be conflicts of personality. I have to play the role of mediator between client and builder, as well as be the judge of how these anxieties can be channeled positively. Ego plays a large part in the process

of building a studio; I have to play the role of a net in such games between the various parties. I take the responsibility of trying to answer every question. That is one of my greatest skills—being able to work in a field like architectural acoustics where there are still so many unknowns, and taking responsibility for getting the job done.

Mix: Is there an objective answer to how a room *should* sound? People can experience live sound for themselves in a concert hall, but are there absolutes in the recording arts?

Van Haaff: In this day and age of home studios, *everyone* has an opinion. The main criteria is simple: The room works if the engineer is happy with the "feel" of the space, and if he or she can take a tape home and recognize the recorded sound on their stereo system. That correlation is the acid test.

Mix: Could you take any space and turn it into a viable control room?

Van Haaff: Yes, given good dimensions and restraint in using large slabs of similar materials. For me, the combination of diffuse-field control rooms

and live, diffuse-field studios is the ultimate correlation for reproducing sound. LEDE® is, on paper, the perfect way to go. But having spent many hours in that type of environment, I'm convinced that those designs have distorted the environment to such an extent that I'm uncomfortable with what I perceive. RPG Diffusors are aesthetically unattractive; the scientific approach to a "laboratory-environment control room" just doesn't make any sense to me. That design concept leaves no room for the owner and engineer to become part of the environment and use it as a creative space.

I attempt to make the room neutral. I include a lot of sidewall diffusion and then wideband/low-Q absorptive pockets for high-impedance trapping below 200 Hz. I'll use AC routing plenums for bass absorption, plus membrane absorbers and polycylindrical diffusors.

There are certain geometric ratios—sacred measurements, if you will, including the Golden Section and the Golden Mean—that people have been using for centuries. In

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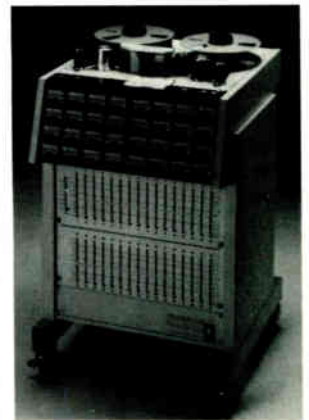


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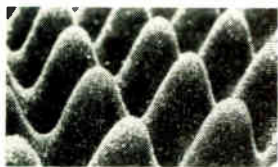
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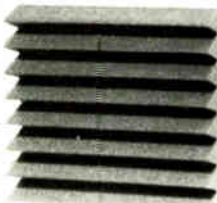
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terms of shape, so long as the acoustics are right, I can do little to upset the aesthetics. One trick is to keep it simple. Once the shape has been chosen with certain constraints—ceiling height, access from a side corridor, visual communications with overdub or voice-over rooms—the environment comes together.

Mix: Are there any "ideal" control room dimensions, ones that you know from experience will result in good-sounding acoustics?

Van Haaff: I like to see a room that is wider than it is deep, with medium-height ceilings—maybe 27 feet wide by 19 to 20 feet deep, with an average 16-foot ceiling. A room that's not too deep means that the image will not disappear too far behind the engineer, so that the producer and musicians in the back of the room hear something misleading. I favor a wider listening area—at least six feet wide at the console.

I go back into my rooms from time to time to identify their virtues. I discover that the more rooms I design, the more I simplify my designs and distill them down to their essence.

Mix: How do you begin the process of designing the recording area, as opposed to the control room?

Van Haaff: The main parameters are the visual appearance and lighting. The space should be conducive for individual as well as ensemble performances. The size obviously defines what can be recorded in the room. But no matter how big the area, it still functions as a "stage" upon which artists will perform. If the space is created so that it has many individual nooks and crannies that have individual acoustics, the artist can become confused as to what the audience—the room—thinks of them.

The idea of using a mirrored wall here, rock surfaces there and wood paneling over there, with nasty-sounding dead boxes called drum booths, makes no sense to me. What instrumentalist wants to record in spaces like that? I like the sense of a studio being fixed, with a minimal number of tricks and added appendages.

I design open spaces with natural materials and let the artist dream their own space into it. One complaint I often receive is that my rooms are *too* live—but it is possible to dampen a

room through absorbent materials. I prefer fixed acoustics, because it leaves it up to the artist to find the best space and ambience, rather than have the engineer alter the space because it is easier to record in such an area.

Lighting is also very important. No matter what we do with skylights and so on, it is hard to bring daylight into the studio. And usually the best performances are made at night, so who cares what the sun is doing! The types of lighting, their placement and their color temperature are all important. No tricky little spots of light.

Mix: What is your favorite room that you have built?

Van Haaff: A&M Studio A. I always felt an affinity with Charlie Chaplin's art—and the soundstage on the Chaplin lot became A&M's big space. I spent two-and-a-half years working at the A&M facility, building the various rooms I designed. Each studio is self-contained with its own lounge, so that artists could work undisturbed.

Mix: Of the rooms you didn't design, which are your favorites?

Van Haaff: Puk Studios, Denmark, because of the freedom of space there and the marvelous outside views. [Primary control room design was by Andy Munro of Munro & Associates, with Ole Lund Christensen and Knud Rosenskjold of SLT handling technical and electronic dimensions.]

In Holland I worked for a while in the studio where the Beach Boys' *Holland* album was recorded. The studio was in the middle of a meadow, so we had a great view, which makes a big difference.

Technically, I would have liked the job of remodeling the Capitol Studios complex here in Hollywood. Few other rooms have that same spirit—something that is out of the ordinary. Some of my rooms might not be acoustically perfect, but they all contribute a new dimension to the often conservative world of studio design. I strive to use concepts that have the dare and the flair to do something artistic within this rigid environment. On more than one occasion, I think I succeeded. ■

With over a dozen years of active involvement with professional audio on both sides of the Atlantic, Mel Lambert now heads up Media & Marketing, a high-tech consulting and marketing service for pro audio firms and facilities.

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1990

A Look at Some of America's Hottest New Rooms



PHOTO: JIM ROBINSON

AudioMaster, Bethesda, Md.:

AudioMaster Studio in Bethesda, Md., opened in late-April 1990 with an eye to digital recording for radio/TV ad soundtracks. That's a 24-input Neotek Elite with built-in AMS AudioFile workstation. The two-tier control room features independently floating vocal studios on either side and a 16x5-foot ART Diffusor along the rear wall. Design by Systems Development Group of Poolesville, Md.



Branam Fox Run Studios, San Fernando, Calif.:

Studio A at Branam Fox Run Studios in San Fernando, Calif., was recently torn down to concrete and studs, then expanded and rebuilt to "liven things up." TEF analysis was performed at every step along the way. The monitors are a custom George Augspurger design with TAD components. The console is a Neve VR60. Original design by Jack Douglas; redesign by studio manager and chief engineer Chuck Fetyko.



PHOTO: JOHN STORYK

Margarita Mix, L.A.:

Margarita Mix has opened in L.A., with five complete studios in over 10,000 sq. ft. Pictured is the Synclavier room with a Sound Workshop console, New England Digital PostPro™ Direct-to-Disk™ system and Tannoy double-15 monitors. "Lots of diffusion and some serious isolation from room to room," says designer John Storyk. Each room is wired to a central machine room, and each room has a telephone "iso" booth to accommodate the ad clients.



PHOTO: LEE ANDERSON

Soundwave, Inc., Washington D.C.:

Terry Lewis of Spacescape, Inc. recently enlarged and cosmetically improved Studio B at Soundwave, Inc., Washington, D.C., home to a TAC Scorpion console and UREI 809 monitors. Acoustic realignment by Chips Davis of Paoletti/Lewitz/Associates Inc., San Francisco.



Sound Arts Recording, Houston:

Sound Arts Recording Studio in Houston remodeled this room to complement the installation of a Trident 80B console in June 1990. Monitors are Altec 604s. Design by John Wells & Associates of Houston; interior cosmetics by Design Howard. Notice the use of hardwoods and the side-to-side vaulted ceilings.

PHOTO: JAY MANIS



Remote Recording Services, Lahaska, Pa.:
The Silver Truck has replaced the Black Truck at David Hewitt's Remote Recording Services, Lahaska, Pa. The 44-foot tractor-trailer includes an API 4848 console designed to Hewitt's specifications. KRK 15A-3 monitors cover the near-field. Design, of course, was by Hewitt.

PHOTO: WARREN BOND



Video Tape Associates, Atlanta:
Bill Morrison of Acoustical Physics Labs (Doraville, Ga.) designed the Lexicon Opus control room for Video Tape Associates (VTA), Atlanta, which opened in November 1989. A custom, tri-amplified cone/dome loudspeaker system, also designed by Morrison, is built into the room.

PHOTO: KEN OWENS



Manhattan Center Studios, NYC:
Studio Eight at Manhattan Center Studios in New York City opened in January 1990 with a Neve VR console (Flying Faders) and the first installation of a Tannoy SGM-15B monitoring system with C-150 subwoofers. "It's a small, tight room with a big sound," says designer Richard Rose of Hot House Professional, Highland, N.Y.



Battery Studios, NYC:
The Studio A mix room with an SSL G Series console at Battery Studios, NYC. The facility, which opened in October 1989, includes three rooms in 6,000 square feet of "technical" space. A Tannoy double-15-inch monitoring system is powered by Perreaux amps. However, monitors are removable and replaceable within 20 minutes, something of a trademark for designer Russ Berger of Russ Berger Design Group, Dallas.



KLUB KEV'S recording co., Seattle:
Scott Spain and Dr. Lloyd Cable, the operator and the engineer, designed their own main control room for KLUB KEV'S recording co. in Seattle. The front wall contains 10 inches of sand, Sonex foam and Westlake BBSM-12VS monitors, which are floating on 3-inch neoprene dowels. That's a Neve 8232: the room opened in January 1990.

Record Plant Remote, West Milford, N.J.:
Designed for 48-track analog or digital recording is the Record Plant Remote, of West Milford, N.J. Built into a 1990 35-foot Volvo FE-7 chassis, the truck features a custom Trident Series 80 48x32 console, UREI 813 monitors and an extensive synchronization system for handling broadcast, film or video dates.





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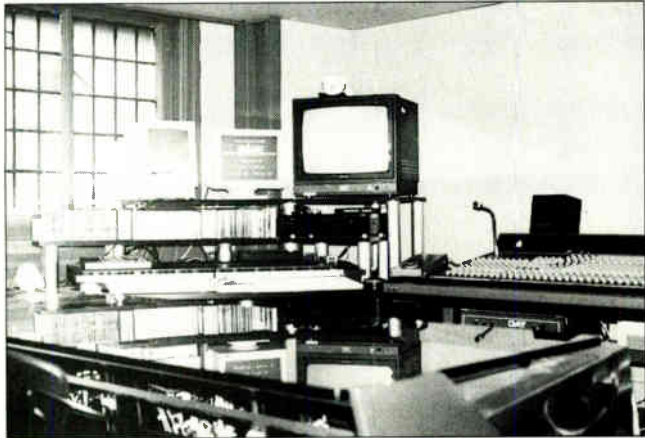
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THE CLASS OF 1990

A Look at Some of America's Hottest New Rooms



Servisound, NYC:

Jonathan Helfand, formerly director of music and sound effects at Trackworks, NYC, has relocated to Servisound, New York. Helfand, who has an extensive list of advertising credits including the orchestral score for the voiceless Paul Newman American Express spots, designed and outfitted this room to accommodate his Fairlight CMI-III digital system and extensive sound effects library.



Poolside Studios, San Francisco:

The main control room at Poolside Studios, San Francisco, features the first installed Euphonix Crescendo automated mixing console in the world. The monitors are UREI 809s, with Yamaha NS-10s and Auratones for the near-field. Wiring design and installation by Steve Raschke of Sound Resources, Oakland, Calif.



PHOTO: MURRAY ALLEN

Universal Recording, Chicago:

Universal Recording has moved into new digs on W. Randolph in Chicago, housing five production studios, two music studios, two film/video remix theaters, one THX™-approved screening room, a broadcast facility, a video layback room and an optical transfer suite. Here is Production Room 1 with its SSL 6000E, NED Synclavier and Direct-to-Disk™. Design by the Universal team.



Edit 7 (NBC), NYC:

Edit 7, the new audio post suite for NBC Television, New York, recently opened with an SSL 6000 48-channel console, Studer Editech Dyaxis workstation and UREI 813C monitors. The room is a Reflection Free Zone™, including RPG Diffusers™. The floor is a floating 4-inch concrete slab on rubber isolators—triple-floating walls and ceiling. Design by Russ Berger when he was still with Joiner-Rcse Group, Dallas.



RO Studios, Concord, Calif.:

RO Studios of Concord, Calif., recently installed the first Otari Sound Workshop Series 54 console, equipped with Diskmix 3 moving fader automation. The studio also features Professional Audio Systems TDC monitors with Mastering Lab crossovers and an Otari MTR-100 24-track.

PHOTO: MARION GRAY

ACOUSTICAL TREATMENT

OF RECORDING STUDIOS

BY MALCOLM CHISHOLM



Over the past few years, massive amounts of research have been devoted to control room design. The published results of these efforts have allowed a facility to select from several excellent generic control room designs.

With a bit of tweaking and tuning, a studio owner can use the published theory to modify a given plan, adapt it to a particular situation and come up with a workable room. In short, we know how to build good control rooms.

We sure as hell don't know how to build good studios. In fairness, there are some designers who appear to know something on the subject, but since they don't give away their stock in trade, the studio owner is faced with the problem of separating good designers from good talkers. With the future of one's business at stake, it's a hard choice, and some very good acousticians have been known to make very bad mistakes in dealing with recording rooms.

A common mistake lies in confusing a recording studio with a typical acoustical environment. Acousticians ordinarily think of large rooms in terms of theaters and auditoriums, which have a definite sound source feeding a definite audience. This applies equally to control rooms, theaters and almost everything else acoustical designers

Neil Grant employed RPG Diffusers for this studio at Tent Records in London.

get into.

It does not apply to studios, which have any number of sources (musicians) and an audience comprised of those same players. Multiple scattered sources, ditto for listeners. Peculiar room.

Keeping strictly to acoustical performance, the primary function of a recording studio is to provide adequate isolation between microphones, while still allowing players to hear each other.

Acoustical isolation is the most often discussed of these two areas, but since the parameters involved are addressable by acoustical mathematics, producing satisfactory isolation levels is a fairly straightforward process.

Treating a room for multidirectional listenability is a good deal more difficult. As it is not a direct function of the room's global characteristics, it cannot be treated mathematically. General solutions are available, and they

work nicely, but they have more to do with old-fashioned intuitive acoustics than with the glitzy, new computer-aided stuff.

Achieving Acoustical Isolation

Acoustical isolation between

instruments is a function of the degree by which the sound of one dies away before getting to the next. With too little die-off, the sound of one instrument falls through the mic of the next and trashes it. With too much, musicians can't hear each other properly, which makes group playing difficult and ruins section sound. Everything in the real world is a compromise, and acoustical isolation is no exception.

The amount of acoustical attenuation for a given instrument in a room depends on the room's global characteristics. As with any radiated field, sound pressure levels diminish as the square of the distance from the source. Double the distance, lose 6dB SPL. The equation holds for any distance in a perfectly "dead" room or out of doors. In a normal room, however, the walls reflect some of the sound. Since the source sound level diminishes with distance, at some point the reflections from the walls will equal the source level. Beyond that point the sound no longer dies away, and the level becomes constant. The point at which this transition takes place is called the

"critical distance." It is easy to observe, easy to measure and a remarkably accurate indicator of a room's acoustical performance.

The critical distance (D_c) of a sound source depends on the reflectivity of the walls and how much wall surface the sound strikes, which in turn varies with the directionality of the sound source.

A firecracker hung on a string in the middle of a room produces a spherical sound field, which will bounce off all six surfaces of a room. Six, because sound has no sense of direction and can't tell a floor or ceiling from any other surface. This spherical source is assigned a "Q" (figure of merit) of 1, meaning it has no directionality at all. Hang the firecracker against a wall, and it radiates a hemispherical pattern. That's a Q of 2. Halfway up the wall in a corner and it's a half-hemisphere, with a Q of 4. On the floor and in a corner, Q equals 8. Q represents the beam width of the sound source. The higher the number, the narrower the beam.

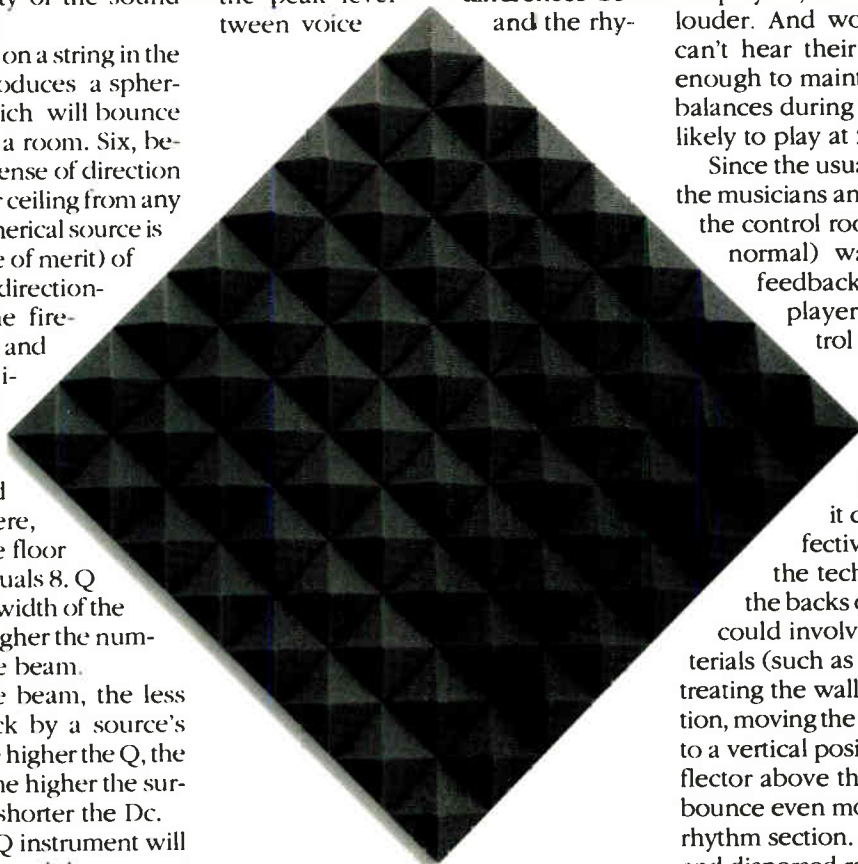
The narrower the beam, the less wall surface is struck by a source's sound. Therefore, the higher the Q, the longer the D_c . And the higher the surface reflectivity, the shorter the D_c .

Therefore, a low Q instrument will have the shortest D_c and the poorest isolation. As it happens, low Q describes both the human voice and the entire rhythm section. Bass, piano, guitar and drums were used to accompany the human voice for many years before microphones and were invented and designed to match it. They match quite well, which leaves us with a kit of Q 2.5 instruments as the basis of isolation design.

The most difficult instrument in terms of isolation is the voice. Not because it's so soft, but because of limiting. Unless a studio wants to turn out 1940s records, there is no choice but to limit vocals, and the limiter costs about 12 dB of isolation as it pulls up the consonants in the singer's words. The vocal channel should show something approaching -20 dB when the vocalist is quiet, 12 dB for limiting and 6 dB to 10 dB to clear the consonants and allow a little dynamic range for the singer. Since other instruments work nicely with a clearance of 6 dB to 10 dB, adequate vocal isolation be-

comes the criterion for acoustic design in studios.

Vocal isolation is made easier by the small size of the instrument, which allows miking at a half-foot without running into serious proximity effects, and so generally presents about 87dB SPL on-mic. Hardly thunderous, but the peak level differences between voice and the rhy-



Above photo: The Azonic Pyramid Pattern from Alpha Audio

thm instruments are not as great as commonly assumed. It's limiting up the -12dB consonants that gives rise to vocal isolation problems. Still, since other instruments are 6 dB or more over the voice's 87 dB, the room characteristics should lay for about 26 dB of acoustical loss.

The problem is made harder by a simple but nasty fact: *The source goes constant level at its D_c , and the level is the same everywhere in the room.*

Distance and directionality have no effect on room problem fall-through except to muddy it. Baffles don't work. Hypercardioid mics don't work. Nothing works. The levels of the rhythm instruments have to fall at least 20 dB before going constant volume, or you can't work a vocal anywhere in the room.

So a reasonable isolation level is about 26 dB. More is nice, but getting

better than that in a small room involves so much treatment that the studio turns into an anechoic chamber, a reflectionless environment with fuzz covering all six walls.

Listenability of the Room

Totally fuzzed walls return no sound to the players, who respond by playing louder. And worse, musicians who can't hear their overall sound well enough to maintain solo and section balances during performance are unlikely to play at full potential.

Since the usual studio setup points the musicians and their instruments at the control room, the obvious (and normal) way to supply direct feedback is to bounce the players' sound off the control room wall.

Given that a primary function of the control wall is to supply a reflective surface to the musicians, it can be made more effective by using some of the techniques employed in the backs of control rooms. This could involve using diffusive materials (such as RPG Diffusers™), re-treating the wall for maximum reflection, moving the control room window to a vertical position or installing a reflector above the window, angled to bounce even more sound back to the rhythm section. A combination of flat and dispersed reflections is known to be optimum for critical listening.

The side walls are far less critical. Because of that, they are given less thought and are frequently left untreated or given some kind of uniform treatment. Neither is a good idea. Flat, straight walls are acoustically unacceptable, and if the side walls are either untreated or evenly treated, the sound will ricochet around the room like a ball on a billiard table until it finds an open mic. It's sometimes possible to control the results by putting an absorbent panel behind every mic in the room, but it's tedious and interferes with communication. Much better to clean up the bounce. Since the villains are flat, evenly treated walls, the obvious remedy lies in knobbing up the walls and installing absorptive treatment in patches.

Both objectives can be accomplished by hanging live-sided boxes filled with Fiberglas™ on the walls (Fig. 1). Floor to ceiling treatment is unnecessary, as mics rarely point upward.

The boxes should be hung high enough off the floor to clear chairs and other clutter leaned against the wall, and generally top out eight or nine feet above the floor.

A box with reflective sides will act as a disperser, and at a foot or so deep, will disperse sound down to about 500 Hz. Not ideal, but not bad, and at a foot the boxes are pretty manageable. They are ordinarily spaced two to six feet apart, leaving the walls reflective between them. This presents a combination of dispersion, absorption and reflection to both the musicians and the mics, reducing the billiard ball syndrome while presenting an optimum listening environment for the studio players.

The back wall can be treated in the same way in small rooms, although it is best to leave the back as live as possible, as reflections give the players a sense of being in a room rather than working with their backs to a vacuum.

In cases where a great deal of absorption is needed, the wall area above eight feet and below two feet can be totally treated without ruining the room's generally live sound, because

—CONTINUED ON PAGE 43

Some Acoustical Materials for the Studio

Proper acoustical materials can be a wonderful tool in the hands of a knowledgeable user. Whether implemented into a new design or brought in to tweak an existing room, they can make a substantial improvement in the nature of any acoustical space and can even work miracles—well, sometimes.

Acoustical materials fall into three general categories: absorbers, diffusers and reflectors. The latter category needs no special explanation. Reflectors are no more than "hard" surfaces with the ability to reflect or bounce sound. Typical reflective surfaces in the studio are glass, wood paneling, hardwood floors, and the occasional use of exotics, such as suspended overhead Lucite panels and the like. A few well-placed reflectors can do wonders in livening up an overdamped, dead-sounding room.

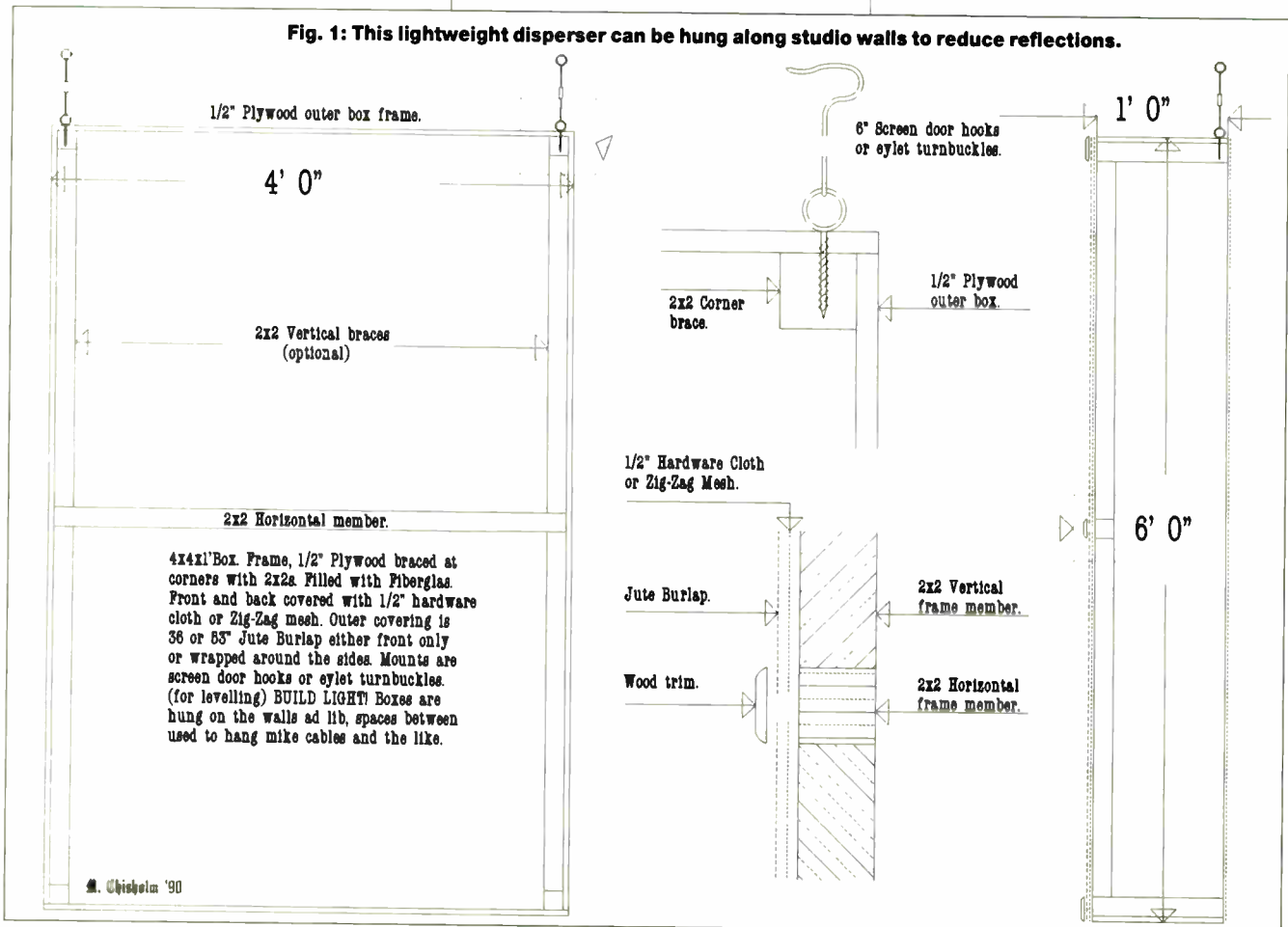
Diffusers are surfaces that redirect incident sounds into a wide,

diffuse field, where the directionality of the resulting sound is controlled by the shape and design of the diffusing device. While commonly used along rear walls (to create a sense that the listener is hearing sounds in a much larger space), diffusion materials are also useful on side walls, ceilings and occasionally as freestanding units that can be moved to various locations within the studio, depending on acoustical needs.

In 1984, RPG Diffusor Systems of Largo, Md., launched the QRD™ Diffusor, the first broad-bandwidth, reflection phase grating RPG™ sound diffuser. The single-dimension RPG consists of a computer-designed series of wells of equal width but differing depths, separated by thin dividers. When the depths are based on quadratic residue number theory sequences, the diffuser is called a QRD, which back-scatters the plane wave into a hemi-disk that can be directed by orienting the QRD or the source. The Abffusor™ is an absorption

—CONTINUED ON PAGE 46

Fig. 1: This lightweight disperser can be hung along studio walls to reduce reflections.



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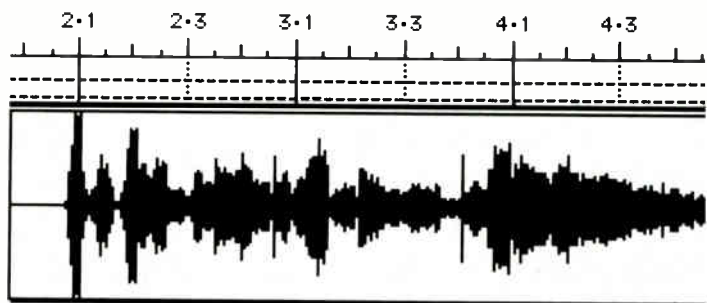
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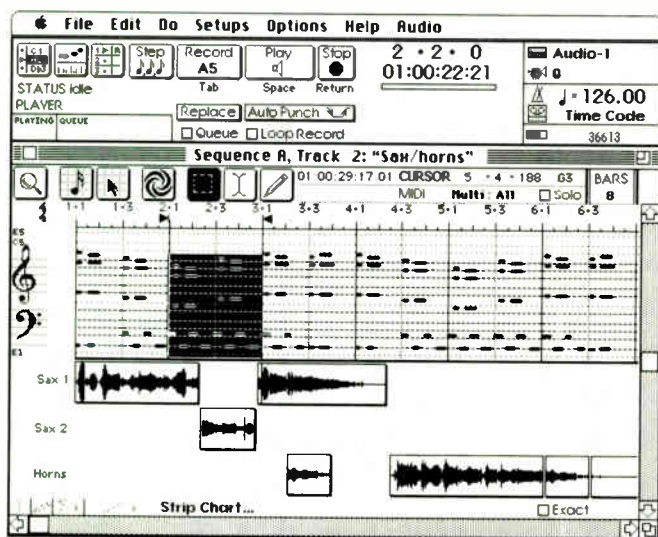
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Opcode's Vision sequencing program for the Macintosh was voted "Best Music Software Innovation of the Year" by the readers of Keyboard Magazine. Wait'll they check this out. Studio Vision combines all the features of Vision with the ability to record CD-quality audio direct to disk along with your MIDI data. Studio Vision works in conjunction with Digidesign's Sound Tools Digital Recording System and runs on any Macintosh II series computer or the SE/30.



Studio Vision has non-destructive editing of the 16bit digital

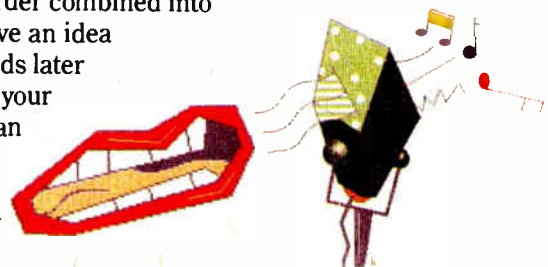


The control bar and graphic editing screen of Studio Vision.

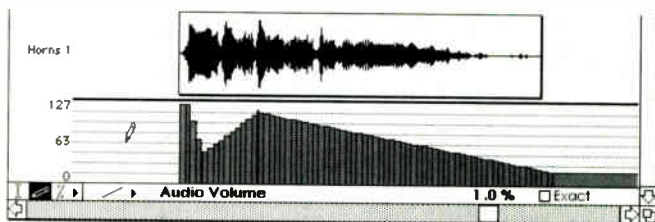
Using Studio Vision and Sound Tools, you can play back two mono digital audio channels simultaneously — with the ability to record as much audio as your hard disk space allows. The program incorporates the speed and convenience of non-destructive editing of the digital audio right along with the MIDI — use commands such as cut, copy, paste, clear, merge, and strip silence. Studio Vision includes SMPTE synchronization and full automated mixing of the digital audio tracks with pan and volume control. Add Digidesign's DAT I/O digital interface for compatibility with most professional digital audio tape recorders. For a simpler setup, Studio Vision also works in conjunction with Digidesign's Audiomedia card. The power of Studio Vision with either hardware system eliminates most multitrack syncing situations when combining MIDI and "live" tracks.

Record Vocals Too!

Studio Vision is the future of computer music recording. It's not just for MIDI keyboards, it's for any "live" instrument — guitar, saxophone, or vocals! Recording artist Thomas Dolby says: "You've got the best sequencer and the best recorder combined into one... you have an idea and ten seconds later you hear it... your creativity as an artist is not trampled on by technology slowing you down."

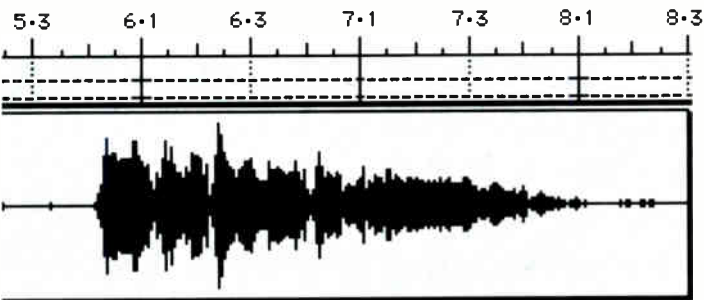


Use your standard MIDI instruments to record "basic tracks" like drums, bass, and keyboards. Then use the digital audio tracks to record the guitar, vocals or sax solo. Record a few takes of the sax solo and cut and paste from each of them to get the perfect take. Record one great chorus and paste it at each chorus in the song. Merge and offset background vocals for richness. Studio Vision's extraordinary flexibility allows you to record separate takes of digital audio onto any number of tracks.



Automated mixing of volume and pan in Studio Vision.

Voice to Your Vision



audio channels, plus all the editing commands in Vision!

Studio Vision dynamically allocates them onto the two playback channels. Now you've got your whole song on the Mac—from instruments to vocals.

And Studio Vision is ready for the next steps in technology: as the Macintosh and DSP (Digital Signal Processing) hardware get faster, Studio Vision will play back more than two channels at once.

Post Production

For post production, Studio Vision combines MIDI sequencing with the ability to record "voice overs" integrated with the music. Using SMPTE sync you can immediately check audio and video, and perform intricate audio edits instantaneously. Cut out a cough or noise here, swap sentences there, and adjust the music to fit the contour of the dialog all on the same screen. Isn't it nice to use just one computer keyboard?

Audition sound effects stored on hard disk before opening them, choose the one you want and place it on a specific SMPTE number, then lock up to video. Convenient.

Track A1: "Sound EFH"					
▶	3	3-112	01:00:25:06.14		
◀	11	3-58	01:00:40:11.57		
	4	1-0	01:00:26:01.33	4 Events	
•	1	2-237	01:00:21:01.27	Gun Shot	8 1
•	1	4-128	01:00:21:26.53	Door Slam	8 3
•	3	2-412	01:00:25:00.66	Car By 1	8 1
•	3	3-112	01:00:25:06.14	Tires scrch 3	8 2

List editing with SMPTE times of digital audio sound effects.

What Price Perfection?

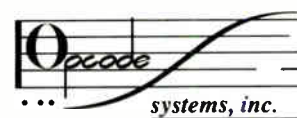
You may be thinking this is awesome—but how much? With a Macintosh II (or SE/30), Opcode's Studio 3 (or any MIDI interface), Digidesign's Sound Tools or Audiomedia, and a hard disk, you're up and running with Studio Vision. And for an integrated MIDI setup, Studio Vision works closely with Galaxy, Opcode's universal librarian.

So if you've been waiting for that really big breakthrough in music technology, or if you're still using that same old MIDI sequencer synced to tape—think smart and go to your local Opcode dealer and hear how Opcode has brought voice to the Apple Macintosh with Studio Vision. Call Opcode for a free brochure and the name of your nearest dealer.

Studio Vision™

Specs

- Full MIDI sequencing capability with graphic and list editing
- 16bit 44.1Khz direct-to-disk recording (mono: 5 megabytes per minute)
- Playback of two digital audio channels
- Recording of digital audio limited only by hard disk space
- Non-destructive editing of digital audio
- Simultaneous integrated editing of MIDI and digital audio
- Full automated mixing of digital audio and MIDI tracks
- Compatible with all digital audio formats
- Digidesign Sound Tools or Audiomedia owners need only purchase Studio Vision
- SMPTE synchronization (except with the Audiomedia card)
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—FROM PAGE 38, ACOUSTICAL TREATMENTS

the ear only needs a little encouragement to think it's in a normal environment.

The ceiling is another matter and needs to be almost entirely dead, because it is almost never high enough to establish a decent modes structure. The ceiling also presents the largest area available for serious treatment, especially since it can be totally absorbent without making a room sound dead. Short, yes. Dead, no. Unless a ceiling is extremely low, the ear ignores it, preferring to take its cues horizontally.

It is critical that the ceiling treatment be acoustically flat in its absorption. Given an ordinary grid hung 16 inches below the structural ceiling, flat response can be accomplished with 1.5-inch Fiberglas ceiling panels or thinner panels and a Fiberglas batt overlay. Check manufacturer's literature for exact specifications, as the low-end absorption of the ceiling must extend far enough into the bass range to avoid the common fault of acoustical treatment: soaking out the top end of the room while leaving the low end live.

The need for flat low-end response applies to all room treatment unless the studio has big windows or its walls are so flimsy as to transmit or absorb bass by vibrating to it. Even so, bass attenuation will seldom exceed 30%, leaving 70% to be handled by other means. While various types of bass absorbing devices can be built or purchased, many are inconsistent in operation and inefficient except in corners. Further, it can be difficult to determine the number and size required. In the long run, it's more practical (and cheaper) to install the general treatment in such a way as to absorb all frequencies uniformly.

Controlling high-frequency reflections is easy, but bass absorption is largely a matter of absorber depth, and it takes considerable thickness to get flat down to 60 Hz. Hung ceilings manage this with thin panels and a 16-inch space between the panels and real ceiling, but a wall-mounted absorber needs a minimum depth of six inches for Fiberglas #703 board, and a foot for glass wool.

Don't use thin treatment. Carpeting and drapes absorb 2% to 14% of bass while soaking out 60% to 70% of the top end, yielding a room with no presence and extreme boominess. Bad for playing, worse for recording. Ironically, both products cost far more

than proper acoustical materials and are not necessarily more attractive. By and large, Fiberglas in one form or another is probably the most practical treatment available.

With the type and location of studio treatment in hand, we can finally address the question of how much absorption is needed. In my experience, voice Dc has proved to be a figure of merit for assessing isolation in properly treated rooms.

Designing for isolation is both simpler and more difficult than it first appears. The simple part is very simple indeed, as voice Dc (and, therefore, acoustical isolation) turns out to be a

function of the amount of absorption in a room regardless of room size. The absorption required for 26 dB of acoustical loss at 20 feet (a voice Dc of 11.5 feet) is about 2,700 Sabins. Sounds easy.

If the practice were as straightforward as the theory, one could stuff 2,700 square feet of Fiberglas in a studio and open for business without further ado. Unfortunately, what's wanted is 2,700 Sabins of absorption, and the actual amount of treatment for that figure can vary from less than 1,500 square feet to just over 2,500 feet, depending on the size of the room. First bear in the woods.

DIGITAL PROOF!

The demands of digital monitoring have driven many "old standby" coaxial speakers to bits. Instead of singing the blues, more and more studios are replacing their blues with Gauss coaxials.

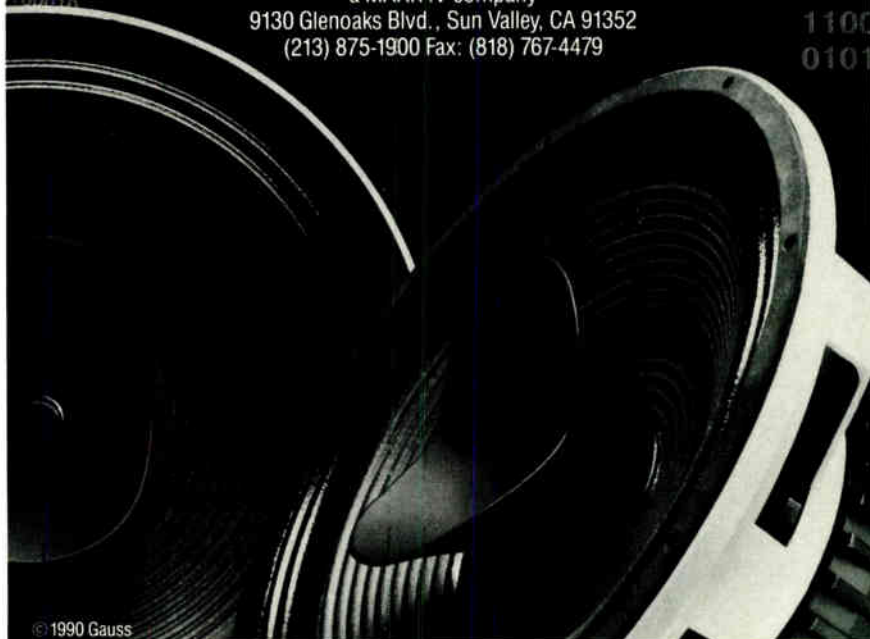
The Gauss coaxials were designed neutral so they wouldn't color the music. The cosh horn and time coherent design eliminate the need for time correction and greatly reduce fatigue. The carefully matched drivers require little or no EQ, provide the widest possible frequency response and 200 watts of power handling (400 peak) without self-destructing.

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The reason for a difference between actual treatment and effective absorption is that the standard Sabin formula is linear, and absorption in highly treated rooms is not. In fact, when 80% of the wall surface absorbs at 1 Sabin per square foot, the effective absorption of the treatment is doubled. There is a formula for this effect (Norris Eyring), which is close enough for jazz, but since it employs natural logarithms, $NEa=LN(1-a)$, it is mind-numbing to use unless computerized.

Another bear in this overpopulated acoustical forest is the difficulty of accurately assigning absorption values to various materials already in the room. Most standard materials can be looked up in tables printed for the purpose, but there are always a few things that aren't on the table. Additionally, it's easy to mistake one kind of acoustical material for another and come up with significant errors in calculations.

Calculations are a pain, anyway; so it's best to circumvent the bears by measuring the room. There are several thoroughly scientific ways to do this as well as any number of manufacturers eager to sell equipment for the purpose. But as a practical matter, such measurements are of little or no use to

the studio owner. Cheap equipment yields cheap results, and the data gleaned from upscale equipment requires expert (and costly) interpretation.

A Simple Method of Room Measurement

Following the KISS (keep it simple, stupid) rule, I prefer to measure a room by determining its voice Dc. The equipment costs nothing, it takes about two minutes, and the results are more than accurate enough for real-world use. Better still, being a simple-minded test, it reports simple-minded figures. No interpretation, no ambiguity. Best of all, the primary measurement is at about 100 Hz, where improper treatment causes the majority of isolation problems.

Measuring a voice Dc is child's play, provided one keeps in mind that the purpose is to determine the global characteristics of the space. Toward that end, it is essential to make the measurement in the acoustical center of the room. Given normal treatment, that will be in the physical center. In cases where the absorption is considerably greater on one wall than another, the acoustical center will have to

be determined.

Using the incredibly sensitive acoustical instruments found on either side of the human head, one sidesteps away from one wall toward another until the reflected sound from the two are equal in each ear. If the reader has not done this in the past, it may be useful to calibrate one's ears to wall sound by stepping up to a live wall and varying the wall to head distance from a couple of feet to a couple of inches until the wall sound is firmly fixed in mind. It is usually perceived as a kind of pressure on the ear, and will reliably inform the listener of his or her position in a space. No sound other than the room's random noise is needed, and once you know the sound of a close wall, you will find that you can walk to within a foot or so of any live wall with eyes closed. This is simply a case of developing a normal human ability into a skill. The blind do it all the time. So do the rest of us, but unconsciously.

Having determined the center of the room, the Dc is measured by two people more or less astride it at a distance of 15 to 20 feet. The talker walks toward the listener droning a "one, one, one," as the listener waits for the sound of the talker's voice to suddenly

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get louder. The process works both ways, with the talker's voice abruptly going constant volume as the sound retreats. My experience indicates that toward is easier to hear than away, particularly in the learning stage. It is also easier to hear if the talker walks briskly at first. Slow down for greater accuracy once the listener has the sound of the transition in mind. The pair can also check the room's frequency response by measuring the Dc using the word "six," leaning on the s and x and suppressing the vowel, so that most of the sound is at 3 to 5 kHz. This is a pretty rough test, but if the Dc's are wildly disparate, they indicate a room with more absorption in the midrange than at the low end.

While Dc is a square root function of a room's global characteristics and, therefore, a rather short ruler, the breakover is sufficiently abrupt to make measurements to within a couple of inches quick, easy and repeatable by any number of talker/listener pairs. The only conditions under which this doesn't work properly are rooms in which the Dc is greater than the wall spacing, and huge rooms, which appear to divide themselves into several acoustical areas due to extreme losses between one wall and another. In the first instance, the room will be too small to be of use; in the second, the room volume will be well in excess of 1 million cubic feet.

Once the Dc of the room has been measured, some room modifications may seem in order. If so, a few cautionary notes.

First, the Dc varies as the square root of the room absorption, so doubling the effective treatment and thereby halving the room reverberation time will extend the Dc to only 1.4 times its previous figure. This presents no problem in a medium to large room, but good isolation in a 30x20x10-foot studio would require some 1,550 square feet of fuzz scattered over only 2,400 feet. Even with the floor thickly carpeted, leaving a reflective 20x10-foot control room wall would require a 75% treatment of the other walls and result in a reverberation time of just over 1/10 second. Some rooms are simply too small to treat for live studio work, as they get too dead. A 6,000-cubic-foot room is probably the workable minimum.

Second, a big studio is rarely allowed more than about one second of reverberation time, which can result in

—CONTINUED ON PAGE 46



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a voice Dc approaching 20 feet. Obviously, such a room needs no help in isolation, and it is a general rule in acoustics that big rooms are easy. It's the small ones that give you fits.

Third, professional engineers commonly do good work under bad conditions. It's not impossible to record in a room with poor isolation, just damn difficult. The point of proper treatment is that it allows you to get decent sound with any reasonable setup, while eliminating time lost in fooling around trying to correct the room's faults.

—FROM PAGE 38, *ACOUSTICAL MATERIALS*

phase grating that combines both diffusive and absorptive properties into a broad-bandwidth (as low as 100 Hz) attenuator that is said to be equally effective at all angles of incidence. RPG's Triffusor™ is a rotatable triangular column (similar to the theatrical periaktoi used in ancient Greece) that provides absorptive, reflective and QRD diffusive sides, allowing the changing of room acoustics to suit nearly any purpose. The Diffractional™ is a full-spectrum diffuser, built within a larger diffuser, that combines both LF and mid-high frequency diffusion into one hybrid structure, functioning in a similar manner as a multi-way loudspeaker. The entire RPG line is available in a wide range of sizes, finishes and materials, including custom designs.

Just unveiled by RPG is the Omniffusor™, the first patented 2-dimensional, broad-bandwidth QRD diffuser, which uniformly scatters incoming sound from any direction into a hemisphere. The Omniffusor is available in 2x2-foot and 2x4-foot panels (in 4- or 8-inch depths) for clustering on walls or fitting into standard suspended ceiling grids. The units can be ordered in lacquered or painted woods or in translucent acrylics for simultaneous light and sound diffusion.

The Art Diffuser (from Systems Development Group of Poolesville, Md.) is a broadband acoustic diffuser sold in 15-inch squares or 15x30-inch rectangles. The pieces can be interlocked and rotated to provide diffusion along horizontal and vertical planes. Poplar construction is standard, and a variety of wood stocks are available.

Absorbers can appear in just about any form, but most commonly as acoustical foam panels. These can vary widely in size, shape, color, fire rating

Fourth, none of the figures given are engraved in stone. A 12-foot Dc is better than 8, and less desirable than 16, but acoustics are inherently inexact, and there is no sharp point at which rooms switch from bad to good; they glide from exasperating to no-problem, with the latter occurring at a Dc of about 12 feet for the bulk of studio work.

A few minutes spent measuring the real-world characteristics of a recording studio may reveal unnecessarily poor isolation, while some of the

(an important consideration when such materials are used in businesses and public places) and absorption characteristics. The realities of physics dictate the usefulness of these products in any given situation, but absorbent foam panels are most effective at attenuating mid and high frequencies, and are often used to eliminate unwanted reflections and reverberation, such as increasing intelligibility in vocal booths.

A common misconception is that there is some wonder foam or fabric that can soundproof a room—sorry, but this involves increasing the sound transmission class (STC) of the wall itself, which often requires techniques such as floating floors and double-wall construction. Acoustician Jeff Cooper provides a thorough examination of soundproofing methods in his excellent text, *Building a Recording Studio*, available through technical bookstores and the Mix Bookshelf. It's well worth checking out.

Alpha Audio (Richmond, Va.) distributes the Azonic line of acoustic foam products: Azonic Pyramids are 24x24-inch sheets (in 2-, 3- or 4-inch thickness); the AZ series are 48x48-inch sheets (2-, 3- and 4-inch depths); and AZ-Max are 12x12-inch anechoic-style wedges in 6- or 8-inch depths for low-frequency absorption chores. The Cutting Wedge (from Thomas Chaffee Music Associates, Beachwood, N.J.) are 12x12-inch foam tiles available in 2-, 3-, 4-, or 6-inch depths. Acoustafoam from FM Tubecraft (Holbrook, N.Y.) are 54x54-inch foam sheets in 2- or 3-inch depths. Illbruck (Minneapolis, Minn.) manufactures Sonex acoustical products, available in thicknesses ranging from 1 to 6 inches, in sheets from 12x12-inches to 48x48-inches, in numerous colors. Sonex also offers a variety of absorptive ceiling systems in 2x2-foot sheets that can be

treatment methods suggested here may improve its general usefulness. Since the measurement involves no expense, and the treatment is designed to make experimentation easy, these techniques offer a practical way for a studio to confirm or optimize its recording room. ■

Malcolm Chisholm, a resident of Chicago, has worked as an audio engineer, acoustician and consultant for the past 30 years.

fitted into standard 2x4 ceiling grids with simple cross-tee adapters. Markferfoam™ from Markertek Video Supply (Saugerties, N.Y.) are 54x54-inch foam sheets in 2- or 3-inch depths. Sound Absorbent Materials (Westwood, N.J.) markets Wedge Tiles™, available in 16x16-inch squares in 2-, 3- and 4-inch thicknesses.

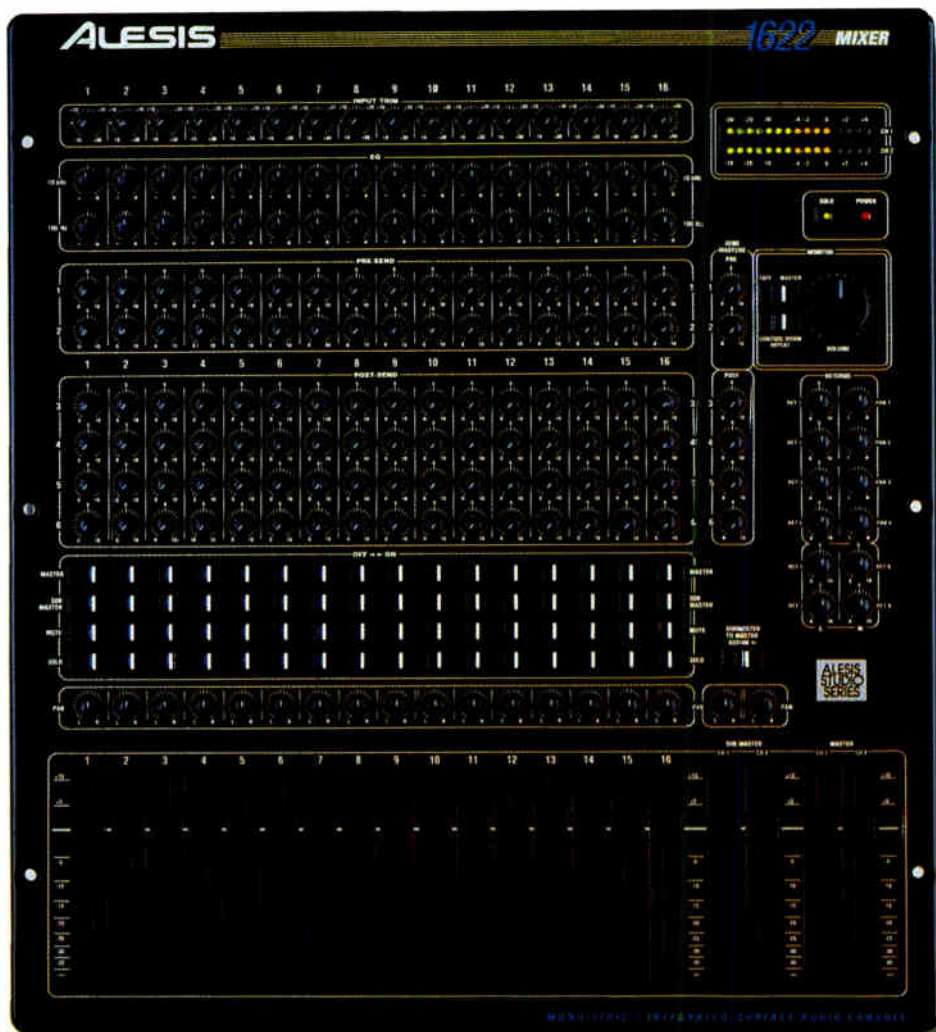
The Pelonis Edge (from Pro-Tech Marketing, Newport Beach, Calif.) is a large, wedge-shaped, broadband absorber/reflector designed for ceiling and wall mounting. The device uses multiple internal chambers and is said to provide reflection characteristics at high frequencies and trapping/absorption at lower frequencies.

Syntony Acoustic Systems of Edmonton, Alberta, markets the Systems I, II and III, a series of quadratic residue diffusion panels with up to 43 wells in a vertical formation. The company's Column Bass Attenuators™ are stackable LF absorbers, available in 14-inch diameters in 2-, 3- and 6-foot heights.

Acoustic Sciences Corporation of Eugene, Ore., is probably best known for its Tube Traps™, which offer midrange diffusion with low-frequency absorption. Tube Traps can be placed on floors or wall- or ceiling-mounted, and are available in a wide range of diameters and lengths, including half-round, quarter-round and third-round models to suit any permanent installation. New from ASC is the Studio Trap™, a tripod-mounted sound baffle with easy height and rotational adjustment. Based on a standard, vocal-range 9-inch Tube Trap, the Studio Trap can be used alone or grouped to provide freestanding isolation, gobos behind instruments in the studio, or as a temporary method of changing control room acoustics.

—George Petersen

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Control Room Monitoring

The Truth, the Whole Truth and Nothing but the Truth

Monitoring perfection involves much more than loudspeakers. It depends upon synergy, the combined, cooperative action of various stimuli. Control room stimuli range from the way access to outboard devices is provided, to the furniture and equipment occupying the space, to the way that the audio signal travels from one end of the chain to the other, passing through power amps, cable, speakers and the acoustic environment itself. The synergy must result in truth.

“The monitoring system is probably the most important purchase of the control room, because that’s how your final material will sound,” says John Loeper of Milwaukee’s AudioLine. Other leading studio designers and installers, George Augspurger, Russ Berger, Chips Davis, Jack Edwards, Tom Hidley, Ron Montgomery, Neil Shaw, Jim Goode, Randy Sparks and John Storyk agree, each in his own way.

by Linda Jacobson



The sound of the final material depends on the monitoring environment, and today's monitoring environment must be versatile so the studio can maximize profits. That means handling post-production and sound effects, as well as tracking and mixing music. Considering the laws of physics and the cost of real estate, it's hard to build a control room that can mix full-range music and is large enough to accommodate producers, engineers and artists—and develop low frequencies and a full soundwave in the bottom octaves.

The room's acoustical impact on the monitor system's performance plays a vital role. "You must look at the monitor and the room design as a *unit*," says Tom Hidley, who lives in Montreux, Switzerland, and works internationally (current projects include Paris' Studio Du Parc and Passe Cinema, a cabaret for Sydney's Parklane Hotel, and facilities in Capri, Prague, Toronto and Moscow). He adds, "The monitor is the source of sound, and

Above: Video sweetening duties often require a large control room, such as this recent example at Compact Video, designed by Jim Goode and Neil Shaw of Veneklasen & Associates; Interior design by Cole Martinez Curtis & Associates.

Below: Designed by Randy Sparks, Edit B at Tandem Computers features soffited, vibration-isolated JBL 4425 BiRadial monitors, offering wide dispersion over both the front and rear listening areas.

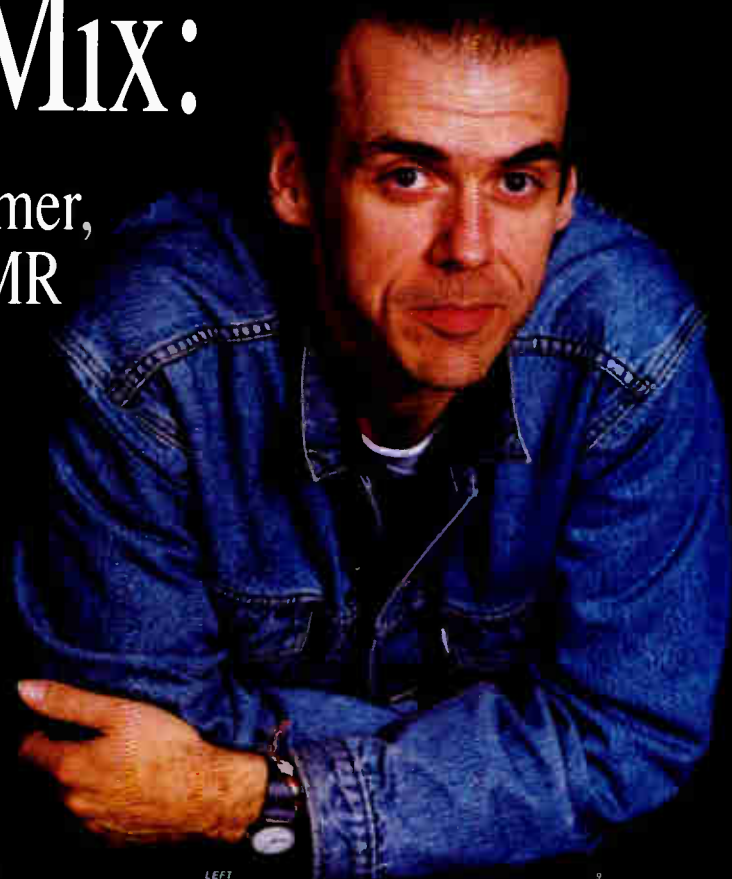


the room is the receiver and handler of sound. They're married, and if they're not compatible you'll have strife, chaos, stress and distortion. If they are compatible, you'll have a harmonious relationship. A good monitor in a poorly designed room cannot be honest and natural-sounding. A poor monitor in a pure, neutral control room will sound unmusical, because it is in an honest room."

Another consideration, the role of program material, is brought up by George Augspurger, head of the L.A.-based Perception Inc. "Nowadays, you may think you're doing a film mix, but if it's successful it's going to be on TV, and if the music is decent it will be released as an album. Now, in film mixing, you have a mono mix or a 3-channel mix with a true mono center. But music recording is still 2-channel stereo, maybe plus surround, where we have this phantom center to contend with; there are things about the phantom center that most people never thought about. This

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The Monitoring Environment WHO NEEDS IT?

A lot of people in the audio business get upset when the subject of improving their monitoring environment comes up. "My monitoring environment? Forget it, I don't have one and I don't want one." But every control room, programming room, mix room and listening room of any kind *does* have a unique listening environment. Near-field speakers are widely used in mix rooms and studios by those trying to eliminate all room acoustical effects. However, those popular little bookshelf speakers aren't really "near-field reference monitors." They're just little speakers that people listen to up close. A true near-field has a spectral balance and axial pattern designed for a 2- to 3-foot range. A true "monitor" produces an accurate signal that is free of coloration. These conditions are not met in a typical small consumer speaker, which sounds quite different (though not necessarily more realistic) up close.

The conventional wisdom about near-fields is they eliminate all room acoustics. There is no question that the practice of moving speakers closer to the listener (and therefore reducing signal level while maintaining loudness) reduces the effect of a room. But it does not eliminate it. Measure the response of a room with different speakers at different levels and you will see the signature of that room in all the results. The effect is greatest at lower frequencies, particularly in the "modal" region: the lower-frequency limit of the room where there are few "normal" modes, commonly called "standing waves."

Near-field speakers can also create high-frequency problems when they are mounted on a console with a low bridge; the nearly horizontal surface will cause comb-filtering in the mid- to high-frequency bands. The result is a hard, edgy sound and poor imaging; slight changes in sound quality is also fatiguing and frustrating to work with.

Fig. 1 is an energy time curve of a popular small monitor sitting on

a console bridge. The measurement was made at a spot normally occupied by the engineer's left ear. The direct sound from the speaker is the first signal at the left. Note that it is followed shortly—approximately one millisecond later—by a strong reflection that is only 12 or 13 dB lower than the direct sound. Anyone who has played with digital delays of such a short order knows that they produce extreme coloration. But that effect is just what we are getting from the "room effect" that this near-field was supposed to eliminate.

Now look at the transfer function (frequency response) of that same impulse in Fig. 2. The region

—CONTINUED ON PAGE 54

—FROM PAGE 49, DESIGNERS & MONITORING situation further solidifies the need for extremely wide dynamic range.

"In small rooms—and acoustically, a 20 by 30 room is small—you cannot separate the loudspeaker from the room in terms of low-frequency performance; they're both contributing equally," Augspurger adds. "I'll play around with reflective and absorptive surfaces to control the first-order reflections in the room. Using a speaker with a different directional pattern, you may find the stereo image has changed slightly, and you can bring it into focus by playing around with room surfaces. Surfaces immediately adjacent to the speaker may work better if, for example, one kind of speaker gives tighter bass response when the area

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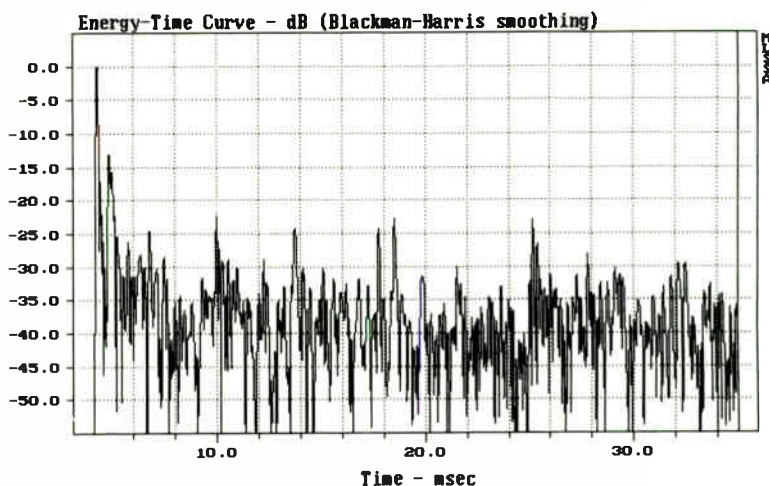
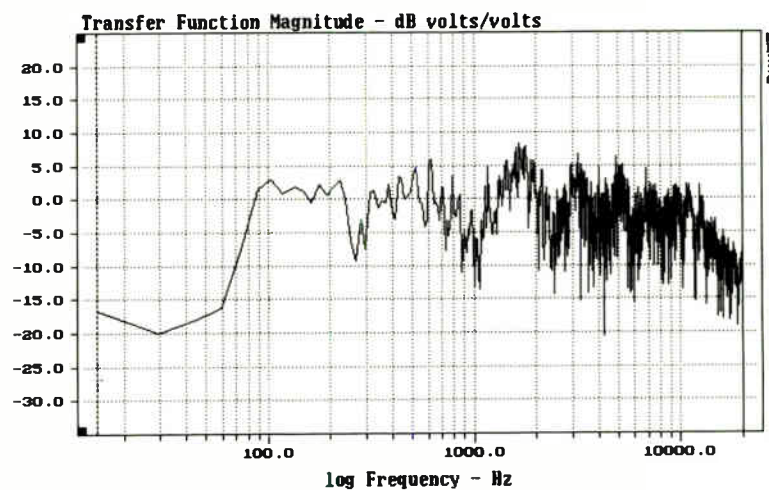
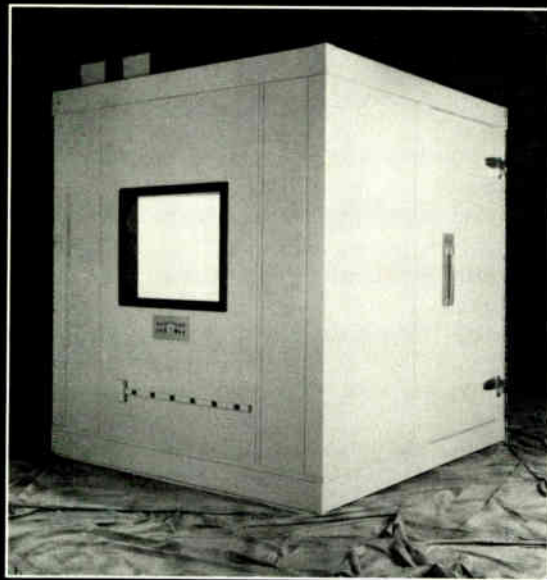


FIGURE 1



CURSOR: y = -13.4153 x = 20004.7347 (1352)

FIGURE 2



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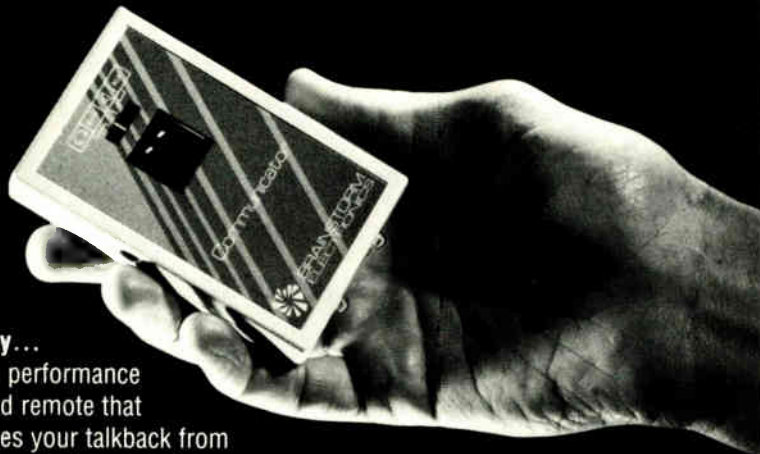
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right next to it is trapped. Another speaker may work best when flushed in solidly."

Russ Berger heads the Dallas-based Russ Berger Design Group, whose current projects include audio and video post houses for ABC-TV. He states, "If the program material's transient content is high and the electronic systems are designed to pass these signals unchecked, the monitor speaker and amplifier system must withstand the beating. Failing to provide adequate dynamic capabilities results in frequent failure of drivers, increased downtime and soaring maintenance costs."

Storyk and the Multi-Tier Concept

Some of studio designer John Storyk's recent projects include Margarita Mix and Ad Music in L.A.; Nashville's Soundshop Studio A; and Rebo Video, a video post house in NYC. He observes, "Machines are going out of the room, and the tier effect is getting very popular. The reason is that everybody's getting involved with video, so the rooms are feeling more like video production spaces.

"We have found this to be true in our last half-dozen projects. A lot of my clients are in advertising, but even my music rooms want second and third rows in the back. The big word there is more complex ergonomics. People who were once concerned only with horizontal dispersion—the x-axis—now need the y-axis to be dealt with—front to back. The only way you can do that is through dispersion. In two of our projects we are using very low- or full-frequency dispersion techniques."

To allow the person in that third tier to hear an accurate mix, Storyk says you have to have a deeper reflection-free zone. "You need monitors with larger Q's in the high frequencies. [Today's rooms are] brighter with larger reverb times. The good news is they feel better; the bad news is that you have to be careful about your reflections so they don't pile up on each other. The result is a lot of diffusion, so you must go down in frequency on the diffusion with deeper rear-wall treatments."

—Tom Kenny

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World Radio History

e have been involved in several painful renovations of studios to swap out monitor speakers, requiring long downtime periods and many thousands of dollars to rework the front walls. As a former studio owner, I find this unacceptable! We've developed several monitor speaker-mounting techniques that effectively isolate the speaker from the shell to minimize interaction, provide a strong mechanical ground to structure for optimum low-frequency support, and let the speaker be exchanged within minutes for another type of speaker. This approach has minimum impact on the studio's upgrade budget, and it lets the studio stay abreast of the latest monitor technology and cater to the whims of clients." —Russ Berger, Russ Berger Design Group

Hidley points to the brain as a signal processor when discussing types of speakers to use: "An orchestra or band is composed of human beings grouped together with musical instruments. By the time you hear what comes off the stage, you hear the sum and substance of the orchestral blend itself, coupled to the stage's acoustical environment, coupled to the airborne cubic volume of the room you're listening in. You don't hear stereophonically; you hear monaurally. You perceive depth and perception in the vertical image and horizontal image, which, for lack of a better word, we call 'stereo.' But in real music you don't have a source left and right, other than musicians standing left and right. You don't have speakers involved.

"If loudspeaker design was such that you could have *one* entity, such as an electrostatic that went from low frequency to high frequency in an even, honest manner, it would be the most electronic-free way of reproducing signal," Hidley continues. "But there are limitations to what the single emitter like an electrostatic can do, in terms of SPL, transients at high pressures and so forth. In principle, I would rather have a single-emitter loudspeaker, but failing that, I would have a two-way loudspeaker."

The Expanding Control Room

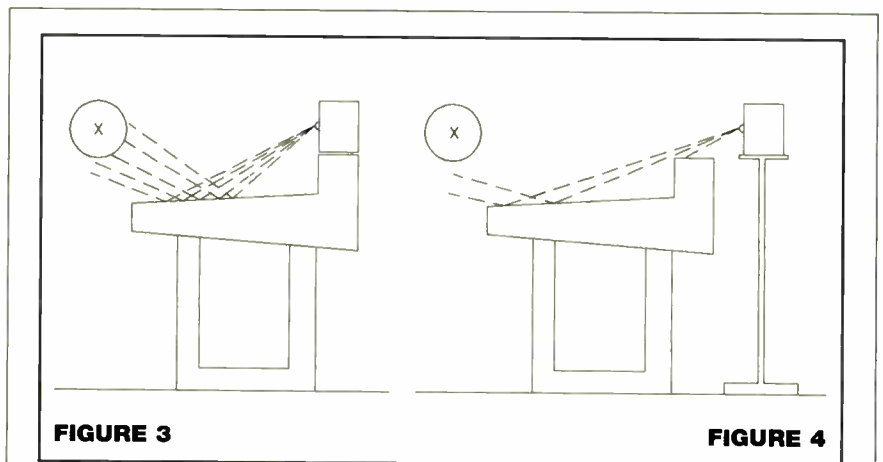
The more people working in the control room, the larger the room must be; the larger the room, the harder it is to provide adequate control of the acoustical environment to support the monitor speakers, as Russ Berger points out. Today's control room is an all-purpose recording/mixing environment, as opposed to Augspurger's "cockpit on the starship" of ten years ago, where everything in the room was focused to sound good at that particular listening location.

Chips Davis, of San Francisco's Paoletti/Lewitz/Associates, lists recent projects: Western Images in S.F., KFOG/KNBR radio station in S.F., Pirate Radio, L.A., Paradise Studios in the Seattle area and Sacramento's KBIE-TV

production studio. Davis notes, "The monitoring environment must accommodate people who final-mix projects they put together on personal MIDI/computer/keyboard setups, and that person as well as the engineer must be able to monitor. In a full-range mixing environment with soffit-mounted speakers, people want to hear music with the dynamics and the range planned for it in production.

That lets them judge the performance of the musical piece, and performance is what helps the feel of the music get across on radio or when it's played back by other people. If you are using big, soffit-mounted speakers, control room design and speakers become even more critical."

Jack Edwards designed Hot Tin Roof, a new multipurpose, music-oriented facility in L.A. Owned by former



—FROM PAGE 51, MONITORING.

from approximately 900 Hz to 1,500 Hz is very ragged and at a reduced level. This is the result of the numerous cancellation dips (comb filters) caused by the reflected, delayed signal mixing with the direct signal. Place a sheet of sound-absorbent material (foam or fiberglass panel) on the surface of the console, and the problem goes away.

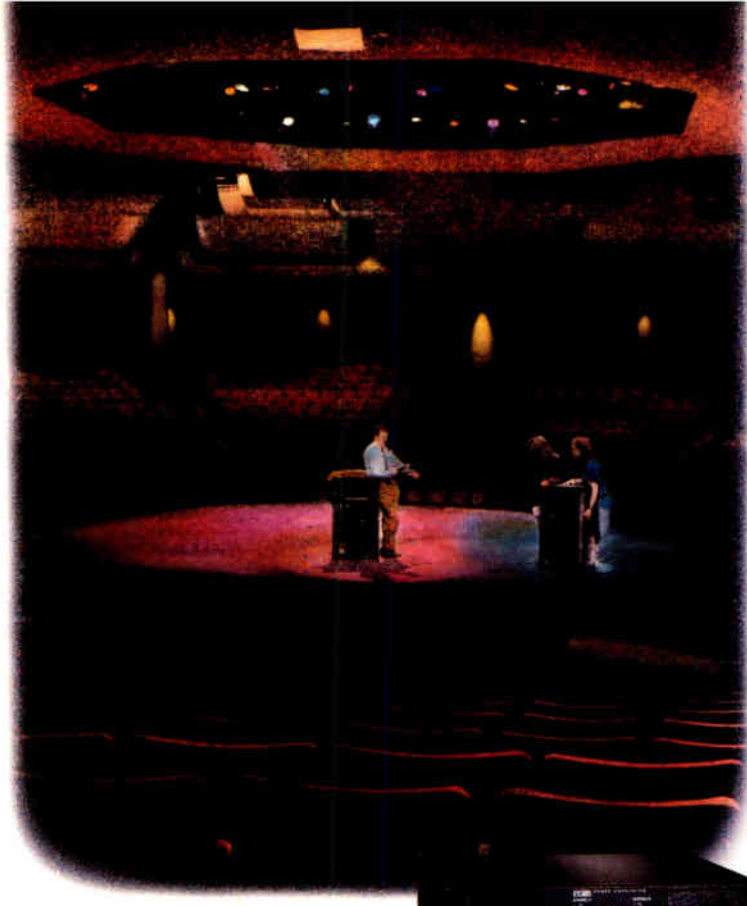
Unfortunately, a 2-inch thick panel covering the surface of a mixing console makes adjusting some controls a bit awkward. The preferred method is to locate the speakers so that early reflections are minimized, for instance, behind the console bridge. Fig. 3 shows a speaker sitting on a low bridge. A simple ray trace shows a clear reflection path from speaker to mixer's ear. Now look at Fig. 4, with the speaker mounted about a foot further back. The reflections

are now blocked by the bridge, which can be covered with absorptive material to prevent diffraction.

This simple modification can produce a big improvement in the smoothness of the monitor signal, and it's an easy fix that anyone can figure out for themselves. You can make a ray tracing from your own sketch or the console manufacturer's illustration. (Remember that at high frequencies, sound waves behave like light waves and are reflected from a surface at an angle equal to the angle of arrival.) So dig out that old tracing paper, dust off the triangle and scale, and let the laws of physics do their magic on your listening environment. ■

Vin Gizzi is a partner at Benchmark Associates/Downtown Design, a Manhattan-based architectural and acoustics design firm.

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PHOTO: GREG PUZA

Left: The listening environment has also become important at the retail level, such as in John Loeper's AudioLine in Chicago, where the demo rooms allow customers to evaluate products in a studio-like setting.

A&M mastering engineer Frank DeLuna, the studio was constructed inside the shell of an old, tin sheetmetal building. "For years we designed control rooms that were nominally 18-foot wide and maybe 16- to 18-foot deep," Edwards notes. "Now control rooms are a minimum of 22- to 30-foot deep, and that puts the console in a place

other than exact center, front to back. This creates a difficult listening environment because of phase cancellation and other things; it's probably the worst area in the room to listen to something.

"So you still maintain the room's bilateral symmetry. There is enough distance from the monitors to the

engineer's position to achieve that, because the width of the console is 12- to 14-foot deep. You have to place the console farther back in the room to create an acoustical 'window' at the console; this is the width of area in which, as you move across the expanse of control area, the signal does not fall off."

Other factors that figure into the systems approach to monitoring include: integration of video and film components and techniques, use of alternate reference or near-field monitors, and choice and interconnection of power amplifiers.

Adding Video and Film to the Picture

"In some TV audio rooms, the control room is really a production room about 20-foot deep by 30-foot wide," George Augspurger says. "It's strung out sideways with an audio mixing area in the middle. It's just the opposite of what

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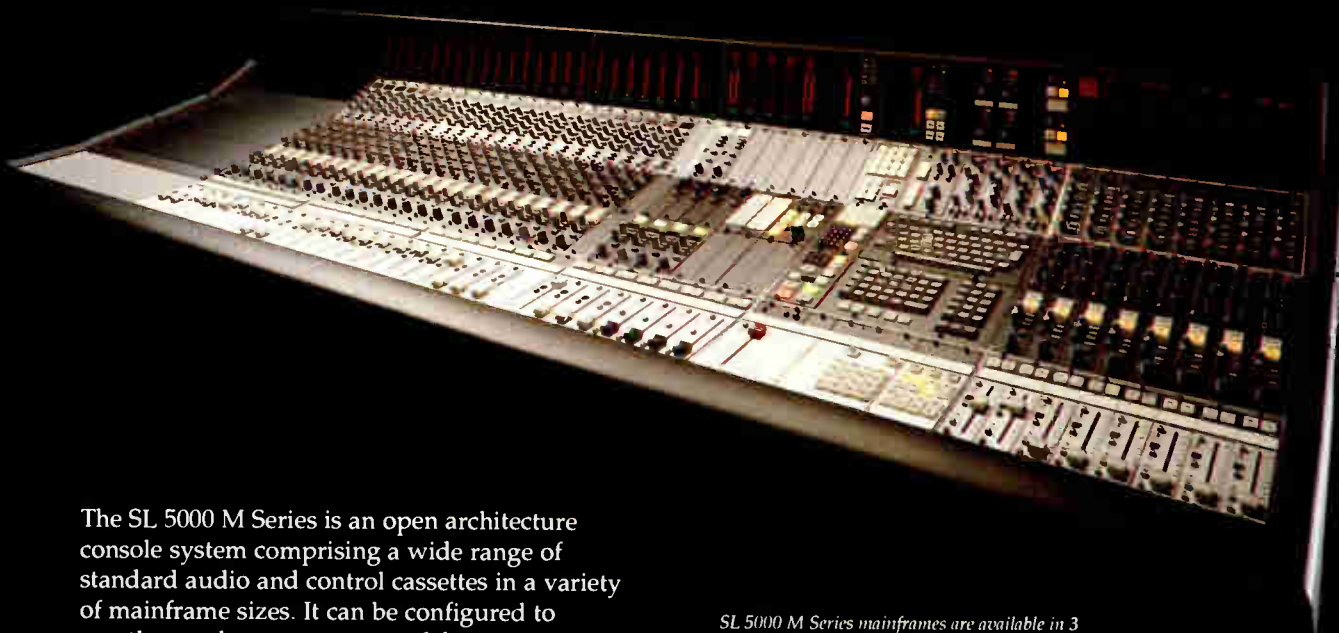
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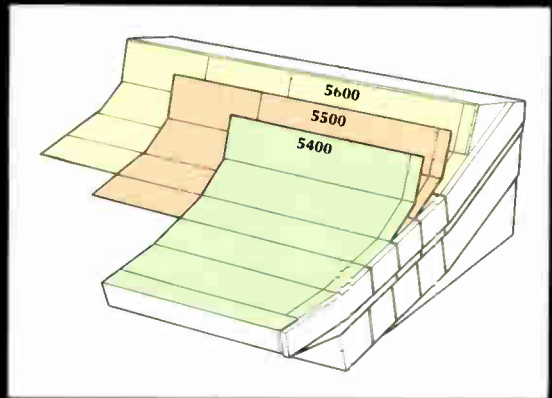
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we have been doing, such as the rooms I designed for Doppler [Atlanta] a few years ago, where there are three tiers of seats [in a room that's deeper than it is wide].

"The monitoring approach is one main set of loudspeakers and [a separate pair of] near-field monitors for the console position. The producer over on one side of the room will have near-fields plus a 'standard' local TV receiver, and announcers or Foley artists on the other side of room will have live microphones and their own little monitors. The big monitors have to be set up so everybody can at least hear them clearly. They're not all hearing exactly the same thing; they still have to switch between the big monitors and little monitors."

Neil Shaw and Jim Goode, who work primarily with TV and film clients, are senior associates with Paul S. Veneklasen & Associates of Santa Monica, Calif. They've designed audio production and control rooms for such clients as Compact Video, Glen Glenn, Paramount, Universal, MGM and all the networks. "We always thought that audio was important, we're just happy that people are becoming more cognizant of it," says Shaw.

Jim Goode adds, "Acoustically, we try to make control rooms neutral; what you're hearing is what's being recorded, and not what may be peculiar to the room. The acoustical environment should not color what's coming out of loudspeakers."

Shaw says, "We prefer linear, vertical arrays for the loudspeakers, with the woofer at the bottom and tweeter at the top, instead of scattered around the monitor at different angles. When these are properly installed, you get a line array with good horizontal location, and the vertical spacing does not impact the vertical imaging negatively, because your ears are mounted in a horizontal plane."

Randy Sparks, head of RLS Acoustics in San Francisco, just finished designing a broadcast television facility for Hewlett Packard. He also is working on large, corporate video production and conferencing facilities. "The video and broadcast communities are paying much more attention to audio. Most TV sets in the U.S. have built-in stereo reproduction, so you're seeing a big change in the way people mix for broadcast audio. People are doing both stereo and mono mixes, and we're starting to see rooms in the broadcast community that can mix for

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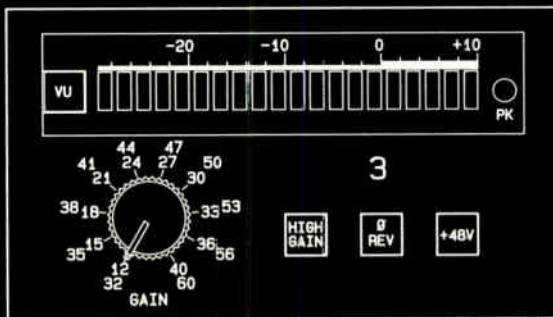
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I believe a larger room should have what I call 'diffusion zones.' When diffusion is coming from the back and side walls, by the time it gets back into the mixing position, the energy drops at any one point because of its spread from the diffusors. Zone diffusion fills this in; you have to diffuse earlier than the back wall. By diffusion between ten and 15 milliseconds as the first 'packet,' you hit an incredibly good stereo imaging side to side off the console, all the way along the console. When you spread this energy across, using diffusion zones, you get even frequency information and stereo distribution on- or off-axis of the mixing position. This helps our MIDI player hear the same thing the engineer hears. I implemented these practices in Paradise Studios in the Seattle area and at KBIE-TV production studio in Sacramento, using closer-in diffusion—within ten milliseconds in some cases—instead of back-wall diffusion, and it's working very well."

—Chips Davis, Paoletti Associates

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"Typically, a facility has low-end, cuts-only edit suites, rooms with 3/4-inch online, and high-end rooms with 1-inch or D2. So clients can feel confident that their program material translates well no matter where it heads, outside the facility *and* within it. We recommend they stick to one family of monitoring systems that are used throughout the industry. This way all the monitoring systems have a similar sound, because they reflect the particular design philosophy of a single

manufacturer.

"Shielding is critical," he adds, "so loudspeakers don't generate hum bars on the associated video monitors. But in a typical stereo monitoring setup, the video monitor is not placed adjacent to the audio monitors. Also, the typical video monitor has a high level of shielding and normally can reject any minimal flux field that might exist, as long as it's not right next to the audio monitor.

"For audio monitoring in the broadcast or video environment, we

use the same principles we use in audio control rooms: a proper, equilateral-triangle relationship between the monitors and the person monitoring, and a room that exhibits bilateral symmetry that *supports* the monitoring environment, not colors the sound you're trying to reproduce. The big thing we're doing now is designing edit suites that don't require monitor EQ."

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"An adequate cubic volume within the listening room is critical for accurate reproduction of low-end information. Appropriate ceiling height is closely tied in with the need for adequate volume.

"The distance from monitor speakers to the mix position affects the overall amplitude and the size of the listening area where accurate imaging can be judged.

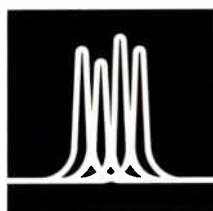
"You have to account for the not-so-subtle sonic results produced by various monitor/amp/cable systems.

"Unless addressed, console top speakers and video monitors may provide significant problems in achieving an accurate mixing environment throughout the room. More and more equipment is competing for the same limited space in front of and within arm's reach of the operators. Creative solutions must be found to allow these elements to coexist.

"Take care in the placement of the HVAC supply and return terminations. Air movement, temperature gradients, duct cavities and resonating construction can produce a wide range of problems that are blamed on the monitoring system.

"Finally, the mixing environment's geometry also has a significant impact on the sonic performance of the monitoring system. All the previous requirements must be made to work within known limitations of acceptable room shapes."

—LJ



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your problems," says Chips Davis. "It *minimizes* the problems, but you still have to deal with console and other equipment reflections. And you can't mix full-range music. The small speakers don't have the bottom octaves. Also, if something like a low E in the bass range is a natural frequency of the room, it tends to hang on and resonate. When you go to near-field, you still have that color, and it colors what you hear."

According to Jack Edwards, who has designed close to 300 rooms, including several at Capitol, Motown, A&M and the old RCA, "Near-field" usually means there is a very narrow

area where you can hear everything you want to hear intelligibly; if so, how can you have a single point at which you hear well when your console is 4-foot, 4-inches deep and 18-feet wide? Also, a great deal of control room work is done in mixdown and overdubs, and consistent with that, there is a lot of synthesizer work. You may want to go to near-field, but synthesizer work goes direct to the monitors and is recorded direct electronically, and that means the synthesizer area wants to be on-axis with the main monitor system. I don't think near-field monitoring is consistent with the size and the width of equipment at the console location or

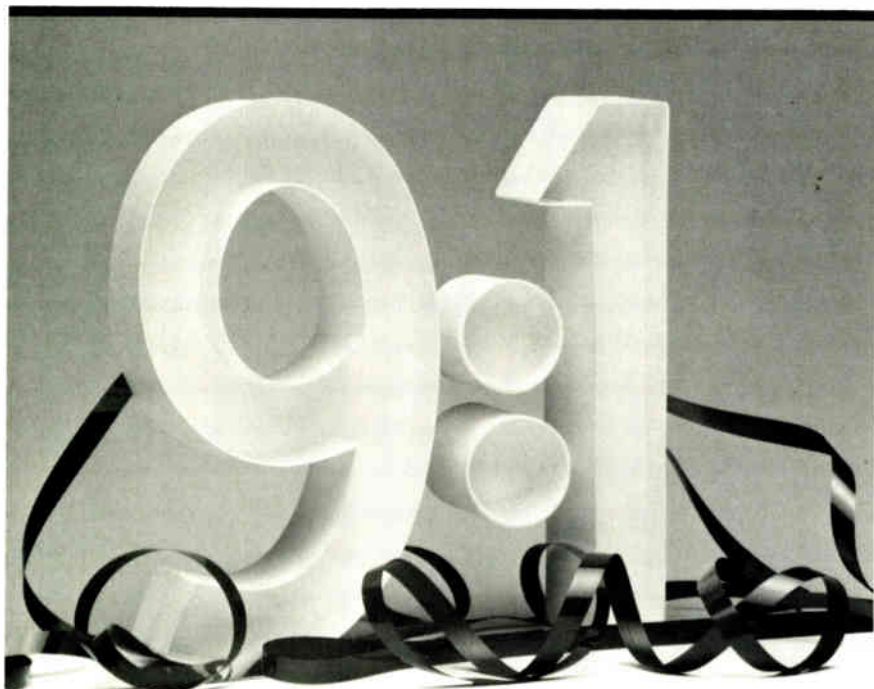
four to five feet back where you're doing synthesizer work, which usually happens in the exact center of the room.

"The advantage of near-field is you hear all the direct sound, so close to the monitors that the room itself does not have the chance to color the sound. As you get farther away from the near-fields, the room's acoustical nature starts to color them, and the signal starts to fall apart."

John Loeper adds, "The whole idea of near-fields is to get a focus on the sonic integrity and definition of the recorded sound, because you lose definition when listening through big monitors at 120dB SPL. In near-fields you're looking for *accuracy*. I've seen studios using a couple of pairs of near-fields, but using the Auratones has slacked off quite a bit, perhaps due to the increased sophistication and fidelity of the broadcast and reception media. Studios don't have to worry about getting definition because it came from a 3-inch speaker on a TV, the reason behind buying cube monitors."

Ron Montgomery is managing director of Atlanta's Technical Audio Systems, a firm that doubles as a production facility, and is a studio designer and installer serving the Southeast, New York and L.A. The firm recently finished recording facilities for the Atlanta Symphony Orchestra and Omega Films of Norcroft, Ga. He makes a case for the small cube near-field when he says, "There are companies mixing for TV on giant monitors without checking how it sounds over a 3-inch loudspeaker. People still aren't running their video into their stereo systems, so if you're boosting 60 cycles with lots of kick drum way down low, and thinking, 'Boy that sounds good and fat,' play it back on a TV set and it sounds like trash. People think that in the age of the CD everyone has a good playback system, but that's not the case."

Montgomery also looks at the smaller speakers from a budget-conscious perspective. "Near-field monitoring can make up for thousands of dollars' worth of acoustical treatment. If you have a rotten room and don't have the money to do anything about it, get some near-fields and worry with them instead of trying to get megamonitors installed in the wall. You may not impress the client in terms of playback, but if you're working in advertising or media production, it's the final product that will make or break you.



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However, many times in small production studios there's some grounding hum, and because it's 60 cycles it doesn't manifest itself on small near-fields. Take it out and play it at an industrial show on a large sound system, and the hum becomes deafening."

Power Play

"The consensus is if you do true double-blind testing, many dramatic differences between power amplifiers suddenly disappear, and people can't tell one from the other." Augspurger says. "On the other hand, my experience has been that there are differences. Certain loudspeaker/amplifier combinations are made in heaven. The trend continues toward not so much higher-power amplifiers but toward high-quality power amplifiers. And in the super high-quality studios, we're seeing the return toward vacuum tube amplifiers, especially to drive the high-frequency loudspeakers. If you want a sweeter, less irritating high-frequency performance, the vacuum tube amplifier is more apt to deliver this than a solid-state amplifier."

John Loeper says, "Engineers have commented to me that a lot of the newer transistor technology has sub-

stantially harshened the sound. I like some of the more esoteric amplifiers, which people say have an element of warmth and a sound that's easier to listen to. But unfortunately, many people still look at specifications, looking for the biggest bang for the buck, the ultimate in distortion and slew rate, and some people base their decisions on that. That's stupid, because amplifiers are just like loudspeakers: you have to *listen* to them."

Ready to Go Shopping?

Both main and near-field speakers must be neutral, musical and reasonably colorless as far as our industry and physics will allow. But what if, from a practical or theoretical perspective, you can't judge a room's character and acoustical impact on the monitor? Tom Hidley recommends, "Take the speaker to an environment that doesn't color, add to or take away from the sound coming from that speaker. The most neutral environment is outside, outdoors. Take the speaker away from the walls and ceilings, the boundaries; get it out in a quiet meadow if you can. Take perhaps five or six amplifiers and five or six monitors, and try the different combinations with source material

that you know to be pure. The final test equipment is your ears. You cannot buy or sell a monitor without understanding its application."

When you go to the store with a list in hand, remember the words of Ron Montgomery: "Everyone wants large monitors, but mostly to accomplish SPL, and that's not required unless you're doing rock product that you have to play back to the artist at a high SPL. If you're being judged on product you send out, then accuracy as opposed to SPL capabilities is the primary concern. When auditioning monitors, use a flat setting, speak into a microphone and ask people whose opinions you trust if your voice sounds like your voice through that speaker. Close your eyes, *listen* and buy what you based your life experience on."

Spend lots of time listening to many pairs of speakers, agrees Loeper. "It's hard to select your monitors in the design phase when looking at a blueprint, but remember that a speaker is only as good as the environment in which it is put." ■

San Francisco-based journalist Linda Jacobson is the managing editor of EQ magazine.

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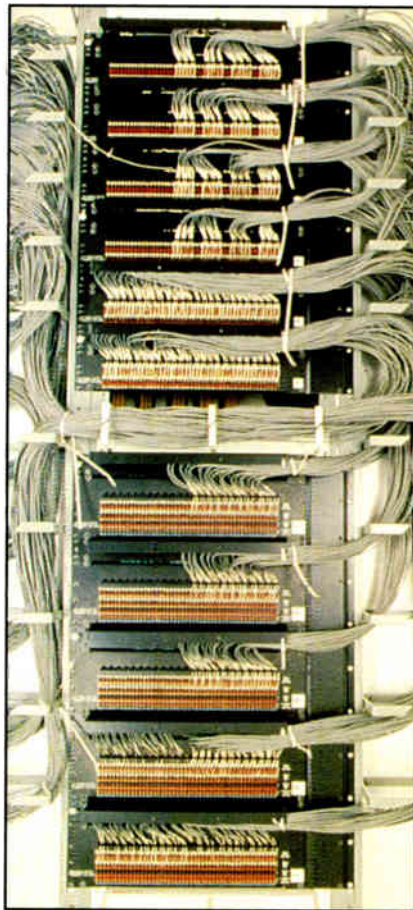
AUDIO PATCH BAYS

by
David Carroll

DESIGNING FOR FLEXIBILITY

As pro audio technology advancements continue to generate products offering increased power and sophistication, earlier generations of equipment are put out to pasture. As a result, the design of large audio facilities must allow for easy reconfiguration. For example, an analog multitrack tape recorder may give way to a digital recording device; a routing switcher may be added to provide some monitor functions; or a film facility may add extra dubbers, forcing a new patch bay layout. And in some studios,

—CONTINUED ON PAGE 67



Above: Lucasfilm's Skywalker Ranch, cross-connect frame. Note the upper terminal panels represent 96-point patch bays with normals; equipment and patch terminals are jumpered across on the front level of the frame with single-pair wire.

SWING-OUT RACKS

In our most recent installations, we developed a patch rack design that solves the cable management problem while providing full rear access to all equipment located above and below the jackfields. By using a custom 24-inch wide cabinet rack, a hinge adapter in the rear and some custom cable bracket hardware, we allow for a maximum of ten 96-point or 20 48-point jackfields per rack, with a 24-inch x 5-inch cable chimney up the side,

—CONTINUED ON PAGE 65

Top view cross section of swing-out patch bay rack

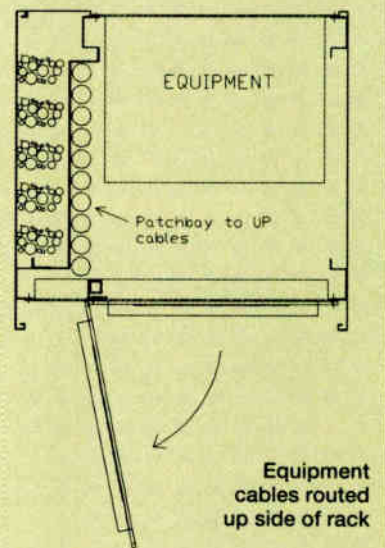


Figure 1: Normal techniques

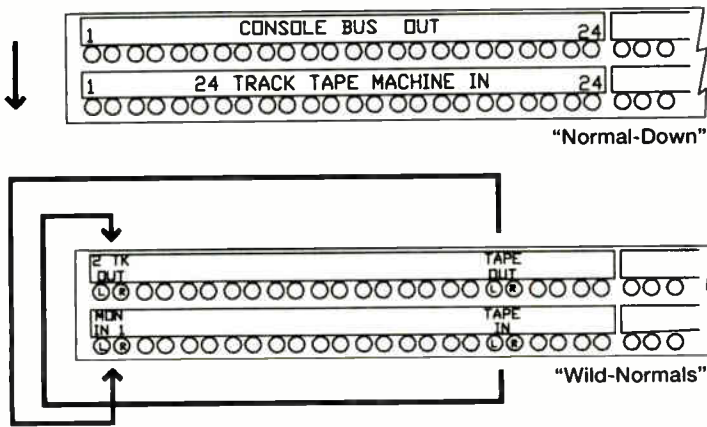


Figure 2a: Full-normal patch configuration

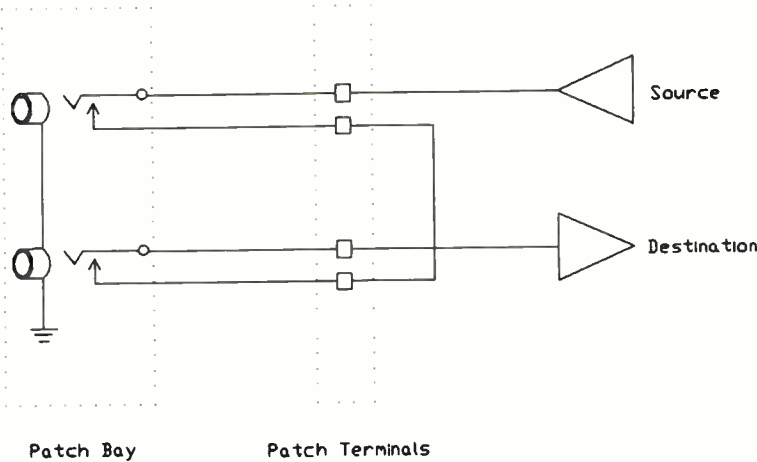
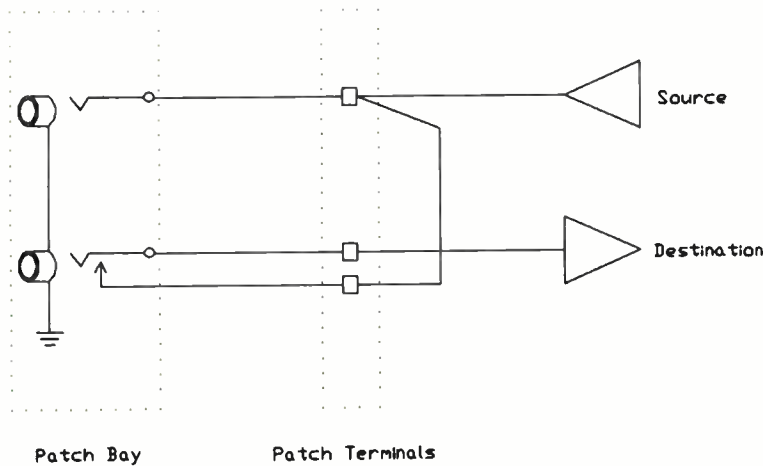
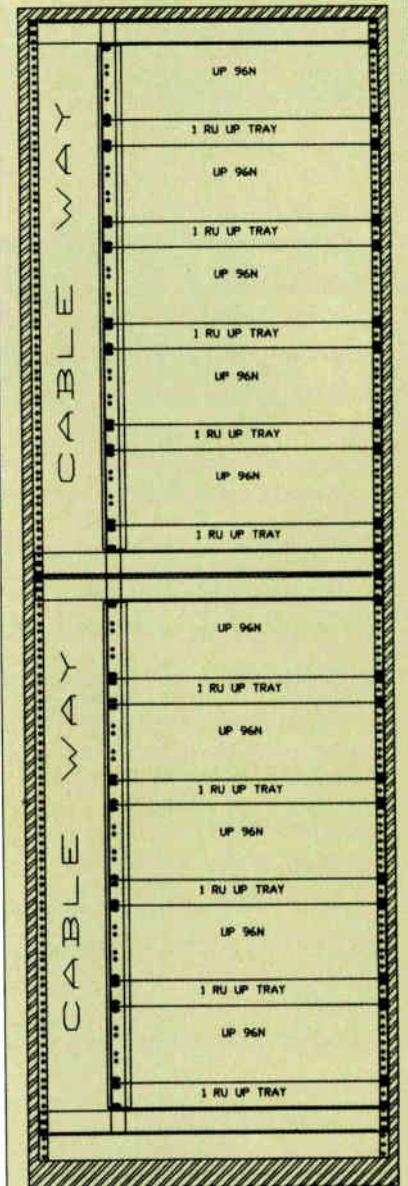


Figure 2b: Half-normal patch configuration



—FROM PAGE 64, SWING-OUT BAYS which is more than adequate for the cable load (960 pairs). The cables can exit the rack from the bottom or top, and are accessible for installation and change from the rear and front through a removable access plate. The entire terminal panel assembly can be swung open for full rear access to the other rack equipment, while the equipment cable bundles easily move with it. All cables are clamped at their exit from the Ultrapatch cable tray, thereby eliminating any movement or strain at the terminal points. ■

Rear view of swing-out patch bay rack with ten ultrapatch panels (96 points each)



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outboard processing equipment changes on an almost daily basis.

Patching and interconnect systems, if properly designed, can outlive most of the equipment they were originally installed to service. When designing an interconnect system, several elements must be considered, including mechanical design and cable management, jackfield and terminal panel design, and wiring. Integrating these elements must produce a reliable system that will be ready for change when—not if—it happens.

Patch Bay Layout

In the traditional "normal-down" patch bay layout, outputs (sources) are located on the top rows of a patch bay, and inputs (destinations) are on the bottom row, with each top jack normalled to the jack below. This works effectively for large groupings of signals such as console line out through noise reduction and multitrack machine, back to console line in. However, when miscellaneous small groupings are found—synchronizers, 2-track machines with time code, echo devices, etc., the normal-down layout becomes cumbersome. In this case we locate equipment logically on the jackfield, with inputs and outputs together, making it easier to find a jack in a hurry. The normal signal path can be established by using "wild-normals" and then indicating them on the designation strips in a unique font or color (see Fig. 1).

Jackfield Types and Termination

Both 1/4-inch and bantam-style (also known as tiny telephone or TT) jackfields are in wide use. The broadcast and film communities seem to be predominantly in the 1/4-inch camp, while the multitrack recording world tends to use more TT bays. The decision to go one way or the other is largely a matter of operator preference, although there is a good argument for consistency: If the consoles are provided with internal patch bays of one type, then stay with it to avoid double inventory of patch cords. A word on patch bay reliability: Both Mogami and ADC now supply nickel-plated patch cords, which should soon entirely replace the plain brass types. Since switching to plated cords, we haven't heard that old call on the intercom, "Shake up that patch!" nearly as much as we used to. Most patch bay intermittents were caused by oxidization of the patch plugs.

All pin contacts on the jackfield must be wired out to terminal blocks or connectors to allow easy configuration. For convenient insertion and deletion of downward normals as well as "wild-normaling," all normal contacts should also be wired out to the patch bay terminals. The choice of terminal type, location, configuration and cable management helps to ensure long-term flexibility and cleanliness of an installation.

In some cases, connectorized jackfields are the answer. The jackfield is usually enclosed in a box, with multipin connectors installed on the rear. Connectorized jackfields work well in situations where space is extremely limited, such as console equipment credenzas. The number of pairs per connector should relate to the cable type and connector configuration of consoles. They generally provide more density than terminal blocks or panels of any kind. However, be warned that there is a practical limit to density. Twelve patch bays in a rack won't help if you can't get the cables in! As a rule of thumb, each 96-point patch bay should be serviced by a cable way having three square inches of cross section for "tight" dress or six for

"loose" dress (read on for more on cable dress factor).

Terminal blocks or panels are far more flexible than multipin connectors when there are many different configurations of wire coming into a patch bay and going in all different directions. Available products include solder- or wire-wrap-type "Christmas trees," other telecommunications blocks such as the "66" blocks, etc. We normally use the ADC Ultrapatch panels due to their ease and quality of termination, obvious "one-to-one" relationship with the jackfield, and appropriate wiring density.

To extend the patching system's life, all jackfield/terminal panels should be wired identically. Avoiding "special" patch bays (for instance, without normals brought out) will reduce the odds of obsolescence.

Bridging, Normaling and Half-Normaling

When matched 600-ohm sources and loads were the rule, one and only one load was connected to a source at a time to maintain proper signal level. Therefore, most patch bays were wired "full-normal," where, if you plugged into either the source or the destination

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jack of a normaled pair, the normal would disconnect, leaving only one load. Nowadays, with low-impedance sources and high-impedance loads commonplace (a "bridging" configuration), this method is no longer desirable in most cases. Leaving the normal path intact while sending a signal to another destination from a single source eliminates the need for a separate mult. By wiring the normal jumper from the top row (source) pin contacts to the bottom row (destination) normal contacts, this is accomplished, and is known as a "half normal" (Fig. 2). We configure all our stock, prewired patch bays with this in mind, eliminating the top jack normal contact entirely, and providing an extra mult of the top jack pin contacts at the terminal panel for monitoring or wild normals.

Patch Bay and Terminal Block Rack Mechanical Details

When laying out a patch bay rack, several important points must be considered:

- * Where will the terminal panels be located?

- * Is there sufficient room for the total cable load?

- * Will there be useful rack space above and below the jackfield?

- * Is the design expandable?

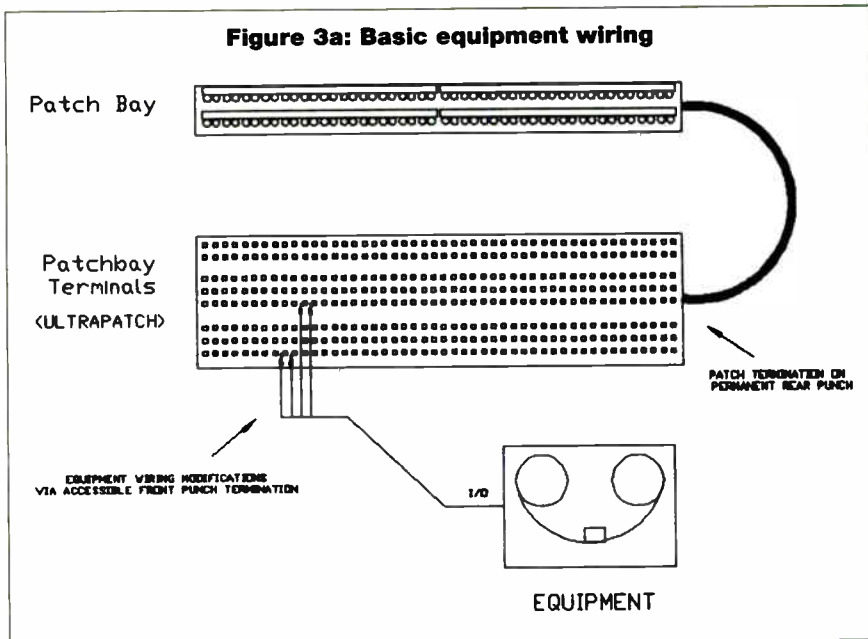
The most common location for the terminal panels is on the rear rails of the patch bay rack. Depending on whether the jackfield is 1/4-inch or bantam, the panels will require two to four times the rack space on the rear rails than the jackfield does on the front. If other equipment shares the rack (and I've never met a patch rack that wasn't stuffed above and below the jackfield), the panels will obscure the rear of some of the gear. This problem gets worse as more jackfields are added. I consider the practical limit for this construction to be approximately four (96-point) or eight (48-point) jackfields per rack, while keeping reasonable access to other rack equipment.

Intermediate designs to increase patch bay density have met with varying degrees of success. We developed an innovative system involving a custom rack that fulfills all the criteria and provides up to 960 patch points (see sidebar).

In gigantic installations, and where equipment from a large area must be terminated at one central point, the terminals can be located away from the patch bay rack, on a cross-connect rack

or frame. This is the method of choice for a full cross-connect where additional space is needed for equipment terminals. The space for terminals is not limited by the physical size of the patch bay racks, so there is no limit to the number of jackfields per rack, aside from practical operation considerations.

In a full cross-connect configuration, "equipment terminals" are provided adjacent to the patch bay terminals. All equipment I/O is wired here to match the way it comes off of the equipment. Equipment-to-patch assignments are made by short, single-pair jumpers between the patch bay terminals and the equipment terminals. If the patch bay needs to be reconfigured, only jumpers need to be moved, eliminating any need to move or replace cables buried under mounds of other cable (Fig. 3).



often left until the last minute, unless the project architect is familiar with the technical issues or a consultant is brought in. A comprehensive equipment plan, showing equipment locations, is a must at an early stage of the project. In addition, a low-voltage plan (or signal plan) should be generated, relating to the equipment plan, which

specifies all locations, types and sizes of cable way required.

Try to specify lay-in cable ways that require a minimum of pulling. These consist of trench and gutter with removable covers. Lay-in allows for the maximum degree of cable prefabrication prior to installation, and easiest maintenance and change afterward.



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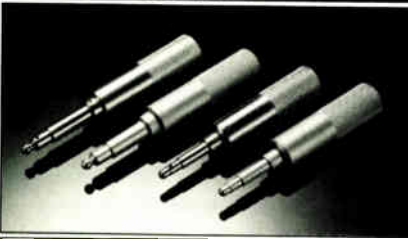
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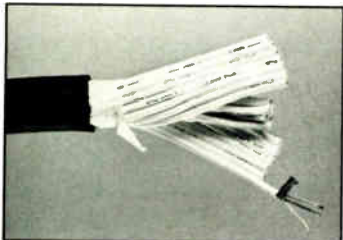
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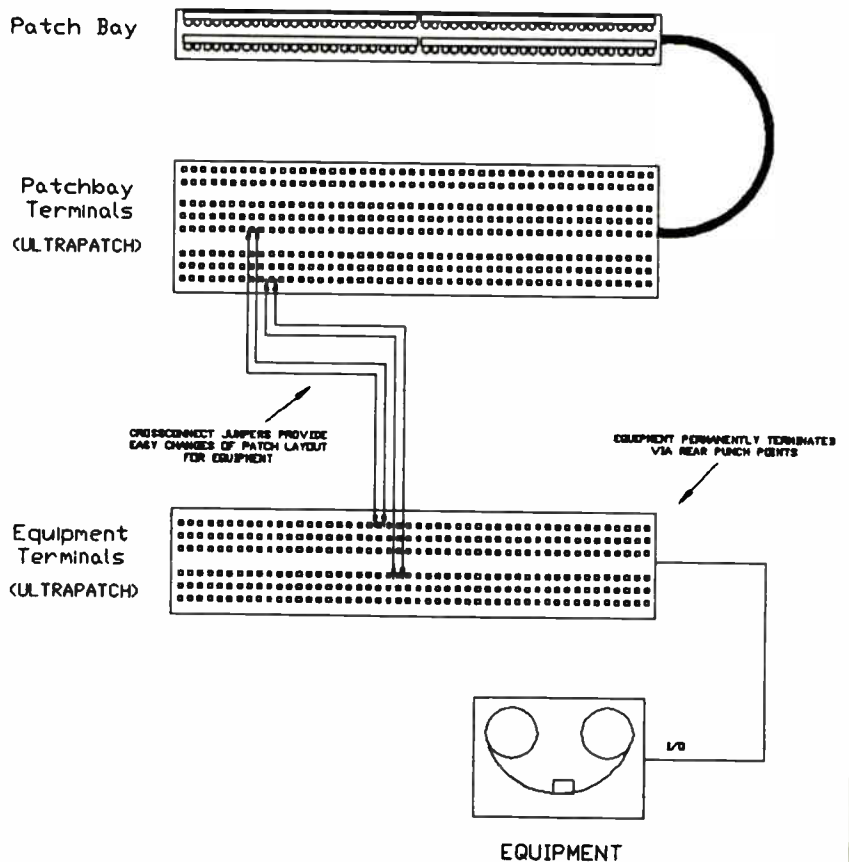


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Figure 3b: Full cross-connect equipment wiring



Prefabrication reduces the time required on-site, and saves money by enabling better quality control and test procedures.

If some runs must be made in conduit, they should be the maximum diameter allowable, with the fewest bends. If possible, use at least 4-inch diameter, in enough quantity to make the cross-sectional area required. Codes dictate that conduit not be filled beyond 40%, and although this rule isn't usually followed, it is a good factor to leave for expansion, given the constraint of trying to pull around sweeps into a partially full conduit.

The best approach is based on an under-floor system throughout the facility, whether it is exclusively lay-in or a combination of trench and conduit. One alternative is the overhead tray, although we do not recommend it, as we find it more difficult to work with during installation and service, and it can involve longer run lengths.

Allow extra wide and deep trenching in areas of high concentration, such as under patch bay racks, consoles and equipment racks. If possible, use raised access flooring ("computer floor") in the machine room. Raised floor provides total freedom of equip-

ment placement and cable runs, ensuring the long-term flexibility of the design, and also allows easy AC power installation. However, if the floor cavity is to be used as a supply air plenum, the cabling must be run in an enclosed metallic tray or conduit to meet fire codes.

In all cases, the designer should make a rough cable load calculation for "worst case" cross-sectional area required and multiply by a safety factor (two to four, depending on comfort) to size the cable ways. Cutting corners should be avoided at this stage; the satisfaction of saving money on the cable ways will wear off quickly, but a designer's legacy lives on if there is a problem.

For the ultimate noise floor, provide multiple cable ways to separate low-level from high-level or "dirty" signals, such as speaker and cue, control or telephone. Of course, you should also physically separate AC power runs from low-level signal runs to avoid magnetic induction of hum currents into the audio.

Cable Dress Factor

Installations are often judged by ap-

—CONTINUED ON PAGE 169

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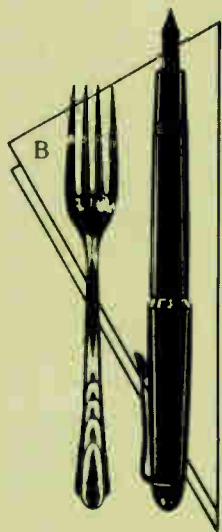
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by Mr. Bonzai

WHEN HARRY MET BONZAI

HARRY CONNICK JR.'S SWINGIN' STORYVILLE



I pulled up to the gate of the CBS/MTM movie lot in Burbank and was directed to Evergreen, the scoring stage where Harry Connick Jr. was recording a new album with a 58-piece orchestra. Done in the grand style of live big band-plus-vocal albums of the past, Connick is laying it on the line with a whole pile of pros today.

I walked into the lobby followed by a chef carrying bags full of Italian food. As cast and crew dove in, I helped myself to a hot garlic roll dripping olive oil. Joel Moss, the engineer for this big date, entered from the control room, introduced me around and told me the orchestra would be returning shortly from a break. We walked into the studio, one of the last big rooms in Los Angeles. Off to the right was the combo set up for vocal, piano, bass, drums,

guitar and the sax of Branford Marsalis. Sweeping far back and to the left were the music stands and microphones, and at far left, a harp waiting for Dorothy Remson, the first lady of the strings.

These are the sessions where the pressure is on. Each clam costs thousands of dollars in studio time. Is Connick nervous? Is he pacing the floor? No, he's cool—in fact, he's sacked out on the sofa. As the musicians begin to file into the room, he pops back to life and Moss introduces me. Connick is gracious, with a warm N'awlins drawl, and as he ambles over to the mic he jokes and palavers with the band.

Connick gained national attention with his stylish music for *When Harry Met Sally*. Born (the same year as *Sgt.*

PHOTO: MICHELLE SINGER

Pepper's) and raised in New Orleans, he's been performing since he was 6, recording since he was 9, and has paid many dues in the nightclubs of Bourbon Street. Drawing from the roots of Dixieland, bebop, jazz and classic crooning, Connick puts it all together with a well-seasoned touch and leading-man originality. Critic Leonard Feather called him "a wild anachronism...The lad simply refuses to go with the fashionable flow."

We met a second time at Smoketree Ranch, a rustic but immaculate studio way out in the foothills of the Santa Monica mountains. Moss has been following Connick's two current album projects wherever they go—even back to New York for some small combo work—but today's session is with Connick alone. While the rest of the recordings are live sessions laid down all at once, Connick is stacking an *a cappella* chorus of 24 voices for one tune, "Heavenly."

Moss explains to me that most solo overdubbers listen back to each previous track as they add the doubles and harmonies. But Connick works it out in his head and sings in the dark, with just the finger pop of his "digit" click track. It all comes together in the control room playback, with Moss rapidly soloing out individual tracks and then popping them back in full congregation. I remark, "Amazing—it's the Harry Connick Singers."

Bonzai: How did you get involved with *When Harry Met Sally*?

Connick: Bobby Colomby gave Rob Reiner my records and Rob liked 'em—thought I'd be good to do the soundtrack.

Bonzai: How did the film affect your career?

Connick: It took me from one level to a higher level of fame and acceptance as a singer, which was very beneficial to my career.

Bonzai: Can you tell me about Harry Connick Sr.?

Connick: My dad is a great guy. He's been the district attorney of New Orleans since 1973. He's been very supportive of my career and my music. We're very, very close. He's just a wonderful man.

Bonzai: When did you make your first record?

Connick: I made my first album when I was 9, and I've been performing since I was 6, so I've been doing it for a while.

Bonzai: You were extremely young for a professional, playing at The Famous Door on Bourbon Street.

Connick: Yes, that was my first gig on Bourbon Street. A guy named Johnny Horn was a helluva trumpet player and used to play there all the time. He had a band and had known me for years. I guess he felt I was old enough to make the gig as the piano player, as opposed to just a kid sittin' in. I was 14 and I played from 11 to 3 in the morning for a week.

Bonzai: How did the audience react?

Connick: They didn't really notice—I was in the back and nobody really saw me. It wasn't really my show; it was Johnny's.

Bonzai: Were you scared?

Connick: Oh, yeah—I knew the music, but I hadn't had to play it one song after another. And some of the songs I didn't know well, like "Mr. Butter and Egg Man." I was nervous because I was

Connick: On the first album I sang one song, and for the second album, which I made when I was 11, I sang two songs.

Bonzai: You're known for doing standards and classics in your repertoire. If you could go back in time to your favorite musical period, where would you go to see it first-hand?

Connick: I'd have to say the '50s, because all of my idols were in their prime then. Louis Armstrong and Frank Sinatra were doing great things. Miles had an unbelievable band in '58, '59. There was a lot going on. And in the early '50s you could still find some big bands. Duke Ellington was still dealin'.

Bonzai: You mentioned Sinatra—what do you think you've learned from him?

Connick: I learned that you don't have to rely on the cushions that recording techniques provide. In other words, he would sing straight through, and if he made a mistake, he wouldn't stop and do it over. This number we're recording today is hard to do, because



Harry Connick Jr. with Joel Moss

PHOTO: MR. BONZAI

the youngest one, and by far the least experienced.

Bonzai: Did your first records sell very well?

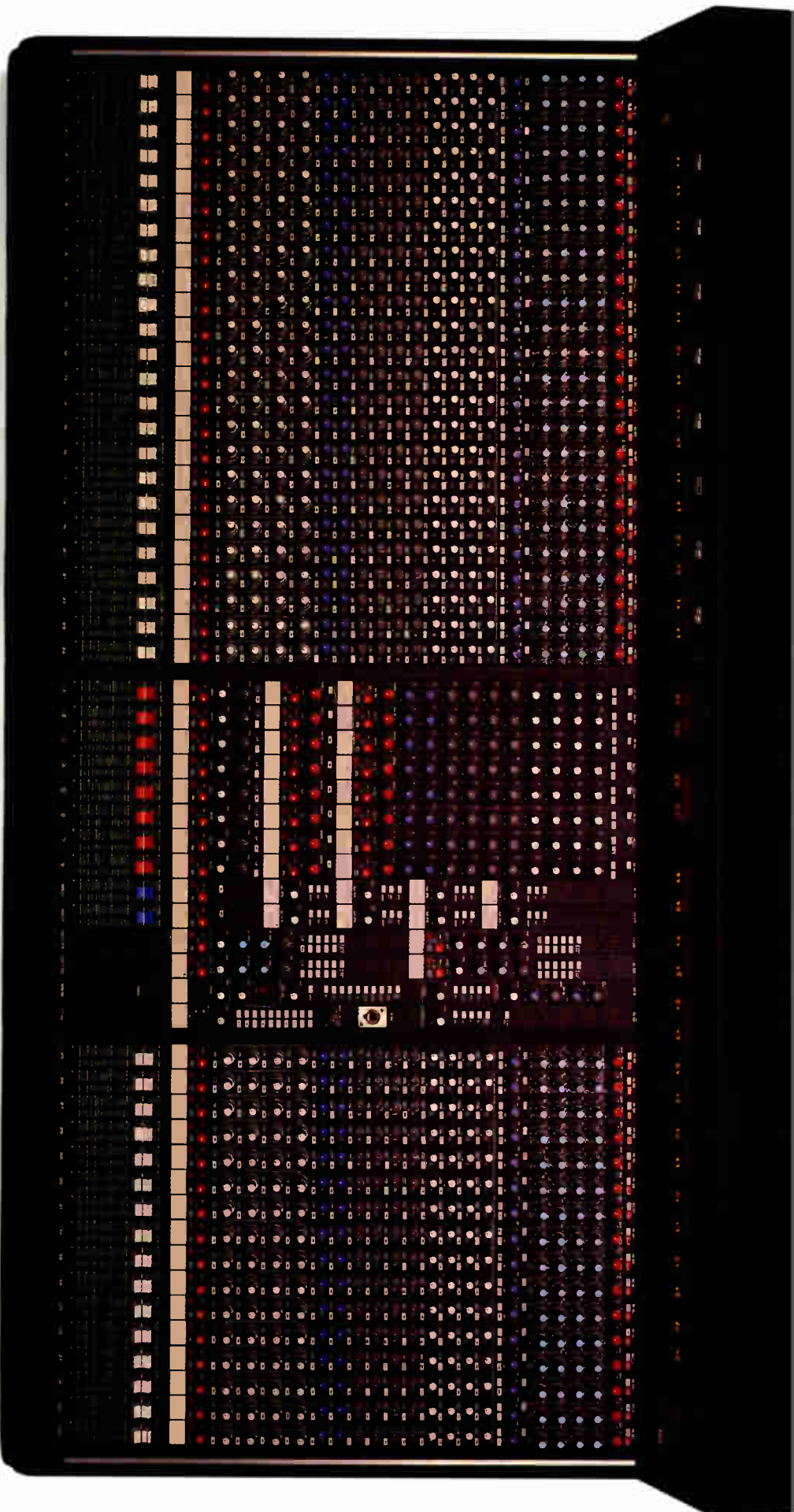
Connick: They were sold in New Orleans. My mother and dad had a record label called Alco Productions, and they pressed about 10,000 and sold maybe half of them. They were recorded with local Dixieland musicians. I think they're good albums, for what they are. They are authentic Dixieland albums. Obviously, I wasn't playin' a *whole* lotta piano, but I did as best as I could.

Bonzai: Were you singing?

there are so many harmonies. But for most of the numbers, we just sing them once through. Sinatra has breath control—he's got such a lung capacity that he can really hold a phrase. He's inspired me to attempt to do that. Lyric interpretation, pronunciation, intonation and the actual sound of his voice—he's the best there is.

Bonzai: What did you learn from Armstrong?

Connick: I think he's the greatest jazz musician of all time. Anybody can be imitated to some extent, except for Louis Armstrong, and maybe Charlie Parker and Art Tatum. But Pops—the



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sound on the instrument—he inspired me to try to attain a big sound on the piano. I've never heard any singer sing as in tune as he. His phrasing on the trumpet, and vocally—he never goes that far away from the melody, but he deals with such musical complexities—harmonically, rhythmically, thematically, he takes the simplest of songs and seemingly the simplest of solos, and makes them into unbelievable masterpieces that could be taught in a college jazz class. Nobody can come close to the level he played on.

Bonzai: Let's talk about New Orleans.

What's the special musical essence, the soul of New Orleans?

Connick: Well, it depends on who you are and how you choose to employ the heritage that New Orleans has to offer. For me, I'm a piano player, so I listened to Tuts Washington, Professor Longhair, Dr. John, James Booker. I listen and learn, and James

Booker was a teacher of mine for a long time. I went down to the French Quarter all the time and played. I chose to go out and learn from the rich music that New Orleans had to offer.

Bonzai: Listening to your piano playing, I was imagining that you must have a split personality to keep both hands going like that.

Connick: Well, when I watch guitar players, I don't see how the hell they do it. I don't know how a guitarist can play chords with his left hand and notes with the right. I don't understand that concept. I don't see how a violin player can use vibrato with the left hand and move the other hand that way. I don't know how Bobby McFerrin jumps around with his voice. What I do is not that hard for me, because it's so natural, like talking. But that's me, and maybe some people respect that—which is good, because that's how I make my living.

Bonzai: Do you have plans beyond music, say, acting?

Connick: I've done one film, called *Memphis Belle*. I play a tail gunner on a B-17. We filmed it in England, with David Putnam producing and Michael Caton-Jones directing. It'll be out this

fall. It was fun, but I felt a little out of my element. I'd like to do more in the future, and maybe with this experience I'll be able to move forward.

Bonzai: Who are the musicians you work with regularly in your combo?

Connick: On bass is a guy named Ben Wolfe, from Portland, Oregon. On drums is Shannon Powell, from New Orleans. On guitar is Russell Malone, from Atlanta. And now, I'm about to go out with my own big band, with 15 guys, and they're all unbelievable.

Bonzai: What happens for you in the small combo? What happens when a tight group like that plays together?

Connick: Well, I started with my bass player. He took care of the low end, and I took care of the middle and high end. He kept the groove going while I soloed. When I got my drummer, he added the time, so we wouldn't have to rely on playing as rhythmically. Then we got a guitar player, so I can improvise and deal with another har-

monic instrument—being aware of the chords he plays and vice versa. And he has to be aware of the melodic lines I play. So when all four of us are really thinking, we have a real tight group.

Bonzai: What do you think about the business side of music?

Connick: Well, I don't think about it too much actually. I have a manager who deals with that. I am aware of it to the extent that I need to, but it's hard enough dealing with the music. So, I have a great manager and a great office of people who organize my business. They do a wonderful job, so I don't have to stick my nose in much.

Bonzai: Let's talk about the rising acclaim that's coming your way. Is it affecting your work, all this sudden excitement about your presence in the business?

Connick: It doesn't affect me, but it affects my work to the extent that the record company gives me more money to do more elaborate recordings and concerts and instrumentation and such. Otherwise, I wouldn't have the money to do it, because I wouldn't have made them any money. But I made that money and they let me do what I want. It's affected me that way, but person-

“What I do is not that hard for me, because it's so natural, like talking.”

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ally, I couldn't care less. The music is so hard, and I think people respect a person who's genuine. I think I am, and that's what they like, and I love to perform. But all the fame and parties—I don't care for that much.

Bonzai: When you take an old standard, and are compared with many who have gone before you, how do you breathe new life into a song?

Connick: No one in the world looks like me; no one sings like I sing and no one plays like I play. There are better-looking people, better singers, and worse. But there is only one me. Although I might sound similar to someone else, 'cause I'm young and impressionable, inevitably it will sound like no one else. Even if I imitated someone directly, I would still have my own flavor in it. The fact that I improvise and play songs in a new way means that it comes out like me, no matter what I do.

Bonzai: How do you like working with Joel Moss?

Connick: He's the greatest. You don't often find somebody with that kind of talent and knowledge in the studio. And his demeanor is so pleasant. He doesn't lose his temper, but he gets upset and I like that. I've worked with engineers who never ever lose their temper, and I lose mine all the time. If the engineer gets upset once in a while, they're human, and I like to see people with their own opinions.

Bonzai: Is it important for an engineer to have real musical knowledge?

Connick: No question about it. Joel has noticed musical things that I didn't hear, and I have pretty good ears. He might say that viola part sounds a little bit out of tune. Maybe we could do it again. Or when I'm singing, he'll let me know if he thinks I'm a little sharp, or got a little faster. People who don't know music can't do that.

Bonzai: I imagine many folks ask, "Where does this kid come from, how does he pull this off?" Where do you get your gumption?

Connick: Who knows? Both my parents were politicians, public speakers,

and could convince people of what they wanted. Maybe it rubbed off on me. Being lawyers, maybe that had something to do with it. Playing the kind of music that's not popular, but still wanting to be popular as a person. Trying to find ways to make that music popular without changing it at all. Just having set ways of how I do things. Some people might not agree, but I think it's the right way to do it.

This might sound cocky, but I'm the only person out here doing what I'm doing. If I'm not cocky, people are just going to pass me by, and the record company will try to make me do things

I don't want to do.

You just have to be real strong. I won't have to be like this all my life, but I think it accompanies youth, or as you say, gumption.

Bonzai: Did you have a relatively normal childhood?

Connick: For me it seemed normal, but for someone else it might not. Going to Bourbon Street when you're 6 years old and playing with the guys

down there wasn't really normal. Having two politicians as parents wasn't normal either. I played with the symphony when I was 8 years old. All this seemed normal to me. It wasn't extraordinary, but maybe not exactly normal when I look back on it.

Bonzai: There are theories of extremely talented young people being associated with reincarnation. Did you ever think about that?

Connick: Well, my religion doesn't deal with reincarnation. But it's fun to think about things like that. Like astrology, there may be some merit to it, but it doesn't really apply to my beliefs. But who knows? I don't really give myself that much credit. I don't hold myself in that high regard, because I haven't done anything.

If I had lived in the '40s, I wouldn't have a gig. They wouldn't be running after me with all this praise. Back then, Frank Sinatra would have totally kept me from singing. People like Art Tatum and Duke Ellington would have kept me from playing piano. And entertaining—forget it. People talk about me and say, "What an entertainer," but look at Sammy Davis Jr. and then look

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at me. That's a whole different level. Judy Garland. I'm just a freak right now, out of my time. There's nobody else doing this. I wish there were more. It would give me some competition and make me work a little harder.

Bonzai: I understand that you only met Dr. John a few weeks before you recorded with him.

Connick: Yes, and what a nice guy. I've found that people who are highly talented have no reason to be insecure or uptight around young talent. They know they can blow me away. What am I going to do, go onstage with Dr. John and try to cut him on New Orleans piano music or singing. What's the point of that?

Bonzai: Hard to beat him at dancing, too, when he does that dirty wiggle.

Connick: Yeah, there's a presence that he has. I can't touch that.

I've always found this to be true. Sinatra—nicest guy in the world. He can cut me to shreds. A couple of weeks ago at the Kennedy Center, I came out and sang before Tony Bennett. Crowd went nuts. I said to myself, "I finally got him." And then he came out, put the microphone down and sang *a capella* in front of 2,000

people. He was louder than me. It ruined me, embarrassed me. He smashed my face in the dirt.

Bonzai: Well, you've got room to grow...

Connick: But it doesn't matter. There's a long history of musicians cutting one another. Nobody cares that I'm young. They were young too. If Tony Bennett was my age, he'd really cut me to shreds. Age doesn't really matter. Tony Williams was 16 when he got the gig with Miles Davis. Sixteen years old, and he's playing drums with Miles. So, age and room to grow doesn't make any difference. It's what you're doing at this moment. If you're not dealing, then get out of the way of those who do deal, 'cause you can really get hurt and embarrassed.

Bonzai: What about producers? Marc Shaiman is your co-producer?

Connick: He listens to all the orchestrations and suggests adjustments. I make decisions about the sound, like maybe not enough of a room sound. And Joel is very involved, as well. We oversee things, and Joel is aware of all the technical side. All three of us work together.

Bonzai: Are you shooting for a single?

Connick: I like albums, actually. Singles are like targeting one song to be heard. I like albums like *Come Fly With Me* by Frank Sinatra. The title of the album was the single, and it had the single "It Had To Be You." I like making albums and letting people decide which songs they like.

Now radio play is big for record sales, so the record company wants something that can be played on the radio. I might get a suggestion to keep it three-and-a-half minutes long instead of eight minutes, and I'll do it for one or two numbers, because I have to play the game. That's no big sacrifice.

Bonzai: Have you made any mistakes in your life so far?

Connick: Yeah, normal stuff. I don't think I've made any huge mistakes. Just normal, growin' up mistakes. I'm still makin' 'em, but what are you gonna do? Sometimes I talk too much, but as I get older I'll cool out. I know I will, so I'll just let this energy run itself down. I'll become more mellow with time, I guess. ■

Mix editor-at-large Mr. Bonzai once danced the dirty wiggle in New Orleans. He's still recovering.



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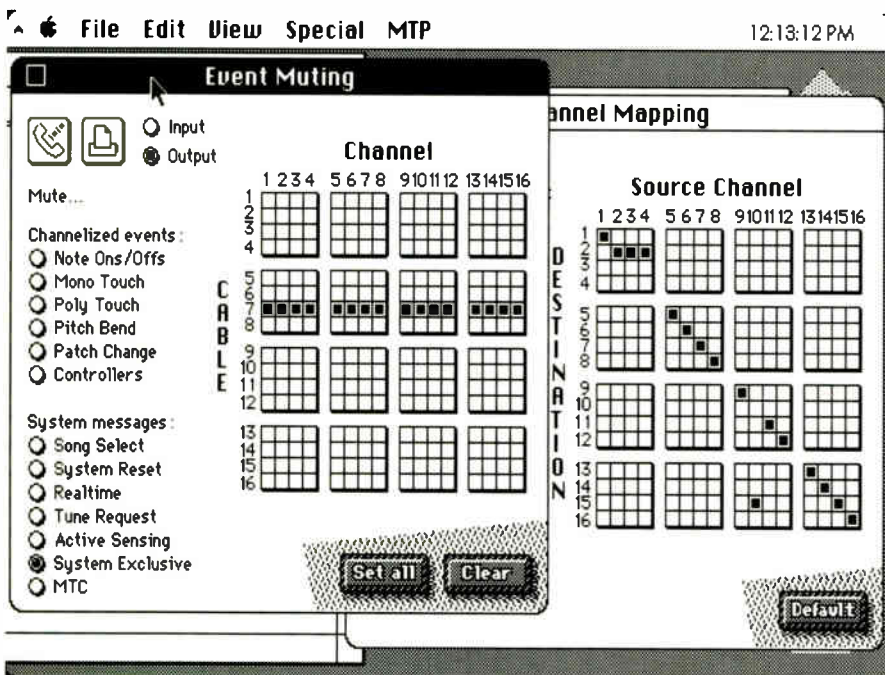
by Paul Potyén

THE MIDI TIME PIECE DIVIDEND



It's embarrassing to admit, but my home studio is kind of messy. It has been expanding steadily over the past several years, and I manage to maintain it about as well as the weeds in my backyard, which is to say, minimally.

clean things up, but, like those weeds, my cables and cords seem to proliferate quickly in a matter of days. My headaches really begin when I have removed equipment for a



session at a commercial studio, and then I have to reincorporate it. So when I heard about the software-based MIDI cable routing features of Mark of the Unicorn's new MIDI Time Piece, my ears perked up.

My setup currently consists of ten MIDI devices, including two keyboards and one MIDI-controlled effects box. I have been managing the MIDI part with Opcode's Studio 3 MIDI interface, which, despite some attractive features, is not without limitations. For ex-

ample, since there are only two MIDI inputs, I must repatch the system every time I want to use an editor/librarian for one of my devices.

The MIDI Time Piece is a hardware/

—CONTINUED ON PAGE 83



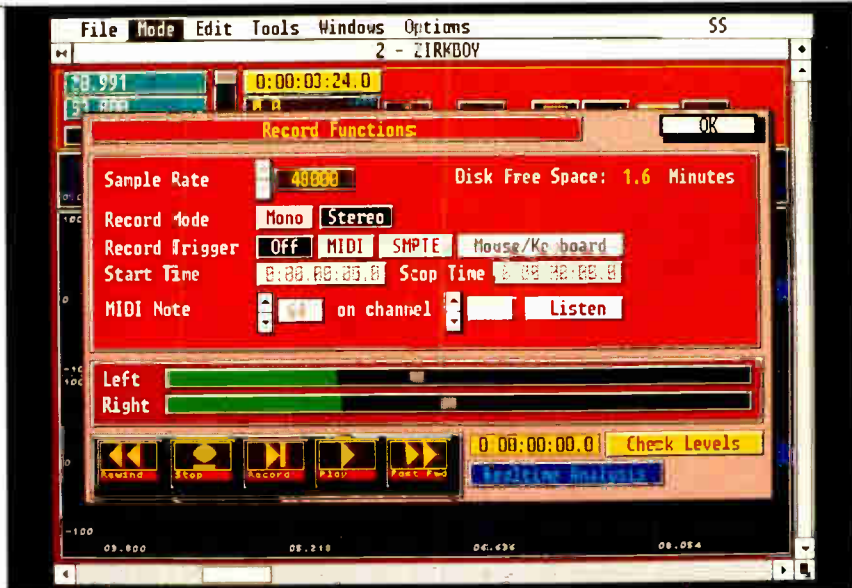
Chip Shots

Turtle Beach Systems has released its digital 2-track editing system for IBM AT and 386 compatibles, the 56K Digital Audio System. It consists of the 56K-PC 16-bit card, two kinds of external interface boxes and SoundStage editing software.

The 56K-PC, based on the Motorola DSP 56001 signal processing chip, provides access to the computer's hard disk for recording and playback. The 56K-D Digital Audio Interface provides connections to AES/EBU and SPDIF devices, and has SMPTE and MIDI capabilities. The 56K-A Analog/Digital Converter is designed for users who do not have other means of converting analog audio to digital and back. The SoundStage module allows digital recording at sampling rates of up to 48 kHz, and offers many editing features.

The retail prices are: \$1,295 for 56K-PC; \$745 for 56K-D; \$995 for 56K-A and \$649 for SoundStage. Turtle Beach Systems, York, PA; (717) 854-8319.

Coda Music Software announced the release of upgrades for two of its Macintosh music notation programs. MusicProse 1.0.1 includes several feature enhancements, in addition to a new template that will allow playback of dynamics, articulations and tempo markings. Finale 2.0.1 includes speed enhancements and other features. MusicProse 1.0.1 was shipped free to all registered



56K's onscreen transport, meters and time/sync functions

users, and the new version of Finale is available to registered users of 2.0 for the cost of shipping and handling. Coda Music Software, Bloomington, MN; (612) 854-1288.

The MIDI Buddy is a portable hardware device from **Eltekon** to be used with other MIDI sequencing systems. It allows playback of files generated on a software-based sequencer without the aid of the computer. The unit retails for \$1,495. Eltekon Technologies, Inc., Livonia, MI; (313) 462-3155.

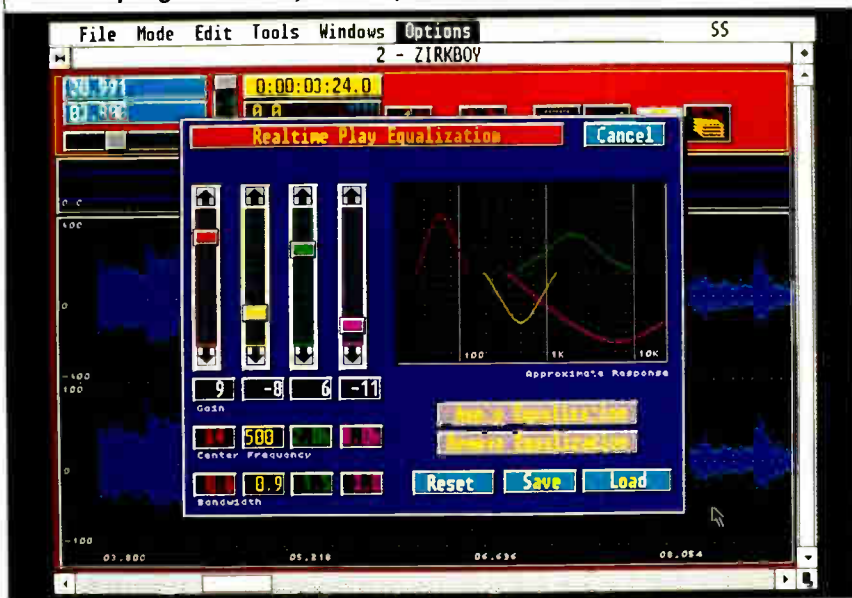
Crown International, developer of the Mac-based IQ System 2000 amplifier control and monitoring network software, has released an IBM-format version. Like its Mac predecessor, the IBM/IQ software controls up to 2,000 am-

plifiers in a system and works with Crown Macro-Tech and Com-Tech amplifiers. Suggested retail price of an IQ-P.I.P. card, which fits into the rear of each amp, is \$349. The IQ System interface sells for \$895. Crown International, Elkhart, IN; (219) 294-8000.

New from **Extrema Systems International** is StereoLink, an IBM PC XT/AT/386 or compatible board that converts analog audio information to digital format for PC disk storage. For "near CD quality," 20kHz stereo recording is possible with the VC270 board at only 64 Kbytes/second, about one-third of the memory used by CDs. XSI developed StereoLink for broadcast editing and (there's that word again) multimedia applications. It sells for \$595. XSI, Reston, VA; (800) 347-6007.

And speaking of multimedia (I swore last month I wasn't going to mention that any more), **Commodore** targeted that market with the Amiga 3000. It comes in two flavors: the 16Mhz model retails for \$3,299, and the 25Mhz version is priced at \$4,499. Standard on both models is a 40MB hard drive, 2MB of RAM, SCSI interface and a 3.5-inch floppy drive. Commodore also introduced a new multimedia authoring system, AmigaVision. It will be bundled with all Amiga 2000 and 3000 Series machines. Existing owners can purchase it at a suggested retail price of \$149. Commodore Business Machines, West Chester, PA; (215) 431-9100.

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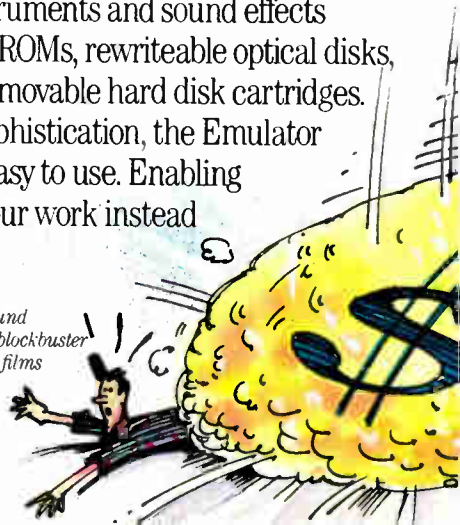
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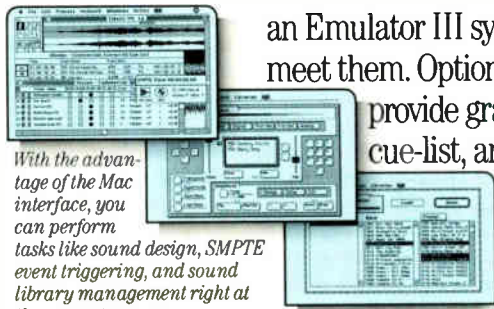
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—FROM PAGE 78

software package designed to solve problems like that. Mark of the Unicorn describes it as four MIDI devices in one: a MIDI interface for the Mac; a MIDI patch bay with routing, channelizing and muting; a SMPTE/MIDI converter; and a SMPTE generator. It provides eight independent MIDI ins and MIDI outs, each capable of handling 16 MIDI channels. That's 128 MIDI channels, and you can save customized configurations on your computer for future reference, much more pleasant than climbing around behind equipment and replugging stuff. (This latter method usually produces the undesirable side effect of several minor head lacerations.) Finally, you can build your own custom network using additional MTPs, Macintoshes and even other MIDI interfaces. Impressive, but what does this mean for *me* and my messy studio? I decided to open the box and find out.

MIDI Time Piece is designed to work with any Mac MIDI sequencer software, but there are advantages to using it with Mark of the Unicorn's own Performer 3.42, such as faster MIDI transmission rates and more accurate MIDI/SMPTE synching. So, armed with a Mac SE with 4 MB of RAM and System 6.0.4, I installed the newest version of Performer (which is included with MIDI Time Piece to all registered Performer users). Next, I used Fifth Generation's Suitcase II to install the Time Piece DA (desk accessory)—a serious mistake, as I discovered later. After hooking the Mac and my MIDI gear to the MTP, I opened the MTP DA from the Mac desktop.

Selecting Network Configuration from the MTP DA menu gives you an icon-based map of your system. And that's where I encountered my first problem. The Mac said it wasn't connected to MTP. I tried unsuccessfully for more than an hour to get through to Mark of the Unicorn's technical support line, and I finally (and reluctantly) pulled rank by calling the business line and identifying myself as a *Mixeditor*. A very helpful techie came on the line and together we determined that the old DX7 I had connected to the MTP was the source of the problem. The solution was to use the Event Muting window in the DA to mute sys ex data coming from the DX7 cable. This specific problem and its solution



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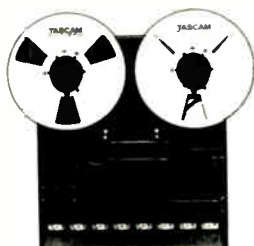
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are documented on page 54 of the manual, but a reference to that section would have been helpful somewhere on page 24, which is where I was.

Having leaped over that hurdle, I proceeded to the Cable Routing window. This, like the Channel Mapping and Event Muting windows, offers the most flexibility in customizing a MIDI system I have seen. In each case a grid allows you to easily map input to output cables, source channel to destination channel for each cable, and a staggering array of MIDI filtering options for each channel on each cable

(like sys ex muting from the cable connected to my DX7 MIDI out).

The last three windows control and monitor the MTP's MIDI/SMPTE functions. The unit supports MTC and its own Enhanced Direct Time Lock (DTLe), which Performer 3.4 uses. Earlier versions of Performer don't use DTLe, and MTP does not provide for an option for owners of the earlier versions. So if you haven't upgraded your Performer software (it's a free upgrade), don't bother to borrow a MIDI Time Piece for synching.

Before launching Performer, I decided to use MTP to stripe a multitrack tape with SMPTE code. The process

At the summer NAMM show, Mark of the Unicorn introduced Video Time Piece, a VITC/MIDI synchronizer with built-in character generation for audio/video production.

was straightforward and went without a hitch. I can't say the same about what happened after I opened up Performer, however. While I could open and edit files created with Performer 3.3, and it locked efficiently to the converted SMPTE signal coming from tape, the Time Piece DA was no longer open. I will spare you the grisly details, but here are two things that can happen if you use Suitcase to load the Time Piece DA and then try to use it while in Performer. Your Performer file can be damaged, and your Mac can lock if you try to open Time Piece. Trust me on this one. Don't try it!

Mark of the Unicorn confirmed this is a problem and suggested the only way to load the DA safely is with Apple's Font/DA Mover. (However, Gary Clayton at Russian Hill Recording in San Francisco claims to have experienced no problems loading the DA with Master Juggler Pro, another utility like Suitcase.) In any event, the absence of any cautionary message in Mark of the Unicorn's documentation compels me to mention this.

Despite my initial rocky experience with MIDI Time Piece, I am very impressed with this package. Both the single rack-mount unit and the software interface are very ergonomically designed. A MIDI system integrator of this complexity really merits a more complete evaluation than I have space for in this column. And the installation and configuration of such a system isn't necessarily going to be a piece of cake. But if you take the time to incorporate it in your setup (and I hope I've saved you some), you'll find its flexibility and modular systems approach a pleasure, particularly if you have rooms full of MIDI gear crying out for control.

Now I'm hoping that the next software update will offer the options of vacuuming the carpet and emptying the wastebasket. ■

Paul Potyen is an associate editor of Mix. His lovely wife, Cate, refuses to set foot in his studio.

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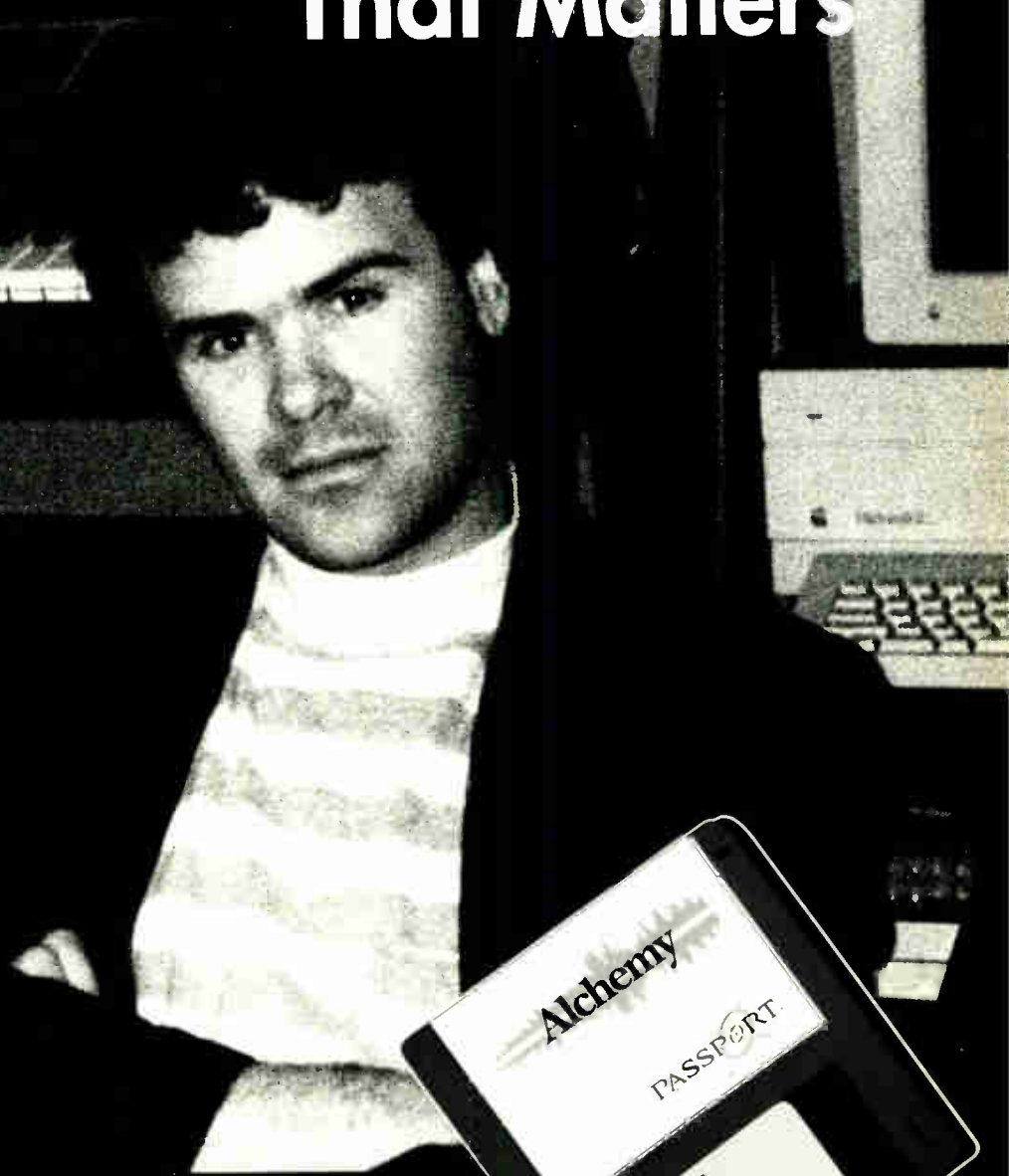
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THE FIRST 25 YEARS OF AUDIO INNOVATION: 1965-1990.



1965 *Dolby A: Dolby Laboratories founded in London*



1966 *Dolby A: First A-type noise reduction units delivered to Decca Records Company*



1968 *Dolby B: First licensed consumer product to use Dolby noise reduction*



1970 *Dolby System: First B-type pre-recorded cassettes*



1972 *Dolby FM: WQXR in New York begins full time Dolby FM broadcasting*



1975 *Dolby Stereo: First feature film with Dolby Stereo optical soundtrack; first film with surround encoding follows in 1976*



1979 *Dolby HX: Headroom extension technology for audio tape recorders; HX Pro follows in 1982*



1980 *Dolby C: C-type noise reduction for audio cassettes*



1982 *Dolby Surround: First consumer surround decoder to play videotapes of Dolby Stereo films*



1984 *Dolby AC-1 A digital audio transmission system known as Soundlink and based on adaptive delta modulation*



1986 *Dolby SR: Spectral Recording, a dramatic improvement in analog tape recording*

1987 *Dolby Pro-Logic: Directional enhancement system for surround decoders*

1988 *Dolby Stereo SR: First movie release using SR encoding*

1989 *Dolby S: S-type, a consumer version of Dolby SR, greatly improves the fidelity of the audio cassette*

1990 *Dolby AC-2: A digital adaptive transform coder allows significant bit rate reduction with no loss of quality*



NEWS

FROM AROUND THE WORLD

Lansdowne Completes Upgrade
Lansdowne recently announced the completion of work on its West London studio, designed to cater to virtually any kind of recording project, from rock and pop tracking and mixing to complex film, video and broadcast work.

At the heart of the redevelopment is the control room, designed by Roger D'Arcy of Recording Architecture. Following rigorous Time Delay Spectrometry analysis, the old control room was completely gutted and all original treatments were removed to produce a consistent, neutral acoustic environment.

The control room's main feature is the Neve VRP console, the first of its kind to be installed in the UK. The VRP offers 48 inputs with complete recall on all settings and Flying Faders automation. The console is also equipped for full Dolby stereo film mixing and audio post-production for video.

The newly purchased Sony 48-track digital recorder will be run in conjunction with the Neve console, offering clients more options in flexibility and sonic performance. Additional tape machines include the Studer A820 24-track with Dolby SR and the new Studer A820 8-track recorder with SR for post-production and Dolby stereo work.

Lansdowne's new monitoring setup, a pair of ATC SXCM 200As, ensures precise stereo imaging throughout the control room. In addition, full Dolby stereo monitoring is provided for film scoring via ATC SCM100As and SCM20s.

The control room and studio areas now contain a comprehensive network of tielines for MIDI, audio and video. Extra mic patch bays have been added in the newly refurbished studio to give a total of 96 mic lines from the studio to the control room.

The new studio, the largest independent facility in the UK, represents

Studio Spotlight: Couleurs Studio

Located less than 22 miles from Paris in scenic Auvers-sur-Oise, Couleurs Studio was built in March 1987 by owner Laurent Thibault. The studio was built on the site of a 1780s stone residence that looks out on more than an acre of gardens.

The Tom Hidley-designed control room is equipped with a 60-input Neve VR console with Flying Faders automation, Roger Quested monitors and various out-board gear. A Mitsubishi X-850 32-track and a Sony APR-24 multitrack are located in a separate room.

The main control room is video-linked to two smaller recording spaces located across the street. The larger of the two rooms is designed to be very live and features a Bösendorfer grand piano. Adams-Smith synchronizers and Sony U-Matics enable Couleurs Studio to work with audio-for-video.

Formerly a recording engineer at Studio Chateau d'Herouville, Thibault has worked with the likes of David Bowie, Elton John, Pink Floyd and Fleetwood Mac, to name a few.

—Guillaume Schouker



a major bid by the Lansdowne Group to address an increasingly competitive market.

Producers Guild Seeks to Increase Involvement Across Europe

With 1992 and the opening of a unified Europe just around the corner, the British Record Producers Guild is looking to expand its activities by linking with producers based on the mainland.

The guild is already recruiting European members and has forged links with a number of producers working in the U.S. The members hope that more European-based producers will come onboard.

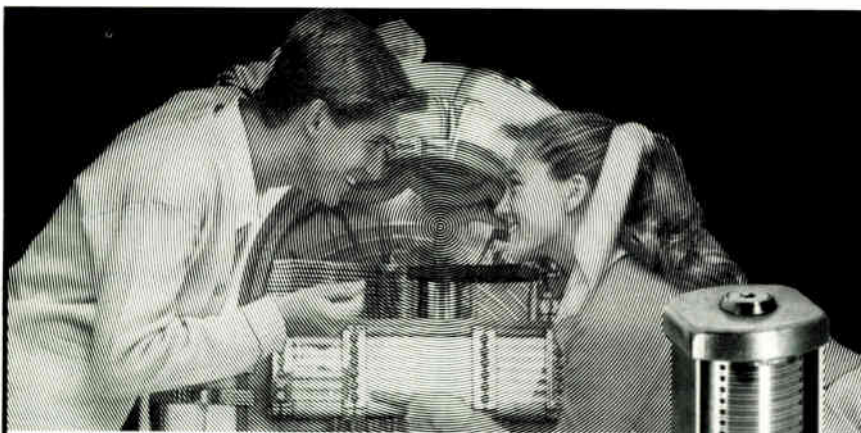
The guild hopes to extend to overseas-based producers the collection of GVL, the German needle time payment. It is also looking at other European territories to see if needle time payments can be negotiated for its members. Another benefit of the guild to European members will be free access to its proposed database on UK recording facilities and international session musicians. The guild provides producers with a forum through which they can exchange ideas and information. It also arranges regular technical seminars to give producers hands-on experience with new equipment.

Since its inception three years ago, the BRPG has steadily increased its membership to the current level of over 70 of the UK's top producers. For more information contact Omer-Li Cohen at (44) 71-586-9795.

Association of Motion Picture Sound Establishes Goals

The London-based Association of Motion Picture Sound had its inaugural meeting earlier this year at London's Pinewood Studios. Formed to promote and encourage the science, technology and creative application of all aspects of motion picture sound recording and reproduction, the group holds monthly lectures, forums and demonstrations.

With a current membership of over 150, the association intends to recruit throughout the entire motion picture sound community, in hopes of improving the state of sound in that industry. For further information contact David Old, 27-29 Berwick Street, London W1V 3RF, UK.



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Studio A is the largest of three recording spaces at Guillaume Tell Studios in Paris. Up to 120 musicians can be comfortably accommodated in an area of 300 square meters, and a second adjoining area with flatter acoustic properties can be used for recording vocals or rhythm sections. Adjacent to this space is a Tom Hidley-designed control room with Mitsubishi and Sony 32-track digital recorders, a Studer analog multitrack and an SSL 4056E console.

New Factory for Lyrec

Lyrec, the Danish tape recorder and high-speed tape duplication equipment manufacturer, has moved to new factory premises in a suburb of Copenhagen.

Occupying 2,400 square meters of factory floor, the new premises at Mileparken provide enormous potential for future expansion. The industrial park is situated 20 minutes from Copenhagen's international airport. Surrounded by manufacturers of electronic equipment, the new building is also ideally placed for access and communication with the company's subcontractors. The move will enable Lyrec to meet the increase in market demand for its products.

UK Studio News

Ridge Farm, one of the UK's best-

known residential facilities, installed a 60-channel Neve VR console with Flying Faders on all settings. Owner Frank Andrews founded the studio 12 years ago in Surrey... London's **Audio Outpost** is a two-room post-production house based around the second-generation digital AudioFrame. The recently completed design will provide all-digital tapeless audio-for-video and film post-production... The **BBC** purchased its second Soundmaster integrated audio editor for its dubbing suite at Television Centre... In other British broadcast news, **021 Television**, **Granada TV** and **SKY Television** have all ordered Amek Classic consoles... Installation of four Lexicon Opus random access digital audio production units has begun at London's **Silk Sound**, the first European studio with all editing rooms structured around

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INTERNATIONAL UPDATE

Opus...Another Opus found a home in **Advision's** mobile recording studio, based in Brighton...In London, **Swan Yard Studios** purchased a Motionworker synchronizer for its SSL-equipped remix and post-production room... Also in London, **Cine-Lin-**

Otari MTR-90II 24-track recorder, a Tascam MSR-24 multitrack machine and UREI 813C monitors...Meanwhile, on the other side of Canada, Toronto's **Studio 306** installed a Neve VRP console with Flying Faders. Intended for use in audio post-production, the studio's new console is supported by a Mitsubishi 32-track digital recorder



The new look at Lansdowne, featuring a Neve VRP and design by Recording Architecture.

gual Sound Studios added a third high-speed film-dubbing studio. The room includes Magna-Tech recorders and interlocked high-speed projectors...The world's first delivery of the TimeLine Lynx SSL Data Interface was made to **T.V. South** in Southampton, UK. Installed in an SL 5000 Series console, it's a flexible, cost-effective method for the SSL studio computer to talk directly to audio tape recorders and peripheral equipment using the TimeLine Lynx. The Lynx SSL Data Interface is a joint development between TimeLine and SSL...To answer increasing demands for DASH-format recording capability, London's world-famous **Air Studios** added Sony PCM-3348 and PCM-3324 recorders to its existing inventory of digital multitrack machines...

Canadian Studio News

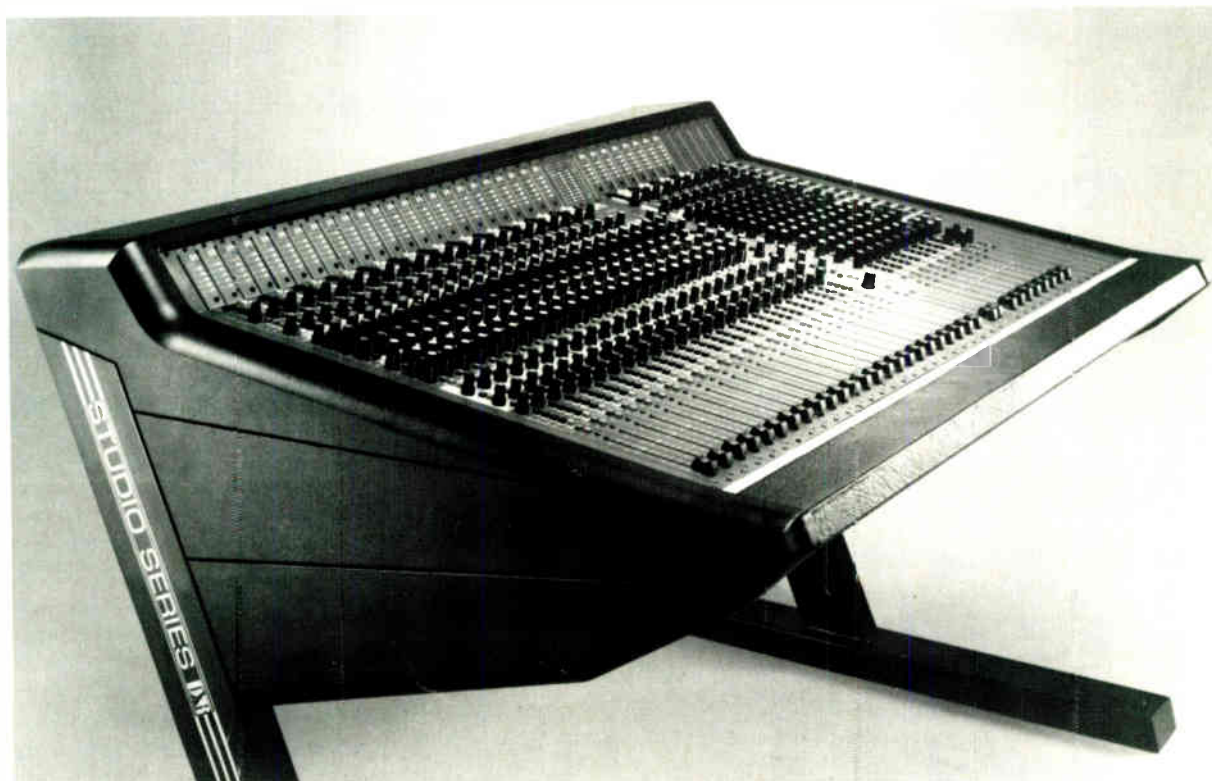
Soundwerks of Vancouver, BC, has opened a new facility for rehearsal and music production. It's equipped with a 36 x 24 Soundcraft 6000 console, an

and an Adams-Smith 2600 synchronizer...The **Canadian Broadcasting Corp.** has installed its first Solid State Logic SL 6000 G Series console in its recently renovated **Studio 7 Audio Facility** in Toronto. The SSL studio is an interim facility for this national broadcaster. A major CBC center is now under construction in Toronto and is scheduled to be completed in 1993. The SSL will move to the new facility at that time...CBC's facility in Montreal purchased two Hybrid Arts ADAP IIs for use in editing sound effects for CBC-produced TV programs...

Studio News Around the Globe

Other recent installations of the ADAP II include **Bavaria Film**, **Wesdeutscher Rundfunk** and **ZDF TV**, all in Germany, and **Centre de Musique Information** in Paris... Recent deliveries by DAR included 4-channel SoundStations to **Radio France** and **BBC Belfast**; a 16-channel to **Eurosonic** in Madrid; and an 8-

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channel SoundStation to **Bekker**, a video post house in Dusseldorf, West Germany...Also in Germany, **Maarweg Studios** in Cologne (formerly **EMI Electrola Studios**) concluded work on a new remix suite that includes an SSL 4056 G Series desk. Acoustics for the room were designed by Sam Toyoshima and John Flynn...Solid State Logic reports several new installations of ScreenSound. New clients include **Ecoutezvoir** in Paris and Dutch broadcasting company **Nederlandse Omroep Bedriff**. In Japan, Osaka-

based **ABC** has also purchased a ScreenSound...A number of French facilities have recently added TimeLine Lynx Keyboard Control Unit and Time Code Modules to their arsenals. **Studios Philippe Sarde** in Paris, **L.T.C.** in Saint Cloud and **Teletota** in Lavoisier-Perret have incorporated the TimeLine equipment to aid in film and video post-production work...Two replicating facilities in Spain and Taiwan each installed an Optical Disc Corp. compact disc mastering unit. ODC 530s are now in operation at **Ibermemory's** audio duplicator plant in Madrid, Spain, and at



Managing director John Burgess (left) and studio manager Malcolm Atkin of Air Studios with new Sony PCM multitrack purchases.

Ritek, a CD replicator located in Taipei, Taiwan...

International Industry Notes

Amber Technology (Brookvale, Australia) has been appointed as Australian distributor of **Otari** recording products...**Pandora International Ltd.**, manufacturer of digital equipment, has signed a license agreement with **Rank Cintel Ltd.** The agreement allows Pandora to supply its telecine grading POGLE to customers of Rank's URSA digital telecine throughout the world...**Audio Kinetics** appointed Roger Patel to the position of international sales manager...**New England Digital UK Ltd.** moved into a new 3,000-square-foot office complex in West London's Hammersmith section earlier this year. The office includes three demo studios all serviced by a central computer room containing five NED systems. Concurrently, Mark Terry was promoted from European director of sales to vice president of international sales at NED... **HHB Communications** announced that Steve Gunn has joined the pro audio sales team, and the service department is strengthened by the arrival of Chris Heap as service engineer... The Australian International Interactive Communications Association and Technisearch Ltd. are jointly presenting the Australian Optical Disc Conference at the World Congress Centre in Melbourne, August 21, 22 and 23. For details contact Technisearch at (03) 660-5100 or fax (03) 663-6925.

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Designed for snare drums, toms, and other percussion instruments, it clamps directly to the rim or, with the H408 bracket, it can be attached securely to a tuning lug. The C408 has click stops so you can set it at virtually any angle and is "road" rugged.

It's terminated in an XLR-type connector for direct phantom powering or use AKG's model C408/B with optional B9 power supply/mixer which can power two MicroMics.

The C408 joins AKG's family of microphones, the most widely used in U.S. recording studios, according to a recent *Billboard* survey.*

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NEW PRODUCTS

RADIAN MM-8

Designed for studio, mastering suite and other critical applications is the Monitor Standard™ series of high-performance loudspeakers from Radian Audio Engineering of Anaheim, Calif. With its 8-inch coaxial driver and compact cabinet, the MM-8 is the smallest model in the series, which also includes 10- and 12-inch versions. High frequencies are handled by a full-size, coaxially mounted compression driver that uses the flare of the woofer cone to provide 120° dispersion, eliminating the sweet spot commonly associated with small monitors. The MM-8 is a compact 10x16x8 inches; stated specs include 100 watt power handling and a usable frequency range of 35 to 22k Hz.

Circle #275 on Reader Service



CLEAR-COM STEREO MONITOR

The Model 1021 from Clear-Com (Berkeley, Calif.) is an amplified, 2-channel audio monitoring system providing 100 to 12k Hz response using one 6-inch LF and two 4-inch MF/HF speakers in a single-rackspace unit. Features include balanced XLR line level inputs, dual level controls with LED meters and a stereo/mono switch.

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AMS AUDIOFILE PLUS

The AudioFile Plus from AMS Industries (Petaluma, Calif.) is a significantly expanded, extended-architecture version of the popular hard disk-based editing system. Through the use of 32-bit transputer technology, system operations are much faster. Other enhancements include: a new card frame layout, allowing up to eight simultaneous inputs/outputs in both analog and digital formats; a 4-channel AES/EBU digital I/O card; and an announced read/write, magneto-optical disk pack backup/archive subsystem. A hardware retrofit is available for upgrading existing AudioFiles to the Plus version.

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SAUSALITO CRAFTWORKS E-SERIES

Sausalito Craftworks (Sausalito, Calif.) has expanded its line of studio rack furniture available in five sizes, ranging from four to 20 spaces. The E-Series features durable gray melamine construction, metal rack rails and includes equipment mounting screws with protective plastic washers.

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BEYER MC 742 STEREO MIC

New from Beyer (Hicksville, N.Y.) is the MC 742, a stereo condenser mic based on the company's successful MC 740 studio microphone. Like its



predecessor, the new model offers five polar patterns, and with the MC 742 these can be selected independently for each capsule. The two elastically suspended capsules are 21.5mm in diameter, and the upper capsule can be rotated up to 360° in relation to the lower, to accommodate a wide range of stereo recording techniques.

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KRK CLOSE-FIELD MONITORS

Distributed by Audio Intervisual Design of Los Angeles are KRK close-field monitors. Priced at \$750/pair, the 703 (12x11x10 inches) is designed for console-top listening, with a 7-inch Kevlar woofer, inverted Kevlar tweeter and a frequency response of 54 to 15k Hz (±3dB).

The 1002 (\$1,350/pair) is a medium-sized, two-way with 10-inch LF and inverted Kevlar tweeter providing 49 to 19k Hz performance. The 1303 (\$2,350) is a three-way bi-amp/tri-ampable system with 13-inch woofer, 5-inch mid and Kevlar tweeter offering 38 to 19k Hz performance at 108dB SPLs and above.

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HILL RACKMOUNT MIX SERIES

Minimix (16x2), Multimix II (16x4x2) and Omnimix (20x8x8x2) are three new rack-mount mixers from Hill Audio (Tucker, Ga.). Designed for recording, broadcast and live sound applications, all feature line/mic input switching, balanced XLR mic inputs, LED metering and 100mm long-throw faders. The \$1,699 Minimix has 2-band EQ and

four aux sends; the Multimix II (\$2,499) offers 3-band EQ, two aux sends, four subgroups, phantom powering and a variable configuration that can be 16x2x1, 12x4x2x1 or 16x4x2x1. Omnimix (\$4,499) features 28 usable inputs, eight subgroups, 12 mono/4 stereo inputs, 3-band EQ (with sweepable mids), four aux sends and an optional 16-channel meter bridge.

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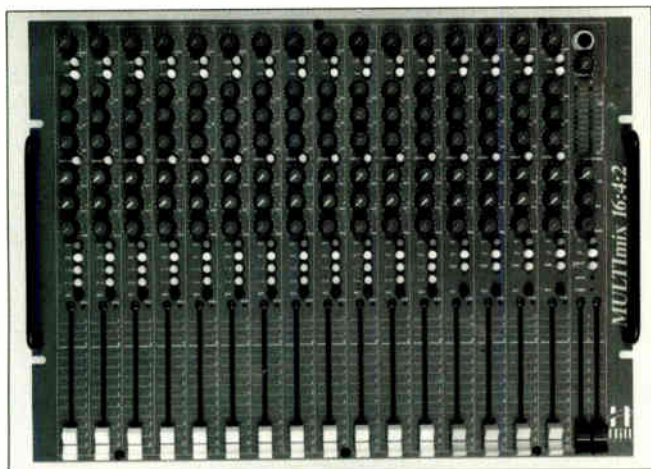
System 215 DMT. HF diaphragms are Duralumin (an aluminum/magnesium alloy), surrounded by a natural rubber surround, which is said to remove unwanted resonances from the diaphragm

TANNOY STUDIO MONITOR SERIES

The new Studio Monitor Series from Tannoy (distributed by TGI, Kitchener, Ontario) was unveiled at this summer's APRS show in London. Based on Tannoy's patented Differential Material Technology (DMT™), the new line consists of the System 2 NFM, System 8 NFM, System 10 DMT, System 12 DMT, System 15 DMT and

itself, thus eliminating HF coloration. A similar approach is also applied to the mid/bass units. Other than the discrete System 2 NFM, all of the monitors in the line use redesigned Tannoy dual concentric drivers, mounted in high-density MDF cabinets with rounded edges to minimize diffraction and reflection effects.

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HOT OFF THE SHELF

Agfa's SR-XS is an advanced Type II chrome cassette designed for studio reference applications. Offered in C-60 and C-90 lengths with a precision shell, the SR-XS is available exclusively through pro audio dealers... **Promusic** has expanded its production library to 230 CDs, including "Hibou" (a general-purpose library) and four classical CDs from the Parry Music Library. Call (305) 776-2070 for details... **Sweetwater Soundblock SW900** (\$795) is a new collection

of orchestral sounds providing over 50 new keyboard setups for the Kurzweil 250/RMX/Expander series. Call (219) 432-8176 for info... **BITTEST.DSP**, a test program for the System One Dual Domain from Audio Precision, generates digital data patterns that are analyzed to provide bit-level error detection for digital signals passing through interfaces, transmission links, or recorded and reproduced from digital media. Call (503) 627-0832 or

(800) 231-7350 for more info... The **Champion Series**, from 27th Dimension, is a ten-CD set of production music, including industrial-length cuts as well as alternate mixes and 30/60-second versions. Also new is a two-CD **Christmas Music Package**, with traditional and original music and seasonal sound effects. Call (813) 763-4107 or (800) 634-0091... **Mic-power** from Whirlwind is a portable phantom power supply that delivers 12-48 VDC for 50

hours from two 9-volt batteries. Call (716) 663-8820 or your local dealer for info... Due to expanded production capability, and to heighten awareness of the format, the price of **Sony D2 digital videotape** has been reduced by 20% nationwide. Call your dealer for details... Northstar Productions has increased its offerings of **Akai S1000 sounds** to a total of 116 banks, available on 45MB removable cartridges or floppy disks. Call (503) 560-7777 for a catalog. ■

by George Petersen

PRODUCT

CRITIQUES AND COMMENTS

Tannoy PS-88 Powered Subwoofer

The use of compact studio reference monitors has changed dramatically over the past decade. In 1980, most studio work—tracking, overdubbing and mixing—involved listening on large mains systems about 90% of the time, with the remaining 10% of the monitoring on small speakers, just to hear how it sounds on the little guys. Today, that process is almost entirely reversed, with 90% of the monitoring done on the engineer's fave reference speakers *du jour*, with the tracks occasionally played on the big guys (to check for overall balance and LF irregularities).

The popularity of MIDI rooms, home facilities, project studios and the like has given rise to a more recent trend: engineers dispensing with the large studio speakers and working entirely in the domain of monitors designed for close- and near-field listening. The problem is many of those oh-so-cute

little speakers (precariously perched atop consoles everywhere) lack adequate bass response, particularly in the critical 50 to 100Hz range.

With this dilemma in mind, Tannoy is now offering a solution in the form of the PS-88, a compact, powered subwoofer system priced at \$798.

Setup is a simple matter. The unit's back panel includes an output level control and stereo RCA line inputs, and speaker-level inputs (via heavy-duty five-way binding posts) are provided for those situations where obtaining a line-level feed to the subwoofer may be inconvenient.

The PS-88 operates by summing the left and right inputs to a mono signal that feeds an internal 100-watt mono power amp driving two 8-inch, 8-ohm woofers (wired in parallel for a net impedance of 4 ohms). The subwoofer is designed for under-console placement, and the PS-88's side-firing design avoids the dreaded foot-through-cone



syndrome that would inevitably occur had the woofers been placed forward, especially with the speaker under a console.

Since bass frequencies are largely non-directional in nature, the PS-88's output blends nicely with most small reference-type speakers, even with the PS-88 placed on the floor. The unit's crossover point of 110 Hz also complements most small reference speakers, and the PS-88's effective frequency range extends down to about 40 Hz.

My listening tests involved combining the PS-88 with a variety of small monitors. The bass seemed a little underdamped, which is not too surprising, given the inclusion of two high-output, 8-inch drivers in a sealed enclosure with a volume that is barely one cubic foot. However, I reduced this tubbiness by raising the PS-88 slightly off the floor, and Tannoy is now including some small spikes with the speaker to accomplish this in a more genteel fashion than the two 2 x 4 slabs I used.

Best results were obtained with the PS-88's level control set at half gain (the 12 o'clock position). The bass level was adequate in a small control room, with plenty of headroom. If you're hoping for throbbing, slam-dunk, up-against-the-wall bass, you're liable to be disappointed by the PS-88. However, it *does* deliver an appropriate balance that augments the bass performance of small monitors in precisely the range where they need it most.

Tannoy/TGI North America, 300 Gage Avenue, Unit #1, Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158.

The Hollywood Edge Sound Effects Libraries

You may have never heard of The Hollywood Edge. It's nothing to be ashamed about, as the company is fairly new. The Hollywood Edge is the recently formed merger between the two founders of Soundelux (the Hollywood-based audio post and sound design facility with dozens of major feature film credits accumulated over the last ten years) and Tod Maitland, C.A.S., a top recordist responsible for an equally impressive string of features. More likely, perhaps, you may have individually heard of the princi-

pals behind The Hollywood Edge: Lon Bender (sound designer and supervisor for *Glory*, which won this year's Academy Award for best sound) Maitland and Wylie Stateman; the latter two received Academy Award nominations for production and post-production sound work on *Born on the Fourth of July*.

Over the years, these three recordists have amassed a wealth of sound effects, and The Premiere Edition (a 20-CD set of general-purpose effects) and Cititrax (a ten-CD collection of urban sounds and street ambiances) are the first releases from the best of their libraries. Each set is priced at \$895, and the effects were recorded primarily on digital tape and edited entirely in the digital domain on an AMS AudioFile system.

The Hollywood Edge CDs are arranged in a logical fashion, thus simplifying the process of finding the effect you need. Similar sounds are grouped on a particular disc, making A/B comparisons a snap. Each set has an extensively cross-referenced index that includes detailed descriptions of each sound, along with running times, disc locations and data about the original recording (stereo or mono, analog or digital).

The Premiere Edition offers over 1,500 tracks: an enormous variety of useful sounds. A full CD is devoted to each of the following topics: nature ambiances; birds and animals; wind; water; rain, thunder, fire, bubbles; planes and trains; cars; traffic, sirens, motors, buses; guns and ricochets, explosions, fireworks; fights, body falls, cracks, whips; crashes, impacts and swishes; sports and boats; human sounds; crowds, kids, babies, heartbeats; interior crowds and ambiances; household; telephones, cameras, clocks; doors, squeaks, creaks; beeps, bells, buzzers, rumbles and tools; and electronic/sci-fi. While each CD includes a listing of all the tracks on the disc, and the 360-page index is exhaustive, some sort of quick reference card would be helpful.

Beyond the vast selection and variety of sound effects (for example, the "guns" disc offers everything from .22-caliber pistols to cannon blasts, along with shotguns, Uzis and black-powder muskets), the library is equally impressive in its first-rate sound quality. Just a quick listen to the insects buzzing in "Night Ambience #5" (one of seven night ambience tracks) is enough to

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AUDITIONS

make your skin crawl. I was not overly impressed with disc 20 ("Electronic/Sci-Fi")—a collection of mostly synth sounds—but 19 hits out of 20 is a pretty fair batting average. A majority of the effects in the collection are stereo and use the width of the sound image to full advantage. Just one of many examples of this is "Car Crash #16" (disc 11), which is spectacular, with a huge stereo perspective.

Cititrax is a ten-CD set of urban sounds: street ambiances; parades, preachers and prostitutes; cars, trucks, taxis, buses, boats and sirens; trains and subways; harbors and helicopters; horns and horses; joggers and jackhammers; bells and beggars; and every conceivable type of traffic background—heavy to light, and in dry to wet weather.

The collection began as over 90 hours of recordings that were edited down to the ten hours of material on the discs. Everything on Cititrax was recorded on location—there are no staged tracks—and the set does an excellent job of capturing the essence of the city. The cuts range from a few seconds to over four minutes, with most of the ambience tracks in the two- to three-minute range, which are

ideal for longer dialog scenes or as backdrops for commercials or radio production. By working with a basic ambience track, other elements, such as a garbage truck, some pigeons, a distant car alarm or a few horn honks can be added quickly and easily for a custom background.

Many of the sounds—especially sirens, traffic drive-bys and horns—are presented in wide perspective stereo, which can be panned closer or reversed to suit different applications. A number of sounds are also recorded close-in with the Doppler effects intact, for a sense of spatial realism.

One nice touch in Cititrax is an entire disc devoted to interior ambiences: restaurants, coffee shops, museums, large office lobbies, delis, grocery and department stores, malls, video arcades, and more, along with elevator, escalator and revolving door sounds.

Representing hundreds of hours of meticulous effort in recording and the editing stages, The Premiere Edition and Cititrax are impressive accomplishments, both in terms of the variety offered and the superb audio quality. Either CD set is reasonably priced at \$895, and is also available on DAT, AMS AudioFile format or as Synclavier optical discs. If you're looking for a



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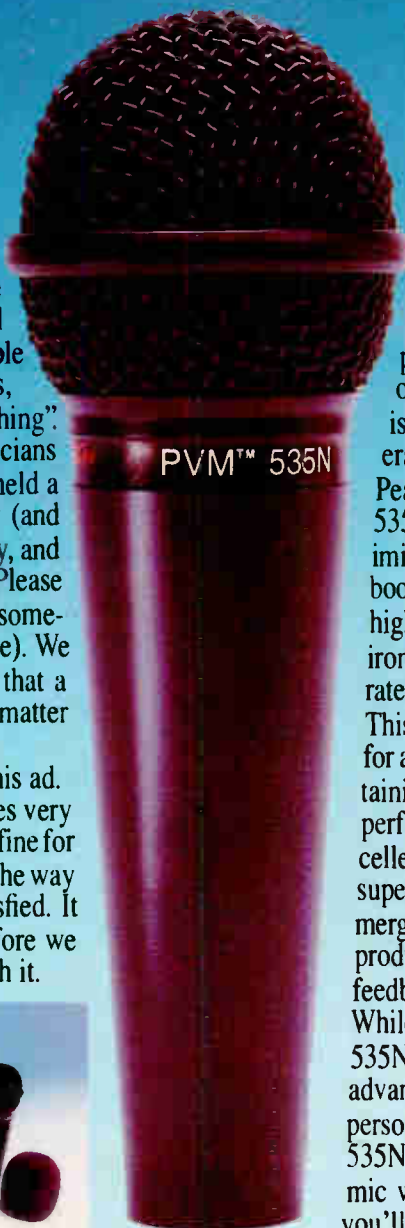
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Which brings us to the point of this ad. The price of progress is sometimes very costly. And while a "sure thing" is fine for a generation satisfied with things the way they are, technology is never satisfied. It must keep moving ahead. Therefore we are compelled to move ahead with it.



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Circle #142 on Reader Service Card

by Stephen Paul

CAD

EQUITEK II

MICROPHONE

The Equitek II is a relatively low-cost entry into the land of switchable pattern studio condenser microphones.

Located in Conneaut, Ohio, Conneaut Audio Devices (formerly Astatic Corporation, king of the push-to-talk CB and ham radio mics) seems, at a glance, to be staking out territory that has been the exclusive province of you-know-who and you-know-who-else. In fact, the company goes so far as to state in its advance promotional literature that the mic "can be compared with Neumann U87s, AKG 414s and even classic old units like the M50, the U47 and the C-12." That is a direct quote. Let's examine this mic closely. After all, that's a lot of freight to haul for 600 bucks!

In addition, it is claimed that "noise, dynamic range and bandwidth are all superior or comparable in the Equitek models." This is also a direct quote. Now, I don't want to seem like David Horowitz or something, but those are some pretty strong claims for a microphone at any price. I would say that if all of these claims were accurate and the thing sounded good to boot, a \$600 retail price would be too good to be true.

A look at the exterior of the microphone reveals a strong resemblance to the Neumann U47 tuber. The large grille, the oversize body and general shape bear this out. It's clear that the manufacturer wanted to recall this classic look for styling's sake. After all, the small studio owner can certainly impress clients with an edifice of this size, regardless of its sound. As long as it looks like one of those things from Germany, we must be in a good place!

The next thing I noticed is the group of small switches arranged around the base of the grille. These are (from left to right) the power



switch, pattern selector, a low-cut filter and a 20dB pad. The workmanship on the exterior is reasonably well-executed. The grille, however, didn't line up properly when fully screwed on.

Some of the features the manufac-

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turer included are somewhat novel. For example, the transformerless DC servoed circuitry for the audio (a DC servo circuit nulls the output offset voltage produced by the op amp and therefore makes it possible to eliminate DC-blocking capacitors in the audio chain); the pattern selection

Fig. 2 shows our first frequency domain measurement. This was taken on a calibrated TDS machine, traceable to NIST (formerly NBS). The mic was in the cardioid position, full gain, no roll-off. The chart shown here is a *linear* scale, which means the frequency markers are evenly spaced over the run of the chart giving the effect of expanding the range above

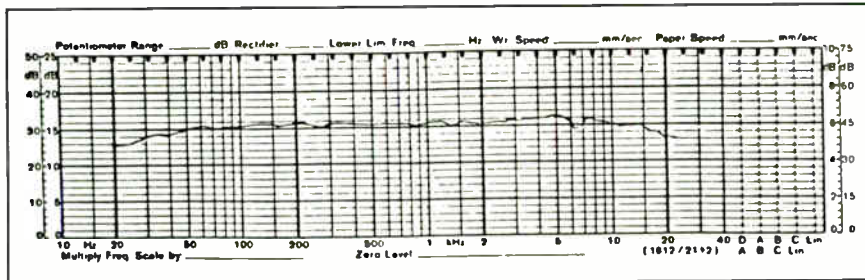


Figure 1

achieved by gain switching and polarity reversal of the op amp (an approach that has its advantages and disadvantages); and the non-capacitive pad. This is done through a feedback change around the op amp. (Ultimately, the best way to pad a condenser microphone would be to lower the polarizing voltage on the capsule. The only mics that currently use this approach are the Neumann 100 Series.)

In addition, the mic uses a unique approach of having two 9-volt nicads inside. The company claims this provides reserves of current that phantom power cannot supply, which results in "an open, silky sound on transients that has been possible only with separate dedicated power supplies until now." (Another quote.) The batteries are trickle-charged with the phantom power, but can operate up to nine hours on their own.

We turned the Stephen Paul Audio searchlight on the Equitek II. The first order of business is to run a series of frequency response graphs to see what the mic is actually doing in the frequency domain. The manufacturer published the response chart shown in Fig. 1. No dB scale is specified on this chart, nor does the manufacturer list one in the specs for the mic. It simply says "20 to 20,000 Hz" with no tolerance for plus and minus. The B&K chart shown is normally a maximum of 3 dB per horizontal division as per the rightmost scale. Judging by what we measured, it wasn't clear what was intended by this chart.

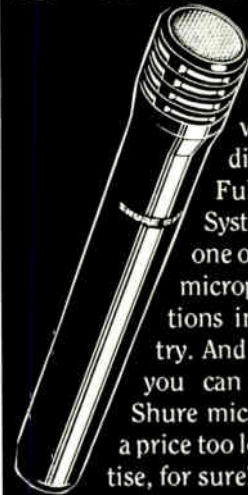
1 kHz for inspection ease. We can see that by 15 kHz things start to fall apart rapidly.

A real divergence from things occurs at 20 kHz. The variation, gauging by the published chart, would be a maximum of +4 dB; the actual measurement is -11 dB. At this same scale, we see that 15 kHz is claimed to be no more than 1.5 dB down, when our mic measured 5 dB down at this frequency. It wouldn't seem that a Neumann M50, which is normally flat or better at 20 kHz, as well as up to +9 dB at 10 kHz, is a candidate for comparison with this mic, if for that reason alone.

Okay, so the promo people went a little overboard...that's no reason to get excited, is it? (In fairness, it should be pointed out that a stock U87 is roughly comparable in bandwidth, if that is all we wish to compare. On the other hand, we're one hell of a long way from the bandwidth of an AKG C-12!) Well, let's see what happens when we switch patterns with this special circuit that has been called out as a feature. Figs. 3 and 4 show the other two patterns' effect on the zero-axis response. Notice the rather large dip at 5.3 kHz in the figure-eight pattern. We're down about 5.5 dB here. I guess we're still in the real world of mic design problems after all. A simple change, such as moving the mic capsules a little closer together, would probably make a significant improvement in performance.

The microphone is equipped with two 1/2-inch capsules of Japanese

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origin, complete with their own original windcreens and meshes over the parts themselves. This is enclosed in a further mesh screen that fits over the capsule holder assembly, and it is over all this protection (at least three layers of screen and one of foam) that the grille fits, adding yet another obstacle to the path of soundwaves entering the mic. We're getting pretty far from the source of the sound. The capsule holders are punched metal, and these are screwed into a rubber frame that isolates the pickups from mechanical vibration. These are placed within two black anodized aluminum girders, which run the length of the body.

As we travel down into the bowels of the mic, we see two nicely executed circuit boards with the nicads

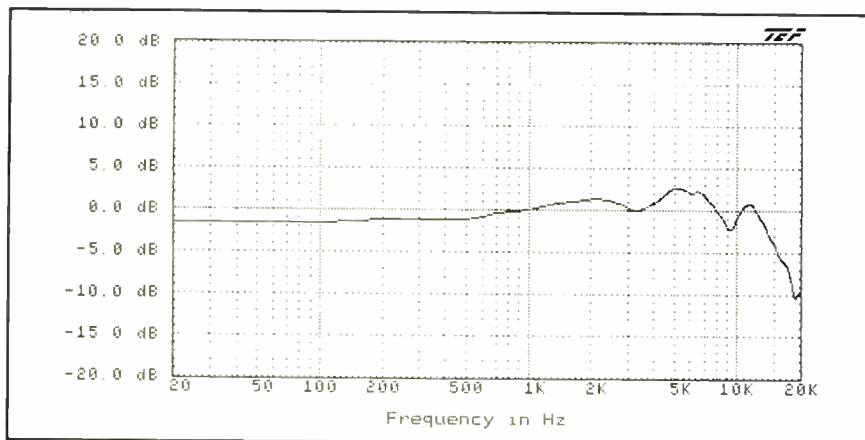


Figure 3: Omnidirectional Response Pattern

mentioned earlier mounted to them. A 40-cent TLO72 op-amp passes the audio along its way. (You chip-ophiles may draw your own conclusions from this.) The mic is certainly a valiant effort in some ways, and I'm happy to see *someone* trying to do *something* in America, but nice circuit boards do not a U47 make.

It is also claimed that the self-noise of the mic is "6dB SPL." I think that it is important to point out that this measurement was obviously carried out with the capsule removed and merely represents the noise capability of the amplifier. We did not attempt to verify this difficult specification, but it is essentially an impractical number to claim. The best of today's studio mics run anywhere from 12 to 19dB equivalent self-noise (with some rare exceptions under this figure, such as B&K), and the DIN specs are

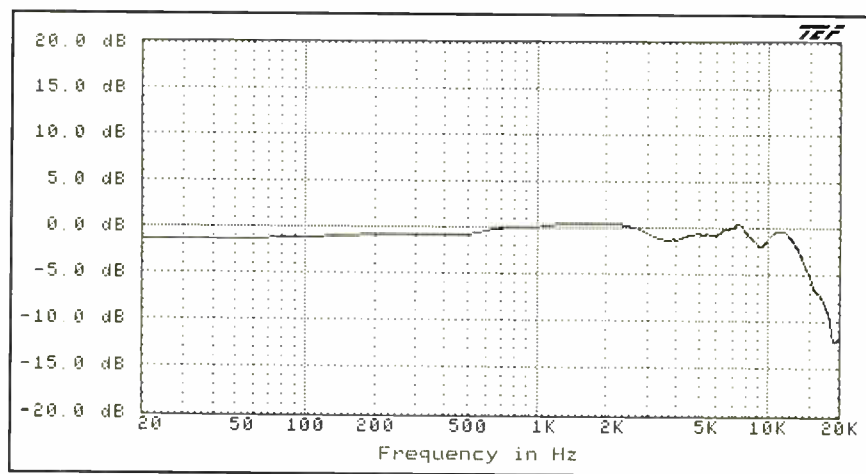


Figure 2: Cardioid Response Pattern

pretty rigid about how this must be specified. The mic is reasonably quiet, and this is what really counts.

Before embarking on listening tests, we need an overview of what is really

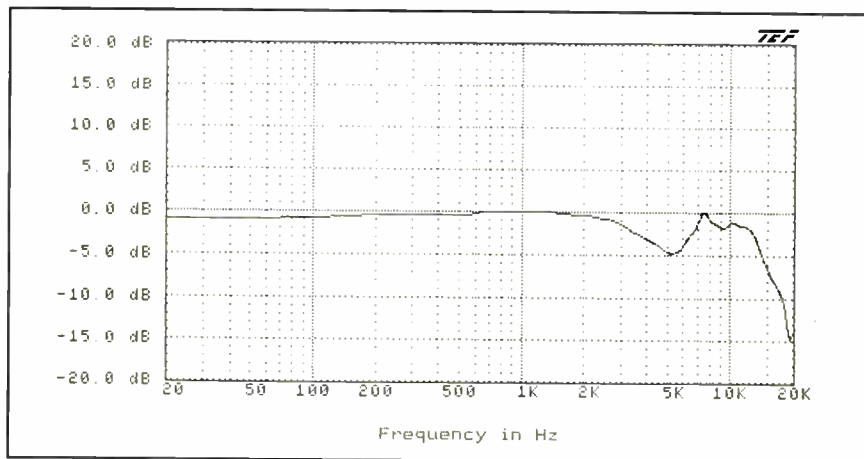
capsule on which all our hopes are truly pinned. No amp in the world can compensate for the shortcomings of the capsule.

This microphone is basically equipped with a pair of electret off-the-shelf capsules from an OEM supplier in Japan. The mic is ultimately only going to be as good as that. In addition, the capsules have been sequestered away in so many screens and so much padding that it isn't a big wonder that the high-frequency response is flagging. These are just the more prosaic observations witnessed on the surface. In addition, no matter how large the *case* is, it's the large diaphragms that give this mic's admitted competition the sound we associate with those upscale models.

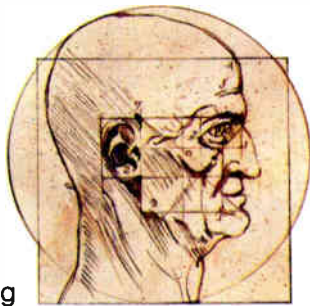
Ultimately though, how *does* it sound? Will our scientific discoveries and our acoustic theories turn out to mean nothing at all, and when we plug this beast in will we be astounded regardless of the evidence? I was willing to be shown. After all, once I'm done with measurements, I

important here. The heart of a great condenser microphone is the capsule. Yes, the electronics are important in bringing that inherent sound to the outside world, but it is the

Figure 4: Figure Eight Response Pattern



LEXICON THE ART AND SCIENCE OF SOUND



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Lexicon
The Art and Science of Sound

just want to know if it sounds good!

Well, here we all know that *everything* must be good for something. Certainly when it comes to vocals, this mic is not a big-time contender. Before you think I'm being too hard on this product, I want to remind you of the manufacturer's claims. It's one thing to try offering a good value for the dollar, it's another to say that the performance is equivalent to a \$2,000 mic, or worse yet, to a \$3,000 tube U47. This mic will not cause any sleepless nights at Neumann.

In listening tests, the mic fared about as well as its response charts might suggest. The ETC reading (not shown) reveals myriad reflections from the multitude of acoustic barriers in front of the capsules. This contributes to an exaggerated sense of "smear" in the image. The mic sounds very much like a garden variety electret with gratings over it, which is exactly what it is. No surprises here. If equalization is not a big problem, and you're willing to crank it on, the mic could be used on a number of things. In the small studio, the variable pattern might come in handy, but you have to be willing to

tolerate the swings in frequency response that are characteristic of most multipattern mics, and in this mic are essentially uncontrolled by the designer.

For \$600 there is certainly quality competition for this microphone. The Neumann KM140 cardioid costs only a bit more and delivers more performance from the capsule while being the closest cardioid equivalent. (Other patterns are obtainable at extra cost through interchangeable capsules.) If you want genuine large-diaphragm performance, the next logical step would be the AKG C-414, which is also multipattern and only a small step up in price. However, the street price of the Equitek II will likely render it a candidate for the studio owner who really wants a mic that *looks* a certain way to impress clients.

We tried it on voice, piano and guitar, and though it sounded predictably rolled-off in the top end, there's no reason that the mic couldn't be used in some circumstances. I wasn't really sure what the bass roll-off was for, as the mic is not suited for outdoor recording (where wind noise might be a problem), and there wasn't

much proximity effect in cardioid. There was more in figure-eight, and there the bass roll-off function might be useful at some junctures. The main thing to do is ignore the specs that the manufacturer gives you (which need some honing anyway) and see if the sound gets you off. If you need a *big* mic for some reason, and you want to buy American (case and circuit boards anyway) and you don't mind that inside this huge mic are these rather small capsules from the Land of the Rising Sun, check it out!

It is certainly a step in the right direction in some areas, most notably the servoed transformerless circuitry designed by David Baskind. As competition for the star cruisers working the vocal circuit, however, I think the folks at Conneaut need to roll up their capsules and go back to the drawing board.

Conneaut Audio Devices, PO Box 120, Conneaut, OH 44030; (216) 593-1111. ■

Producer/engineer Stephen Paul runs Stephen Paul Audio, Inc. of Burbank, California, and is currently completing his first solo album.

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Audio explorers are also applauding the new *Function Generator* that lets you program autopanning, arpeggios, sweeping flangers, randomized vocal doublers and much more. And *Soft Functions* that lets you customize your own H3000SE front panel to get the precise sound you need faster and easier. You can even add Eventide's exciting new HS322 Internal Sampling Board—it gives any H3000 up to 23.7 seconds of 16 bit, 44.1 kHz sampling at a breakthrough price.

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Circle # 156 on Reader Service Card
World Radio History

by Mark Herman

SOUND REINFORCEMENT NEWS

When the Seattle Mariners wanted a rock 'n' roll-quality playback system for the Kingdome, they called on Proshow, which installed six clusters of Electro-Voice MT-4 enclosures to handle the venue. Twenty-one Crown Macro-Tech 1200 and 2400 amps (under IQ System 2000 control) power the system.



have been using for nearly 18 months. The M6 system was used last summer for large stadium shows by **Cliff Richard** at Wembley Arena and **George Michael** touring in Southern Europe. **Mike Scarfe** of MHA says, "We have sold all our European stock of Hill M4 loudspeakers with 64 flying cabinets going to an Eastern Bloc sound company that specializes in concerts by U.S. and European acts touring in the USSR. U.S. stocks of the M4 system are also going fast to regional sound companies."

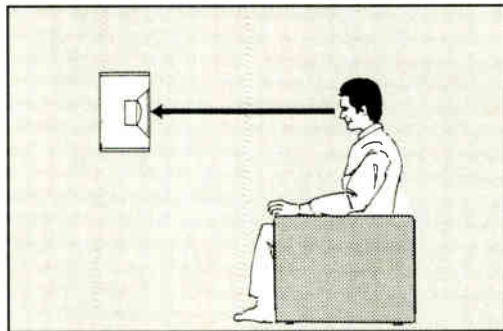
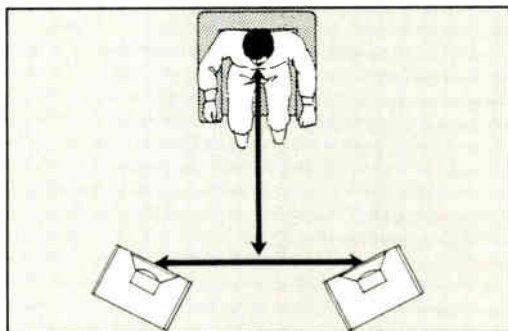
Sound Image (San Marcos, Calif.) has added a new 160,000-watt main system to handle stadium dates for **Jimmy Buffett's** summer tour. **Ross Ritto** says, "This is the biggest system we have ever put together. We are building 82 of our proprietary Phase-Loc speaker cabinets—44 three-ways, 24 subs, eight long-throws and six center cluster boxes." New QSC 3800, 3500, MX2000 and MX700 amplifiers will be combined with the existing stock of more than 600 QSC power amps. Sound Image

Sound reinforcement companies across the country report heavy business. I've heard no complaints this season except for the familiar "I need more equipment!" blues that always seems to hit hardest in June, July and August. There is definitely no shortage of tours, festivals, fairs and regional work this summer.

MHA Audio (Hagerstown, Md.) has tours in the U.S. and Europe. **Gary Moore, Marillion, Fish** (ex-

singer with Marillion), **Saxon** and **Status Quo** traveled throughout Europe. These acts enjoy tremendous success overseas but have little impact in North America, although Marillion did just begin their second U.S. theater tour this year. MHA's biggest U.S. tour features the energetic **B-52's** hitting sheds and arenas with opening act **Ziggy Marley & The Melody Makers**. The B-52's tour will be the U.S. debut of the new Hill M6 speakers system that MHA's European clients

Fostex RM Monitors Leave No Room For Error.



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The RM high directional design is a true coaxial point-source reference. All the sound reaches your ears at the same time, just like in nature. Thus RMs are working tools for those who work with sound. They are especially good for mixing because what you hear is what you get.

Now you can end the frustration of mixing something in the studio and hearing it sound different on home and car systems or in other studios. The mix you create on your RMs will sound proportionally the same on all other playback systems.

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RMs are designed for the classic listening arrangement: placed the same distance apart as from the center point to the listening area or "sweet spot", with our drivers and your ears on the same horizontal plane.

In fact, a good test of correct placement is to sit down after arranging a pair of RMs as shown above. Listen for a few minutes, repeat the program material and after 30 seconds, stand up.

The sound changes radically because your ears are now out of position. Try this simple, effective test with other so-called near-field monitors. Then ask yourself this musical question: "Who's kidding whom?"

So listen to a pair of Fostex RM monitors--one of our three models will best suit your application. A neutral, accurate reference you can rely on, leaving no room for error.



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RM-900

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RM-1000

12" Woofer
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LSA* Tweeter
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has also been touring this summer with **Jackson Browne, Barbara Mandrell, John Denver, Melissa Etheridge** and **Robert Cray**.

Speaker glasnost...Loudspeaker manufacturer McCauley Sound (Puyallup, Wash.) was recently invited to the USSR for marketing venture talks by a Soviet loudspeaker manufacturer. Owners Tom and Pete McCauley spent two weeks in the Soviet Union discussing a possible trade of American manufacturing expertise and parts in exchange for rights to the vast, untapped Soviet loudspeaker market. Tom McCauley says, "They have a tremendous demand for good-quality loudspeakers. We have the design strategies, precision instruments and overall manufacturing and testing quality that can re-

ally boost the sales of an already successful loudspeaker firm." The Soviet loudspeaker cooperative presently houses manufacturing firms in Moscow, Leningrad and what is presently known as Lugansk (formerly Voroshilovgrad). With new designs and materials, the Soviets hope to expand their business even further. Both companies view this joint marketing venture as a "long-term business affiliation with far-reaching advantages—not only economically, but socially as well." Eventually, McCauley plans to manufacture loudspeakers at the Soviet factory. For the time being, only parts will be shipped to the USSR; further trade and marketing issues will be explored during McCauley's next visit in November.

Mac attack...For all of you who have dreamed of a compact, road-worthy, rack-mounted Macintosh com-

puter with shock-mounted components, the wait is over. The rugged, fully serviceable, 4-rackspace **Mac 'n Rack SE/30** is now available as a retrofit, complete system or custom configuration from Current Music Technology; call (215) 647-9426 for info.

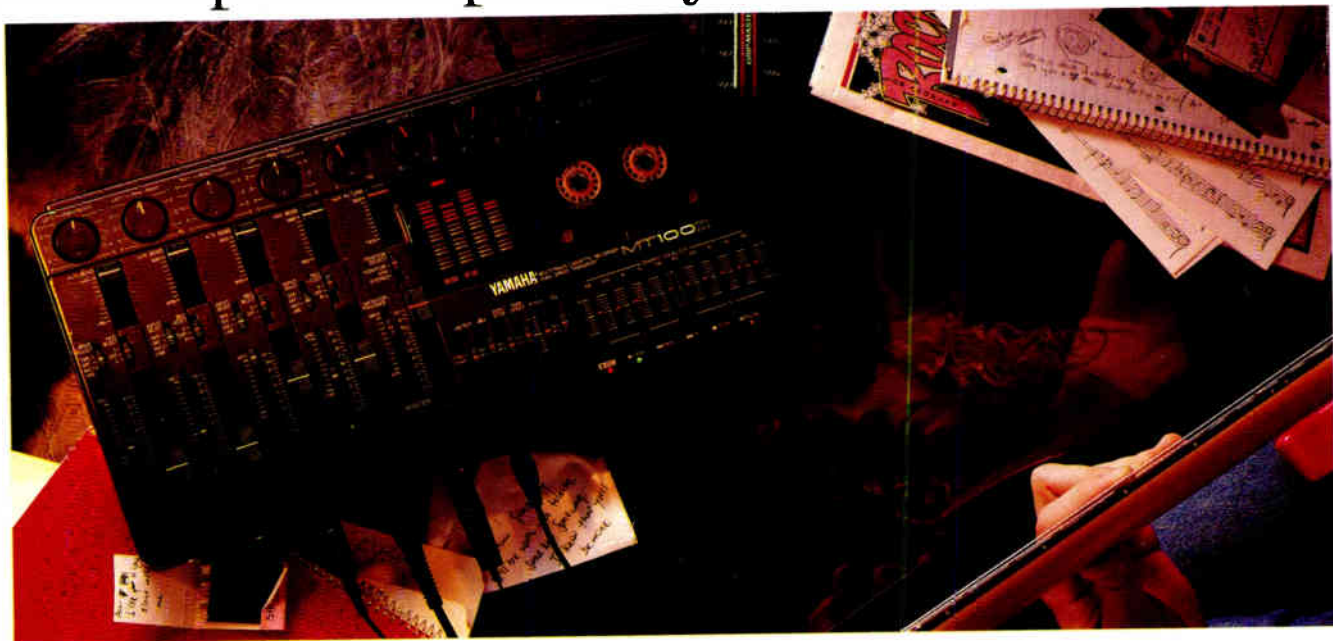
Clair introduces new pro audio line...Audio giant **Clair Brothers Audio** (Lititz, Pa.) opened Clair Brothers Audio Systems in January, expanding into the worldwide sound contracting and audio designing market with offices in London, New York, Tokyo, Montreal and Phoenix. With the formal unveiling of the 12AM portable stage monitor system at the Trump Plaza Hotel and Casino in Atlantic City, N.J., the new company, headed by Gene Pelland, introduced the Clair Brothers Professional Product

ON THE ROAD

SOUND COMPANIES, EQUIPMENT, ARTISTS & PERSONNEL ON TOUR

Artist Sound Company Tour Dates Region	House Console #1 House Console #2 Monitor Console #1 Monitor Console #2 House Crossover	Main Speakers Main Speakers Subwoofers Monitor Speakers Monitor Speakers	Main Amplifiers Main Amplifiers Sub Amplifiers Monitor Amplifiers Monitor Amplifiers	Engineers: (B) = band (H) = house (M) = monitor (T) = tech (a) = assistant (C) = crew chief
Hearst Audio Analysts June-1991 North America	CADD SM-2H 40x16x2 — Gamble 32x16 — AA	(52) AA HDS-4 (8) AA HD Subs AA 2x15, HDA-3 AA S3	Crown MA2400 — Crown MA10000 QSC 3800 QSC 3800	Richard Erwin (B,H) Sean Webb (M) Roger Blinette Tom Satterfield Robert Behrens
Bruce Hornsby Schubert Systems June-December U.S.	Gamble EX 56x16x2 Yamaha PM3000 40x8x2 Ramsa WR-S840 40x18 — SSG Custom	(32) SSG Steradian (16) SSG Steradian Sub SSG 1x12, 1x15	Crest 8001, 7001 — Crest 8001 Crest 7001	Dirk Schubert (B,H) Allan Bonomo (M)
Barbara Mandrell Sound Image April-December North America	Yamaha PM3000 40x8x2 — Ramsa WR-S840 40x18 — BSS FDS 360	(10) Phase-Loc Series 5-H (6) Phase-Loc Series 5-L Phase-Loc 1x15, 2x15 Phase-Loc Series 2 sidefills	QSC 3350, 3800 QSC 3800 — QSC MX2000, 3350 QSC 3350, 3800	Michael Wisniewski (B,H) Tony Disterano (B,M) Greg Alexander (aH) Rick Stanley (aM)
Robert Plant Clair Bros. July-November North America	Yamaha PM3000 40x8x2 — Harrison SM-5 32x16 — Clair Custom	(56) Clair S-4 Series II — Clair Custom, 12AM	Carver/Clair 2.0 — — Carver 2.0	Olive Franks (B,H) Joe Ravitch (aH,C) Ed Dracoules (M) Peter Pelland (T) Scott "T. P." Appleton
Prince dB Sound June-August Europe Sept.-Nov. Japan	Yamaha PM3000 40x8x2 Yamaha PM3000 40x8x2 Ramsa WR-S840 40x18 Ramsa WR-S840 40x18 EV MTX-4	(52) EV MTH-4 (52) EV MTH-L E-30 CPM-12 EV DML 122, 1152, 2181	Crown MA2400 Crown MA2400 — Crown MA2400 Crown MA2400	Davey Moire (B,H) Harold Danker (B,M) Bruce Knight (aH,C) Rick Kordash (T) Mike McNeil (aM)
Suzanne Vega Sun Sound June-July North America	Yamaha PM3000 40x8x2 — Ramsa WR-S840 — EAW/Sun modified MX-800	(16) EAW KF850 (16) EAW SBF850 Sun Sound 212, 115	Crest 8001 — Crest 8001 Carver 1.5	Moray McMillan (B,H) Fred Mueller (aH) Barry Thornhill (M) Steve Schrems (T)

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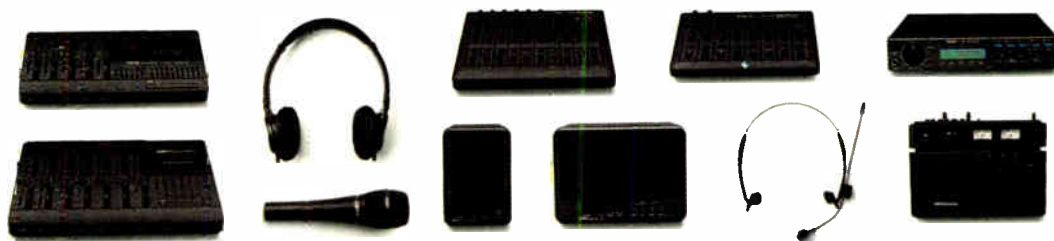
But you didn't realize just how important they were till the day you finally got the chance to put all the pieces in place.

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line into the pro audio marketplace. Products such as the 12AM have been previously only available on a rental basis to Clair's touring accounts; now they are available for permanent installations and to all pro audio companies.

The 12AM consists of electronics, special cases and the 12AM bi-amped, 74-pound, low-profile wedge loaded with a 300-watt, 12-inch driver and a high-frequency compression driver featuring a 2-inch throat, 4-inch titanium diaphragm

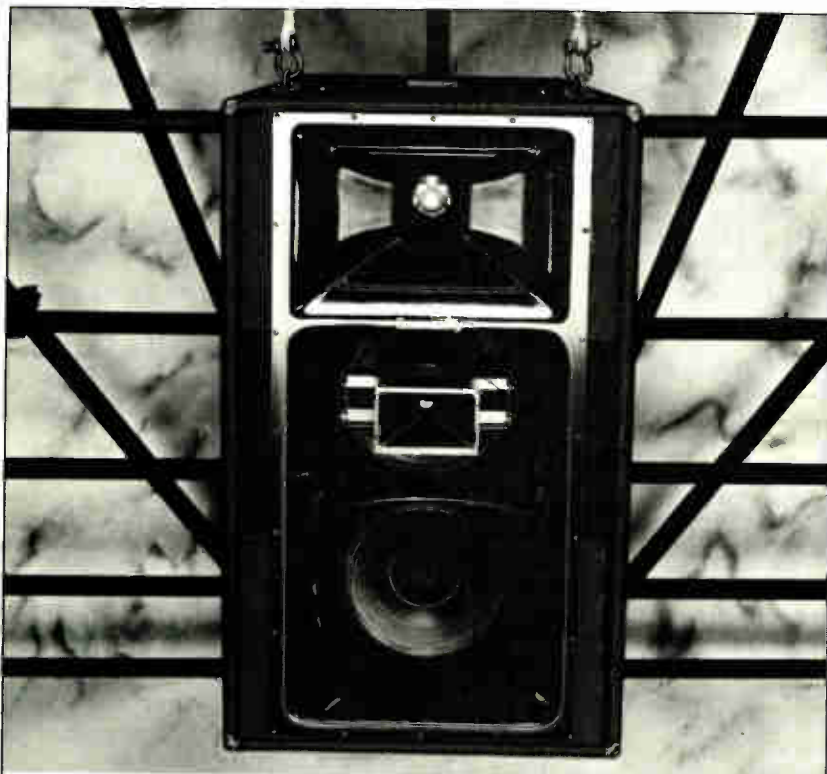


Clair Bros. 12AM floor wedge with CA-12AM hinged road case

and neodymium magnet assembly mounted on a special horn. Frequency response is 65 Hz to 18 kHz, with a crossover point at 1,200 Hz. One of the nice things about the 12AM, besides its smooth, even response, is the streamlined appearance and soft lines that allow it to blend into the stage. Electronic processing with a two-way crossover is built into the power amplifiers, packaged in either the 200 Series or 400 Series rack unit. The compact 200 Series rack is capable of driving four mixes and up to eight wedges. Ergonomical molding is integrated into the rack for secure stacking of multiple racks. For larger systems, the 400 Series uses the same electronics but doubles the discrete mixes to eight and drives up to 16 wedges. The entire system packaging is compact and "user friendly."

The 12AM monitor line is available factory-direct through Clair offices as either a complete system or individual pieces. "There are proprietary processors built into the amplifiers with the equalization curve compensated for off-axis response on the horn," says Gene Pelland. "We mount the horn for a 40° x 60° coverage pattern vs. the standard 60° x 40°. Nowadays, most vocalists use two wedges, so horizontal distribution is not the issue, vertical distribution is. The 12AM will work for people of any height and for those who like to get right on top of the wedge during the performance."

The Palace (Hollywood, Calif.) recently had **Schubert Systems Group** (North Hollywood, Calif.) install a 30kW flown main house system, comprised of 12 SSG Steradian and eight Steradian subwoofers powered by Crest 8001 and 7001 amplifiers, and a stage system using ten SSG wedges and four sidefill cabinets powered by Crest 7001s. Equalization is via Klark-Teknik DN360s. The Steradians are JBL-loaded with two direct-radiating 2225Hs and one 2421J compression driver on a 2385A horn, while the subs feature dual JBL 2245H woofers. SSG tour update shows **Bruce Hornsby & the Range** (June to December), **Bonnie Raitt** (July to September), **L.A. Guns** (June to August), **Mi-**



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chael Penn (monitors and electronics only, May to July), **Oingo Boingo** (April to June) and **Rickie Lee Jones/Lyle Lovett** (May to July).

dB Sound tour update... **Aerosmith's** world tour sees them leaving North America this August for Europe, with plans to come back to the U.S. The tour continues through February... **Prince** has been touring Europe since June and plans to finish in the middle of August before heading to Japan for three weeks. **George Thorogood** finished touring in mid-May... The **Allman Brothers** started in June and are scheduled to be out until October, with Thorogood opening on some of the dates... The popular **Frankie Beverly & Maze** tour (out since February) ended in late May. They are taking a brief break before going out on this year's Budweiser Superfest, scheduled to feature Stephanie Mills, Luther Vandross and Patti LaBelle.

May the best team win!...The sports enthusiasts at Clair Bros.

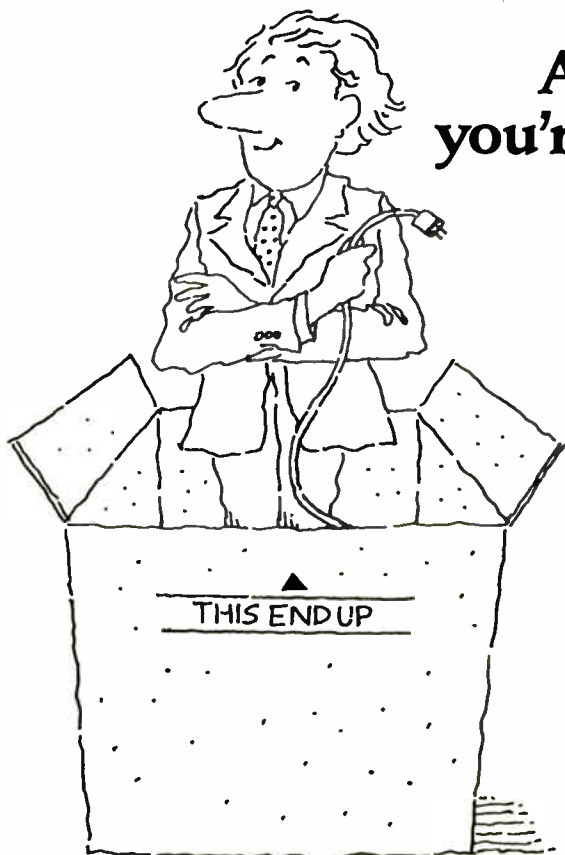


The mix position for the Aerosmith tour includes a Gamble Series EX console, Mac SE by the helm and enough outboard gear to outfit several studios.

have issued a challenge to any and all sound companies across America. We are not talking sound now—this is much more serious—it's **volleyball**. That's right, and here are the stipulations. (1) Teams can range from two to six players per team. Clair doesn't care. (2) No ringers. Everyone must be a valid employee for at least one year.

(3) The games can be at any reasonable site. (Clair has a good indoor court if any dare travel there.) (4) The winner of the best-of-five matches will be honored in this column with the scores reported. Call me at (415) 726-2428 or Clair Bros. at (717) 626-4000 for ar-

—CONTINUED ON PAGE 120



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Engineer/Producer

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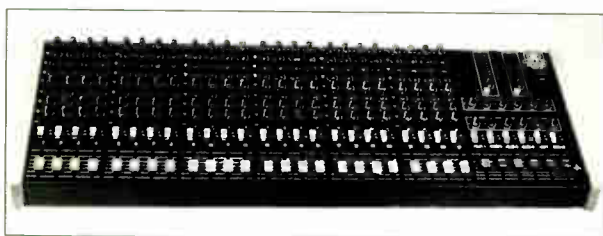
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Designed for professional contracting applications is the ES Series of power amps from JBL/UREI (Northridge, Calif.). Output ranges from 75W/channel in the ES150 to 600W/side in the ES1200 (into a 4-ohm load), and weight is substantially reduced, with the top-of-the-line ES1200 tipping the scales at only 39 pounds. Designed for cost-conscious applications is the SR Series, a stripped-down version of the ES Series, consisting of three models (SR6615, 150W/ch; SR6630, 300W/ch; SR6650, 500W/ch) in convenient, two-space packages.

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**GALAXY I/O ▲
CONSOLES**

Designed for permanent installations or portable sound reinforcement applications is the I/O Series of mixers from Galaxy Audio (Wichita, Kan.). The consoles are available with 4 to 24 inputs (expandable in 4-channel increments), featuring 3-band EQ, phantom power, four subgroups, eight balanced outputs, four aux sends and two matrix mixes. The power supply is external, and the I/O Series can be ordered with the connection panels on the rear or bottom (for concealing wiring in permanent setups) of the unit.

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**ROSS
TX252/452
SPEAKERS ▶**

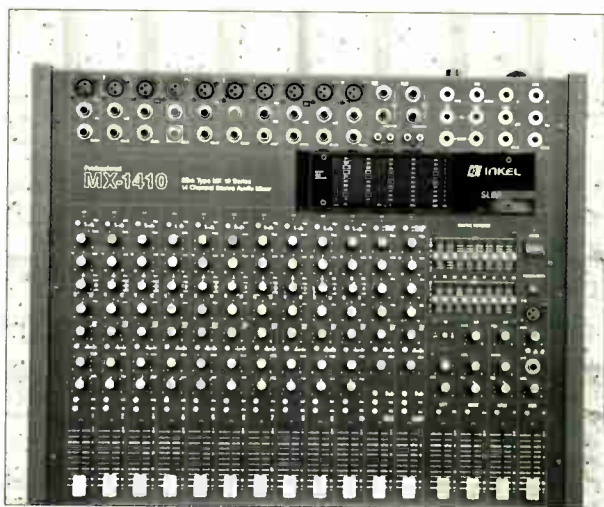
New in the TX line of American-made sound reinforcement enclosures from Ross Systems (Ft. Worth, Texas) are the TX452HL, TX252HL and TX252. The latter uses a ported, direct-radiator bass section, while the HL designations refer to systems with horn-loaded LF sections. All feature a titanium compression driver coupled to a 90°x40° coverage, large-format horn; reinforced OSB/plywood construction; protective metal grilles; and Ozite™ carpet covering. The double-15 TX452HL (\$649.95 list) is 48x25x17, weighs 110 pounds and is rated at 300W RMS (600W peak), with a response of 45 to 18.5k Hz (±4 dB). The smaller TX252 (\$499.95) and TX252HL (\$479.95) are 32x25x17 and handle 200/400 watts.

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AUDIX DIGITAL SNAKE

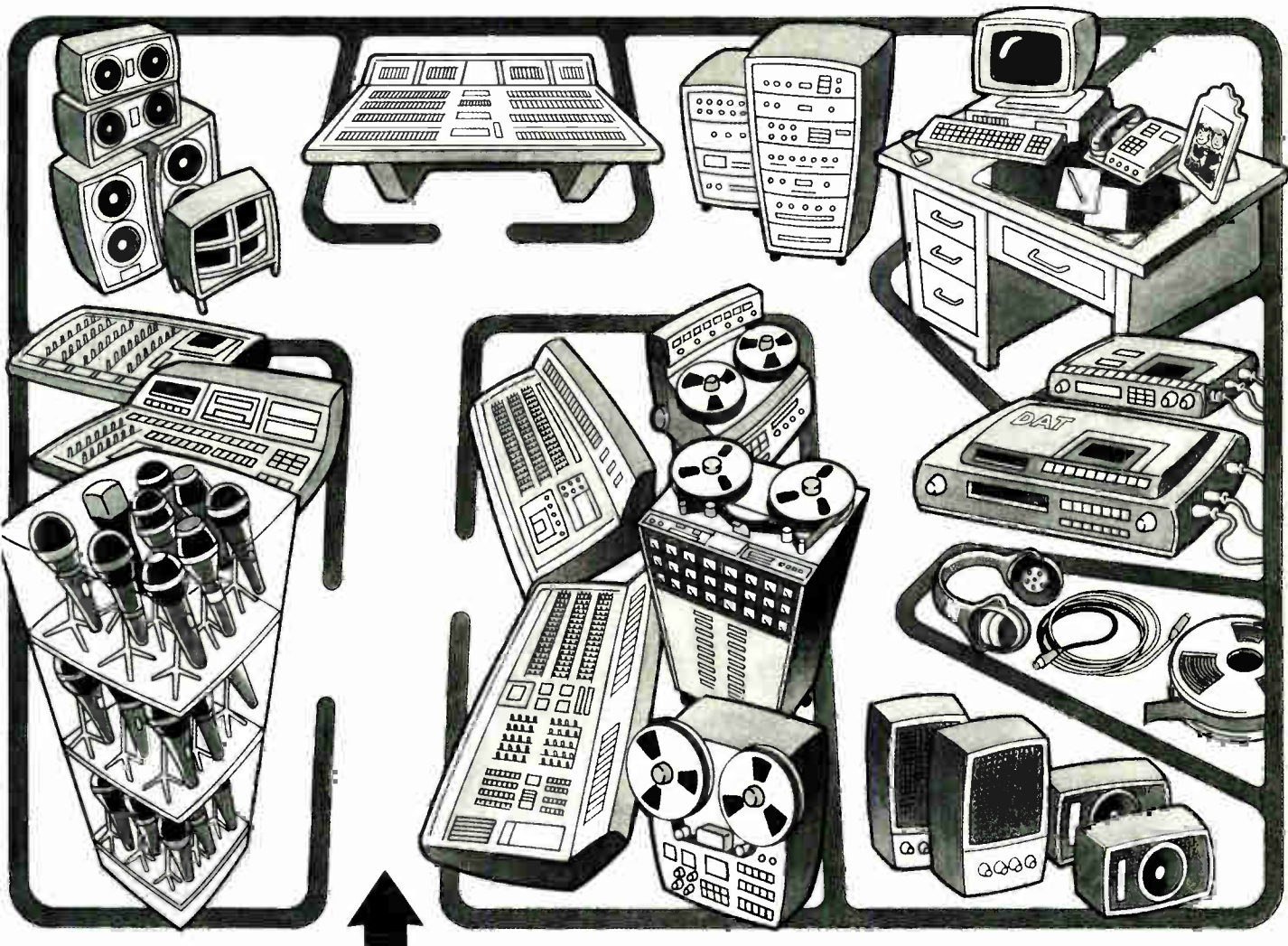
The DS-8 from Audix (Pleasanton, Calif.) is an 8-in., 8-out snake that routes up to eight low- to medium-impedance mic signals through a standard XLR-type mic cable, exiting as line-level signals. Using low-capacitance cable, the DS-8 is said to allow up to 1,000 feet between the compact stage box and the rack-mount output panel. The unit can also be used to expand the capacity of existing snakes.

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INKEL MX SERIES ▲

Distributed by Senior Audio (Norwalk, Calif.) is the Inkel line of sound reinforcement mixers. Available in 10x4, 14x4 and 14x4 configurations, the MX line features 3-band input EQ with sweepable mids, two stereo line input channels, phantom powering, dual 9-band graphic EQs on outputs, and LED bar graph metering of PFL, subs and program outs.

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LIVE SOUND

—CONTINUED FROM PAGE 116, SR NEWS
 arrangements.

New sound companies...The owners of **Nashville Cartage & Sound**, Sheila Barnard and Jim White, along with studio drummer Eddie Bayers and his father, Ed Bayers Sr. have formed a new sound and lighting company called **NCS Pro-Sound & Lights Inc.** The new company will be located at NC&S's rehearsal facility in Nashville and will in effect give NC&S full production capabilities. The sound system was designed and built by **Paul Glasgow**. New startup sound company **Audio-Pro** (Springfield, Mo.) announced it will be using QSC MX Series amplifiers to power both house and stage systems. Northeastern music store chain **Drome Sound** (Albany, N.Y.) opened a new sound reinforcement division headed by Gary Clegg. Inventory includes JBL 4000 speakers, EAW wedges, Crown Macro-Tech 600, 1200 and 2400 amplifiers, and Soundcraft 8000 and 400B desks. Processing gear consists of Lexicon delays, dbx compressors and gates, Klark-Teknik and Rane EQs, and Yamaha SPX900s and 90s.

Paragon goes Hi-Tech...In Half Moon Bay, Calif., sound reinforcement equipment rental specialists **Hi-Tech Audio Systems** added the new feature-loaded ATI Paragon mixing console to its inventory. The just-released, high-end 40-channel universal house/monitor console features full dynamic noise gate and compressor/limiter processing on each channel; 4-band full parametric EQ on each input and 16 discrete submasters; nine VCA groups with integrated muting; four stereo and four mono matrix outputs; 16 aux sends; eight stereo effects returns; and a comprehensive priority cue system allowing stereo monitoring.

C.V. Lloyd Sound System (Champaign, Ill.) reported Midwest dates with performer **Ann-Margret**, who has resumed touring. The house system is made up of 16 custom-designed C.V. Lloyd C1-f three-way main enclosures and four C1-S subwoofers powered by Crown Macro-Tech 2400, Micro-Tech 1200 and 600 amplifiers.

House electronics include Yamaha PM3000-40C and PM2000-24 consoles, Klark-Teknik EQ and BSS FDS-360 crossovers. Onstage are custom, small low-profile monitors controlled via the house console. Extensive, customized cabling was fabricated for Ann-Margret's brass and string sections, which were located on a motorized, multi-tiered cart that moves around the stage during the performances. Working for C.V. Lloyd were **Bub Phillippe** and **Jay Lipschutz**.

Odds and ends...Thailand's largest nightclub, The Inter-Theque, installed Celestion SR1s and SR2s combined with custom subwoofers loaded with Celestion B18-1000 watt drivers. **Pro Mix** (New York) installed three DDA consoles at Lincoln Center in New York City. Two S Series were placed in Avery Fisher Hall and one Q Series at Alice Tully Hall. **Audio Analysts'** North Hollywood operation handled the installation of the sound system for **Van Halen's** newly opened Cabo Wabo Cantina in Cabo San Lucas. Located at the tip of Mexico's Baja, Calif., the new 10,000-sq.ft. bar and restaurant's system features JBL components powered by QSC amps. The Stratford Shakespearean Festival Theatre (Stratford, Ontario) installed Tannoy dual-concentric B-50 loudspeakers and T-300 subwoofers in the 2,400-seat Festival Theatre. A horizontal coverage of almost 240° was needed for the unique auditorium. The Space & Rocket Center Theatre (Titusville, Fla.) installed a Tannoy P-100 dual-concentric stereo surround system for the purpose of reproducing rocket launch sounds and audio program information associated with space exploration.

(Note: Some of the data in this column and in "On the Road" is based on information provided by the companies. Address all correspondence and photos to Mix Publications, Sound Reinforcement Editor, 6400 Hollis Street, Suite 12, Emeryville, CA 94608.) ■

Mix sound reinforcement editor Mark Herman also operates Hi-Tech Audio Systems, a company specializing in console rentals for live sound and touring applications.

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by Blair Jackson

TOSCANINI LIVES AGAIN ON CD

O

f the hundreds of noteworthy reissue projects that have come about because of the rise of the compact disc, few have been as ambitious and technically demanding as BMG Classics' 82-disc (81-cassette) series covering the entire recording career of maestro Arturo Toscanini, one of the true giants of 20th century classical music. Dubbed *The Toscanini Collection*, the discs span the years from his first recordings in 1920 with the La Scala

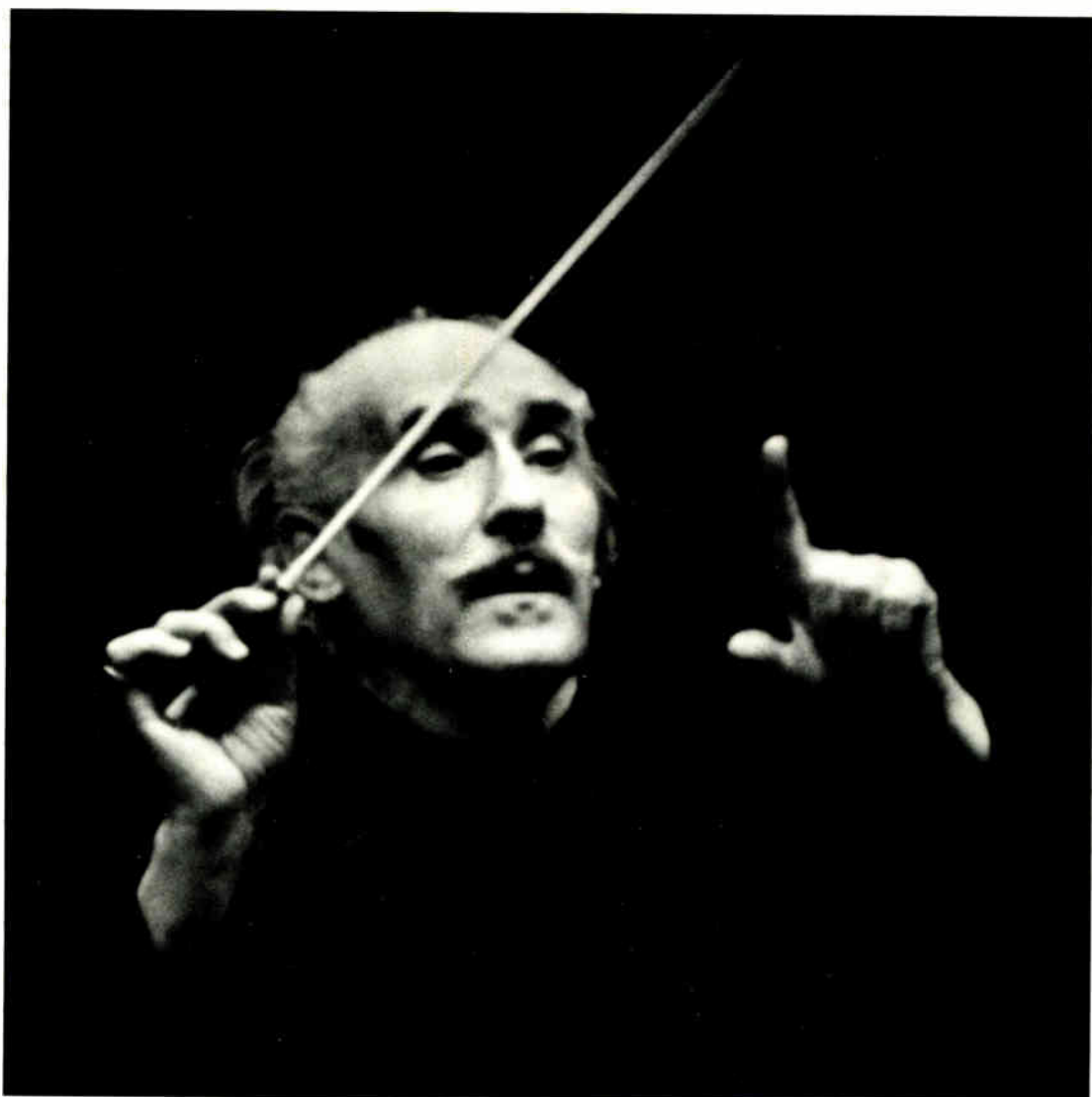


PHOTO: ROBERT HUPKA

Orchestra, through his years as conductor with the New York Philharmonic (1929-1936) and his own NBC Symphony Orchestra, which he led from 1937 until his retirement in 1954 (he died in 1957). BMG will be re-

leasing the discs (on its midline RCA Red Seal label) in spurts through 1992, the 125th anniversary of Toscanini's birth in Parma, Italy. The inaugural releases in April consisted of boxed sets of the complete sympho-

nies of Beethoven and Brahms, and Giuseppe Verdi's *Aida*, *Falstaff* and *Requiem*. In May, works by Beethoven, Bach, Richard Strauss, Paganini and others became available. In addition, BMG is putting out a series of nine videos (on videocassette or laserdisc) comprising the conductor's televised work on NBC between 1948 and 1954.

Because so much of Toscanini's American fame derives from the immensely popular radio broadcasts and recordings he made in the '40s and '50s—really the

twilight of his career—many have forgotten that the maestro was already well-established in Italy by the last decade of the 19th century; indeed, he led the premieres of such classics as Ruggiero Leoncavallo's



Pictured during the digital remastering of "The Toscanini Collection" at BMG Studios in New York are (left to right): Arthur Fierro, who supervised the remastering of the recordings; William Lacey, remastering engineer; and John Pfeiffer, reissue producer.

Pagliacci and Giacomo Puccini's *La Bohème*, and he was a supportive contemporary of the likes of Dvorák, Debussy, Jean Sibelius and Ottorino Respighi. He was rightly admired for the breadth of his musical knowledge, the sensitivity of his interpretations and his unflagging energy. This is a man who was still doing great work in his mid-80s.

The challenge of pulling together Toscanini's incredible output for a CD series fell to John Pfeiffer, a 40-year veteran of RCA's production staff who worked with

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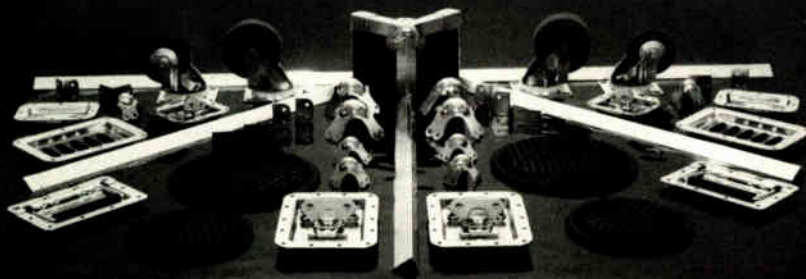
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Toscanini on some of the maestro's later recordings. "We'd been wanting to do this ever since compact discs came in," he says, "but it took a long time to work out the details with the estate, our technical people and our money people. It's an expensive project. It's required a lot of time and effort to search and find the best original sources. After all, this is a career that went from the earliest recording technology in the '20s [metal parts], to acetates and into the tape era after 1949."

The bulk of the recordings in *The Toscanini Collection* comes from his many years with the NBC Orchestra, in part because "Maestro hated recording, originally," Pfeiffer says. "When he came over in '20 or '21 with the La Scala Orchestra, he was recorded acoustically, and he didn't get a very good impression of what recording was. So he didn't do any recording for many years after that. He did a little bit between 1926 and '29 with the New York Philharmonic, but it wasn't until quite a bit later, when his son set up a series of 16 loudspeakers in Maestro's enormous two-story living room in his house in Riverdale [N.Y.] and tried to reproduce the true volume of an orchestra, that he got enthusiastic about recording. I spent a lot of time there, and I can tell you it was almost painful to listen to things."

In the pre-tape era of Toscanini's association with NBC Symphony, "the originals were acetates or lacquers that both NBC and RCA made of the broadcasts or recording sessions. They were 16-inch blanks that held 15-minute segments of the program for the broadcast. In the case of studio sessions, they'd hold a certain number of takes of each 78 rpm side. Finding those lacquers, and more, finding them in good condition, has been one of our problems.

"NBC didn't have room for them, so they donated them to the Museum of Broadcasting," he continues. "The Museum of Broadcasting didn't have room for them either, so they donated them to the Library of Congress. So now NBC has to authorize us to get them from the Library of Congress." On the RCA side, the search has taken Pfeiffer and his team to RCA warehouses in Indianapolis and Foglesville, Pa., looking for good original source material. At the same time he's been researching another mammoth CD re-issue project on Enrico Caruso. "That's been quite a job, too," he says with a sigh.

Though some of these performances were issued on RCA Records during Toscanini's lifetime, Pfeiffer found that "the original production masters weren't what we were after, in part because of the limitations inherent in the LP system at that time. We used to have to cut off the bass and restrict the highs and the dynamic range to get a good level on the LP. We're not controlled by those limitations anymore, so if we can go back to the originals and get good, clean transfers, we get a better picture of the real performance as it was recorded—not as it was prepared for LP."

While the CD is capable of reproducing the full dynamic range of the vintage recordings, it also reproduces the aural flaws of the acetates and tapes. "One of our worst surprises was the 1954 recording of *Un Ballo in Maschera*," Pfeiffer says. "You'd think it should be fine, but it turns out there was something wrong in the console at the time, and there's a whole series of clicks in it that are very disturbing. They passed in the dark on black vinyl, but the compact disc doesn't hide it."

While a No Noise™ system was employed to attack certain prominent

ticks, Pfeiffer notes, "We're not using technology to eliminate the hiss, because we don't want to lose any of the musical value. In fact, I've had customers say they're happy when they hear the hiss because it means we haven't reduced the highs."

I mention to Pfeiffer that some of the lower-register string passages in the Beethoven symphonies sound a little muddy, and some of the brass too bright, and he is quick to add, "The pianissimo passages aren't what they could be, either. The CD does tend to transmit the brightness too much. I've heard comments that the brass sounds blatant, and it does. But that's mainly because of the dry, acoustic environment Maestro liked to record and perform in. It was important for him to hear the detail."

The earliest recordings were made with one strategically placed microphone; later, the engineers went to two, then four mics—two outside on the strings, and two inside to get a balance between the woodwinds and the brass. Both the consoles and recorders RCA used once tape came in were custom-built by staff engineers. The recorders accommodated 7-inch

reels at 30 ips, for a whopping seven minutes of recording per reel. As a result, the engineers frequently had to use more than one recorder, overlap at the cutoff point, and then re-edit later. Because of the limited storage capacity of 78s, too, symphony movements occasionally had to be split and spread over two sides of a disc.

For the Toscanini video series, the decision was made to forego the optical soundtrack that accompanied the existing 16mm film footage and synchronize the film with the magnetic tape masters. "The quality was immeasurably better," Pfeiffer says, "although it was tedious doing it this way. In some parts we could only sync a couple of seconds at a time. It took us three months of hard work to do the ten programs, but we wanted them to be as good as they could be."

Perfectionism is definitely a trait Toscanini appreciated. He worked his musicians hard, and he also cared deeply about the audio quality of his broadcasts and records. He occasionally would insist on level and equalization changes on his work, "and he was very critical of himself," Pfeiffer says. "He usually blamed

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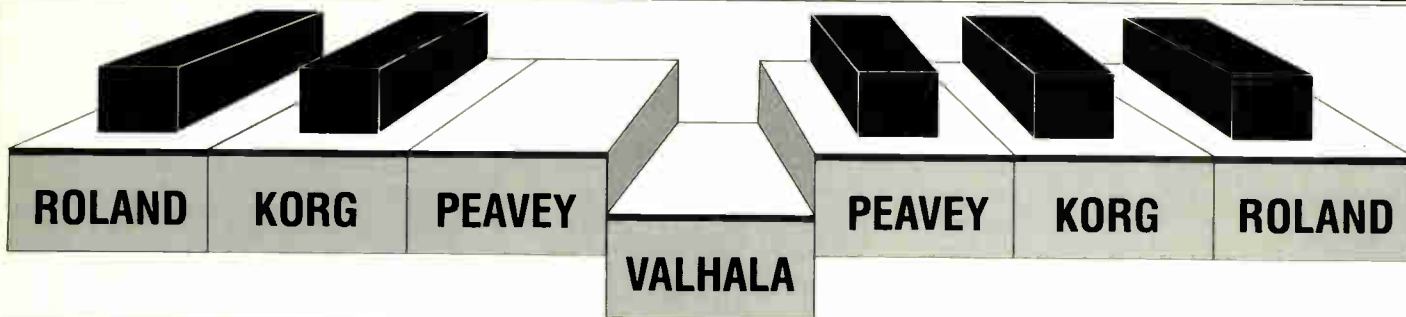
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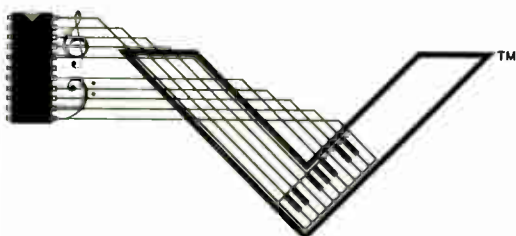
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himself for anything that went wrong with a recording. Even if the tape machine wasn't running at the right speed, he'd blame himself for playing the piece too slowly."

Maestro would undoubtedly be impressed with the care lavished on *The Toscanini Collection*. Sonically, the discs released so far are superb, given the original recording limitations, and each package contains extensive liner notes that put the performances in a coherent context. "I realize we can't compete on a technical level with a lot of recordings out there," Pfeiffer says, "but the real value is in the performances—hearing what he could do with an orchestra; it's really quite interesting and amazing. He *was* unique."

BJ's Disc Picks

Delbert McClinton Keeps It Real

"At this point in my career I'm trying to please myself as well as my audience," says Delbert McClinton, whose latest slab of R&B-drenched country is an LP called *I'm With You* on Curb

Records. "I can't worry about trends and all that. I'll leave that to others. I'm going to make the music I want to make."

Actually, as the recent success of friend and kindred spirit Bonnie Raitt attests, the times may have finally caught up with McClinton's soulful honky-tonk sound. *I'm With You* is easily the Texas-bred singer's best album in over a decade. The irony is that this roadhouse veteran, who has always stood away from the prevailing streams of country, moved to Nashville last year and made this record. "It's been a good move for me so far," he says. "Obviously, the place is just filled with musicians; everywhere you turn you run into 'em. That's been exciting."

Typical of McClinton, though, he didn't go to Nashville and immediately enlist all the local country session heavies. To co-produce the record he teamed up with Barry Beckett, whose sound has always been more Muscle Shoals (where he used to work) than Nashville. Beckett produced McClinton's biggest chart hit, 1980's "Giving It Up for Your Love." Engineering at OmniSound Studios was Justin Niebank, best known for his blues recordings for



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Chicago's Alligator Records. For the all-important lead guitar duties he tapped Anson Funderburgh, one of the more progressive young pickers around, and Jim Horn, who contributed the punchy horn arrangements, definitely comes out of the rock 'n' roll world. McClinton freely admits that part of the feeling he was after was "that great Stax Records sound" of the early and mid-'60s, and for the most part he's succeeded in capturing that delectable blend of grit and grooves.

"I like to work as live as I can in the studio, to keep it real," he says. "I like to be in there with the other players gettin' it down on tape. Working with Barry [Beckett] is great because he's a musician himself and he really knows how to get it goin' in the studio. He hears like a musician and a producer at the same time, which is what I need. I feel good about this record. I'm not going to chase any rainbows, because I've done that and been hurt, but these sessions were some of the most fun I've ever had in the studio."

It shows, too. These tracks are crackling with energy, and McClinton's voice has rarely sounded so self-assured. Whether that will translate to big record sales is another question, but you can bet on this: Delbert's not sweatin' it. He's turning 50 in November, and he's still on the road more than 200 days a year, drawing good crowds most places. That's what keeps him going.

"I love doing this," he says, "and, fortunately, now I know how to do it

without hurting myself. I see the wreckage of other lives, and I see what I *have* done to myself through the years. I just thank God I didn't do more damage than I did.

"I love being on the road. I love the bus when it comes alive. When it's sittin' over there in the lot it's just a big ol' piece of dead metal. But when you start the engine up and people are comin' in and makin' their bunks and puttin' all their stuff away and start bullshittin' and laughin'...that's what I love. It's like we're all on this voyage together. And that always brings to life some of the kid in me. It feels healthy. It feels like something I wanna keep doin'."

Merl Saunders and Jerry Garcia in the Rainforest

In the early and mid-'70s, San Francisco keyboardist Merl Saunders and Grateful Dead guitarist Jerry Garcia led a series of small bands whose sole reason for living was to get down and jam. They played extended versions of Motown hits, Dylan tunes, Beatles songs, reggae songs, even "My Funny Valentine," and stretched, probed and transmogrified in the best jazz tradition. It was low-key and loose, but it cooked, too. It's been 15 years since the two have worked together on an album, and their new collaboration, Saunders' *Blues From The Rainforest*, is quite a departure for both of them.

Saunders terms the largely instrumental disc "an environmental new

Photo below: Garcia (left) and Saunders



PHOTO: LINDA JACOBSON

age suite," but don't confuse this with the standard synths-and-sequencers audio wallpaper that characterizes so much of that unfortunately labeled genre.

Saunders is adept at so many different feelings—from rock to jazz to lounge piano—and his battery of synthesizers on this album (Korg Poly 61, Roland D-50, etc.) fairly *sings*. Garcia, of course, brings a certain passion to everything he does, and the most prominent textures on the project may be the decidedly human-sounding percussion of Eddie Moore (Saunders' cousin, who died in May) and Muruga, who play all manner of drums, shakers and odd instruments over the course of the disc's six compositions.

Saunders composed most of the melodies, and then he and the percussionists essentially improvised around those melodies live in Saunders' home studio. "We'd do one run-through and try things out, and then we'd start recording," Saunders says. "On the song 'Sri Lanka,' I did things like clench my fist when I wanted a groove, open it when I wanted to space out. I'd have one

finger going up and down to set the tempo."

Garcia's electric and acoustic guitar parts were overdubbed later. "Blue Hill Ocean Dance" marks Garcia's maiden voyage in the studio with his new MIDI guitar setup: his custom Doug Irwin guitar fitted with a Roland GK-2 MIDI pickup, which triggers various synth modules, including the Roland GR-50, Korg M1R PCM and a Roland S-550 sampler. "Jerry could assign two different sounds to each string," says engineer Greg Gordon, who manned the sessions with Bill Thompson. "Often it was a matter of setting up some pleasing textures and allowing serendipity to take its course."

"'Blue Hill' became a sort of odyssey underwater," Saunders enthuses. "Jerry did his MIDI guitar with a flute sound, and it sounds like both of us are just scooting along the bottom of the ocean. The drums are going through an Echoplex dimension. Eddie Moore's got these little African cymbals. The track takes you on a neat trip. It's nothing that's going to make the Top 20, but it's something you can listen to over and over and

get little things out of."

So far, *Blues From The Rainforest* has received overwhelmingly positive reviews, and its built-in audience—Deadheads—has given this independently distributed project a nice boost. "It's also been satisfying to me that I've also gotten such good feedback from people who aren't even into Jerry's music," Saunders says. "It seems to be reaching people from all over."

Which isn't to say Saunders is playing down Garcia's role in the project. He's the first to acknowledge that "we have a musical thing happening between us that I can't really explain, but it's very heavy, musical and magical." All three of those adjectives fit Saunders' latest triumph.

(Like most indie projects, *Blues From The Rainforest* is apt to get only limited national distribution, so it may not be at your local record store. To order it on Visa or MasterCard, simply call (800) 759-MERL. For more info, write to Sumertone Records, PO Box 22184, San Francisco, CA 94122.) ■

Blair Jackson is managing editor of Mix.

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by Philip De Lancie

QUALITY CONCERNS DOMINATE AT ITA CASSETTE SEMINAR

BASF introduced a Mechanical Calibration cassette, designed to be used in tandem with its industry-standard Azimuth Calibration cassette.



The CD may grab all the headlines, but the history of the compact cassette reads like a Horatio Alger story: a rise from humble origins to success and importance. When the cassette was first introduced for voice recording applications, the notion that it could ever seriously be used for music, let alone outsell the LP, must have seemed laughable. In its early years, the prerecorded cassette, for good reason, was viewed with disdain by most music consumers. Though that attitude continues in some quarters to this day, the fact that two of every three prerecorded units shipped are now on cassette shows how far the format has come.

A myriad of factors contributed to the cassette's climb to the top, not least of which is the American consumer's love of convenience, portability and automobiles. The appeal of taking music out of the living room and into the streets has proven more powerful than any

concern about the cassette's fidelity limitations, which are hardly noticeable in many typical listening situations. At the same time, cassette duplicators and their suppliers have by and large worked hard to extend the boundaries of cassette quality, so the best prerecorded cassettes today are far better than those available when the CD debuted in 1983.

After years of steady growth, cassette album shipments by RIAA member record companies actually dipped a bit in 1989, while CD shipments continued to grow (up 38%). Of course, one year's results don't necessarily indicate a trend, but duplicators cannot afford to be complacent. Judging from this year's International Tape/Disc Association "How and Why Seminar," they are well aware of that fact. The fifth annual event, "dedicated to improving the quality of prerecorded audio cassettes," was the best-attended yet.

Held in Asheville, heart of western North Carolina's verdant hill country,

the May 14-17 gathering brought together about 225 participants. Attendees represented major and minor duplicators, as well as suppliers of equipment and materials. The program consisted of individual presentations and panel discussions organized and moderated by ITA executive vice president Henry Brief, a man who knows the value of mixing a touch of levity into otherwise rather dry subject matter. A lot of ground was covered in the nearly 20 hours of sessions. We'll be taking a look, this month and next, at the main points that were raised.

Calibration

The first topic of discussion was calibration of components in the duplication chain. Brief recruited two panels, one of equipment manufacturers, the other, major duplicators. Jim Williams, president of Gauss, outlined a proposed schedule of maintenance procedures: cleaning and inspection of tape paths daily, level checks every other day and full response checks every week. Gauss recommends a full alignment, electronic and mechanical, including guides, heads and tensions at 500-hour intervals, and at every 1,000 hours, head polishing is suggested.

Next was Mark Nevejans of Gauss's sister company Electro Sound, who pointed out that different plants have different needs in alignment methods. Major label-owned plants can standardize tape stock and shells, dedicating certain lines to certain types of product, while

custom houses are more likely to be changing materials all the time. He suggested reducing the number of areas in which problems can arise by using only one type of tape in the bin-loop reproducer. He also set forth five important points in minimizing problems in the chain: buy quality equipment and materials, keep important spare parts in stock, purchase adequate test gear, hire competent technical staff, and take extra care in all setup and maintenance procedures. His list of basic tools included a scope, multimeter, tone generator, spectrum analyzer and test tapes. A slave calibrator and real-time analyzer were also strongly recommended.

Frank Berge of Lyrec reviewed his company's test gear, which includes the TG 511 generator and the TV 2 test head and associated controller. The combination may be used to generate graphic displays of system response.

Larry Good of Otari Corp. started by going over that company's offerings in five duplication-related areas: 4-track master recorders, master bin reproducers, slaves, QC reproducers and loaders. He suggested alignment procedures for Otari gear at each step in the duplication process.

First on the user's panel was Rick Wartzok of Sonopress (part of the Bertelsmann family that also includes RCA), whose impressive modern plant in nearby Weaverville hosted a tour on the last day of the seminar. Wartzok concentrated on slave alignment, demonstrating his technique for HX Pro setup. HX attempts to keep total signal at the head constant by reducing bias in the presence of high-frequency program. The "ratio of control" adjustment is crucial, determining the relative importance of audio vs. bias at the detector circuit. If adjusted for too little audio, the HX does nothing, while too much audio will cause too much bias reduction, dropping response at all frequencies. At Sonopress, HX is adjusted for the maximum high-frequency output with no

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Pat Shevlin of Specialty spoke about that plant's efforts at maintaining alignment uniformity. To keep the facility's four master recording rooms in line, one room, set up for working copies of selected master reference tapes, has been designated as a standard to which the others are referenced. Their daily alignment procedures include electronic and mechanical setup of master recorders and bin-loop reproducers. For consistency, slave setups are referenced to PCM-1630 recordings of a master recorder playing the house reference tape.

Shevlin was followed by PolyGram's Bob Waymire, who emphasized the importance of proper care in handling reference tapes. Thorough cleaning of the tape path before using a test tape is very important, he said, as is avoiding fast forward or rewind modes. Tapes should be stored in their proper box under recommended environmental conditions, and worn or

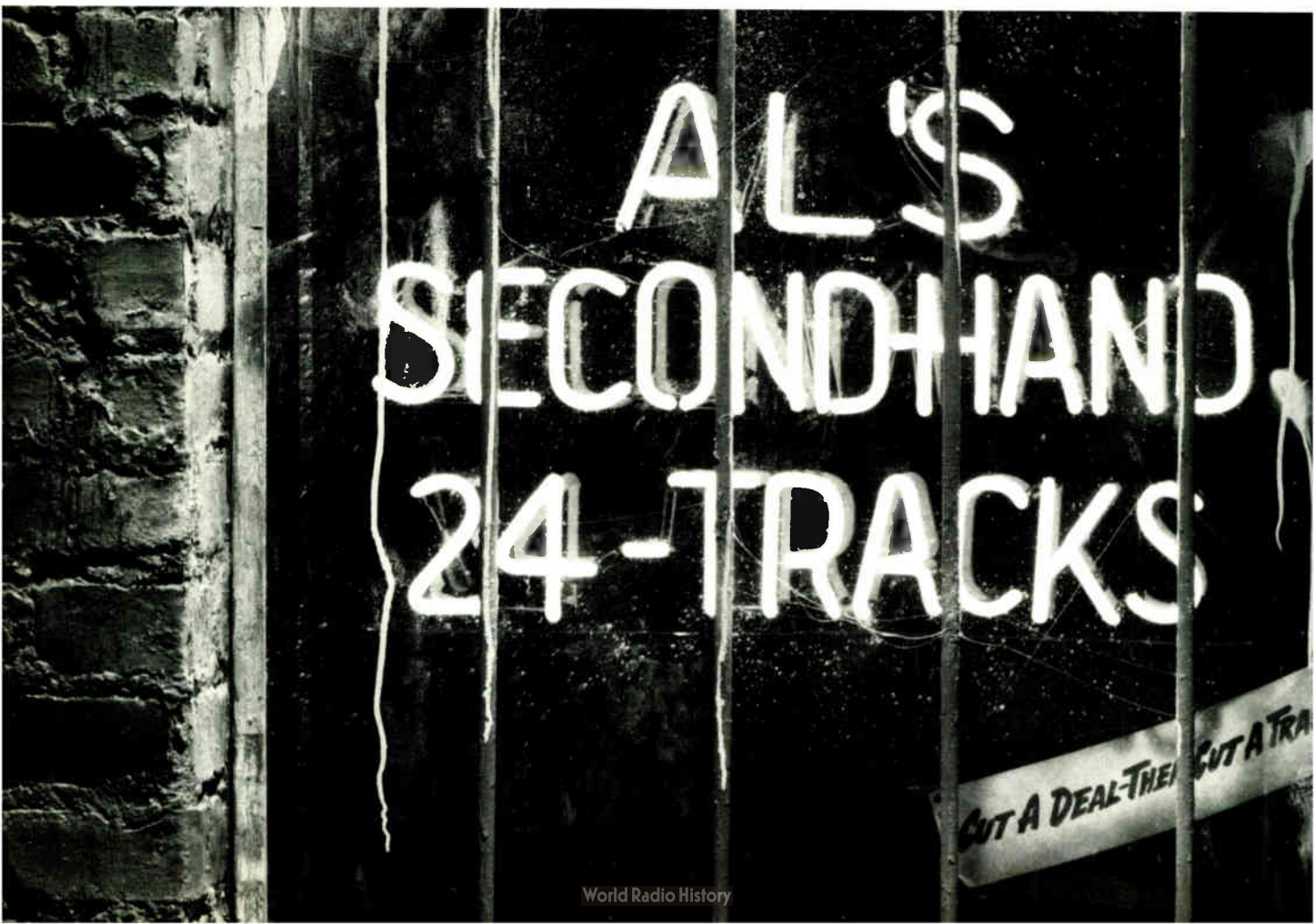
defective tapes should be disposed of rather than left around for accidental future use.

Last up for the user's panel was Paul Nimmer of Capitol-EMI, who explained the use in the company's XDR system of a two-second burst of 11 frequencies at -20 dB to confirm acceptable response at various steps in the production process. The XDR tones, used in the master reproducer alignment procedure, are also layed down at the end of every pancake to facilitate QC checks. Nimmer also noted that every change of duplicator stock, even from C-60 to C-90 of the same type, requires readjustment of slaves and that slave heads are polished every 200 hours.

The first hint of controversy at the seminar came during questions following the user's panel, when frustration was voiced over the lack of industry-wide consistency in finished cassettes. Part of the problem, apparently, is that the major duplicators have each arrived at their own definition of the "normal" cassette deck on which their cassettes should provide optimum playback. But complaints

also surfaced about variations in reference tapes, some of which were addressed by a later panel on calibration tapes with representatives from three companies whose standard tapes are used in the duplication industry.

Rudolph Mueller of Agfa and Walter Derendorf of BASF outlined the IEC specifications upon which their tapes are based. Jay McKnight of MRL explained some of the factors that contribute to the inconsistencies about which the duplicators complained. In particular, he noted variations in tape-to-head contact caused by head oxidization, atmospheric pollution, and changes in tape compliance due to fluctuations in temperature and humidity. These minute changes in contact, which may affect level and low-frequency response by only 1/4 dB or less, can make up to 1 dB of difference at short wavelengths. Variations may also arise when it comes to interpreting and applying a set of standards to a given real-world system of tape, electronics, heads and transport.



One step toward eliminating some of these variables was outlined at the seminar by Klaus Goetz of BASF, who introduced a Mechanical Calibration cassette. The new cassette is to be used in tandem with the company's ITA-standard Azimuth Calibration cassette in testing the mechanical azimuth of cassette transports and azimuth measuring recorders. The two cassettes are identical, except that the new product has been designed to allow vertical play in the roller guide. Goetz explained that the pinch roller and capstan of most cassette decks are not exactly parallel, which causes a bending of the tape that affects azimuth, especially when there is play in the guide. By comparing azimuth on a given deck using the two BASF cassettes, one with roller guide play and one without, a difference in azimuth may be measured. That difference disappears when the pinch roller is bent into proper alignment with the capstan, and head azimuth may then be adjusted without error introduced by the transport.

Adjustable Azimuth?

While BASF's new cassette might allow the professional community to move toward a more accurate application of azimuth standards, the consensus at the seminar was that most of the decks on which the public listens to duplicated product will remain out of azimuth alignment until hardware manufacturers make progress in standardization and consistency. Consensus ended there, however, because there was little agreement on what the hardware people should or could do about the problem. Hardware makers declined ITA invitations to participate in a seminar panel on the issue, but a panel was formed representing two major labels and two independent consultants with ties to consumer hardware interests. The topic provoked some of the seminar's most lively debate.

Warner VP Ed Outwater began by listing improvements in duplication technology implemented by the majors, saying there is little left to be done unilaterally on the software side to optimize the match

between cassettes and players. He argued that fixed azimuth, no matter how tight the standard, is subject to drift through use over time. Instead, he advocated that manufacturers design into their decks a way for consumers to easily adjust playback azimuth: a knob with a detent at "normal" azimuth and perhaps a record lockout to prevent recording at any other setting. The control is envisioned only on decks listing for \$250 or more. Prospects for the suggestion are uncertain, however, because hardware makers in Japan, where CDs outsell cassettes three to one, are less committed than Americans. Outwater believes, to extending the life of the cassette.

This view was echoed by Gene Wooley of MCA, who described some of the efforts made so far to build Japanese support for the proposal. Two meetings have been held so far, with American label representatives contending that the U.S. cassette market will remain strong for a long time, and that portable digital systems lack the

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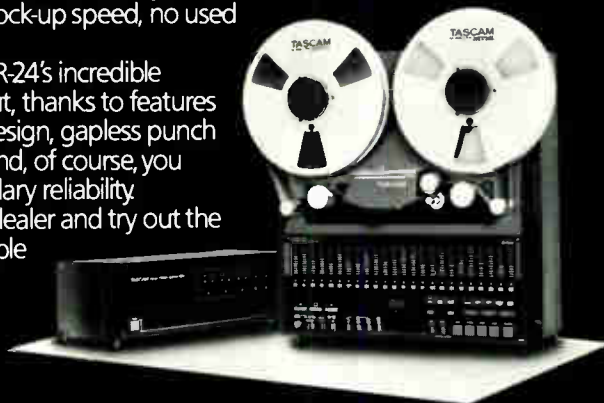
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battery life to meet the demands of the American consumer. Listening comparisons were used to demonstrate that prerecorded cassettes can be of excellent quality. But interest on the hardware side remains low, with doubts about whether the consumer really wants such a control and whether it is worth the added cost.

Without evidence of consumer enthusiasm for the idea, no action is likely to be taken. According to panelist Marc Finer of Communication Research, optimum fidelity is seen by hardware marketing people as less important to the consumer than portability and reliability. And convenience features like remote control and auto reverse are viewed as much more appealing than an azimuth adjustment. Further, since 90% of players list for less than \$300, and 65% for less than \$200, most decks wouldn't even be covered by the proposal.

Finer's skepticism was shared by Leonard Feldman, whose Electronics Laboratories does technical

consulting for the EIA. Feldman acknowledged the severity of the problem, noting that a half-degree of azimuth misalignment results in complete cancellation of signals over 10 kHz. But he pointed out that the adjustment already exists on high-end decks, and manufacturers feel the duplicators don't realize what's involved in implementing the idea on a broader scale. He also questioned the ability of consumers to make the adjustment accurately by ear, and doubted that they would want to have to adjust for each cassette. Finally, he raised the issue of requirements that Dolby Labs would be making on licensees of its new S-type noise reduction system, speculating that manufacturers would be forced to stick with a fixed azimuth system to ensure compliance with Dolby specifications.

Dolby S-type

Dolby's plans for S-type were the subject of a separate presentation by the company's software licensing manager, Dennis Staats. Staats reviewed the basic workings of the complementary system, including the

principles of "least treatment," which keeps the system's actions to a minimum by passing high-level signals untreated, and "action substitution," in which fixed and sliding noise reduction bands are used together to minimize the effect of higher-level signals on the compression of signals at other levels and frequencies. Two frequency-shaping networks are utilized: "spectral skewing," to desensitize the system to response errors from very low- or very high-frequency signals, and "anti-saturation," to reduce tape overload by attenuating high-level high frequencies. Dolby claims 10 dB of noise reduction at low frequencies and 2+ dB in the higher frequencies where tape noise is most evident. Further, the design is intended to be more resistant to the kind of decode errors that have driven most consumers to listen to B-type cassettes without decoding.

Referring back to the discussion on azimuth problems, Staats stated that the new system puts Dolby in a position to influence improvements in player specifications.

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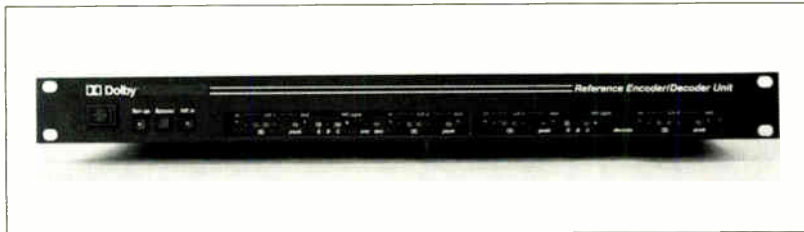
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Dolby has developed a preliminary set of overall performance specifications for S-type machines, including a requirement that fixed azimuth, measured with the BASF standard calibration tape or equivalent, be within three minutes of arc, or that adjustable azimuth, manual or automatic, be provided. Based on his own observations of hardware production lines, Staats offered his personal view that an adjustable approach may be the only way that licensees will be able to meet the standard. A 3dB frequency-response window from 100 Hz to 10 kHz has also been specified, widening to +4 dB from 50 to 100 Hz and 10 to 14 kHz. Other requirements will include playback calibration accuracy limits of 0.5 dB and a head height specification.

Given the qualifications set forth by Dolby, it's not surprising that the

company expects S-type to be available initially on only the top 1% of decks. Cost of the S-type circuits is also a major factor. The five licensees that exhibited prototype machines at the winter CES used boards incorporating a three-chip set. Each board costs



Dolby unveiled the Model 422 encoder, capable of handling B-, C- and S-type noise reduction.

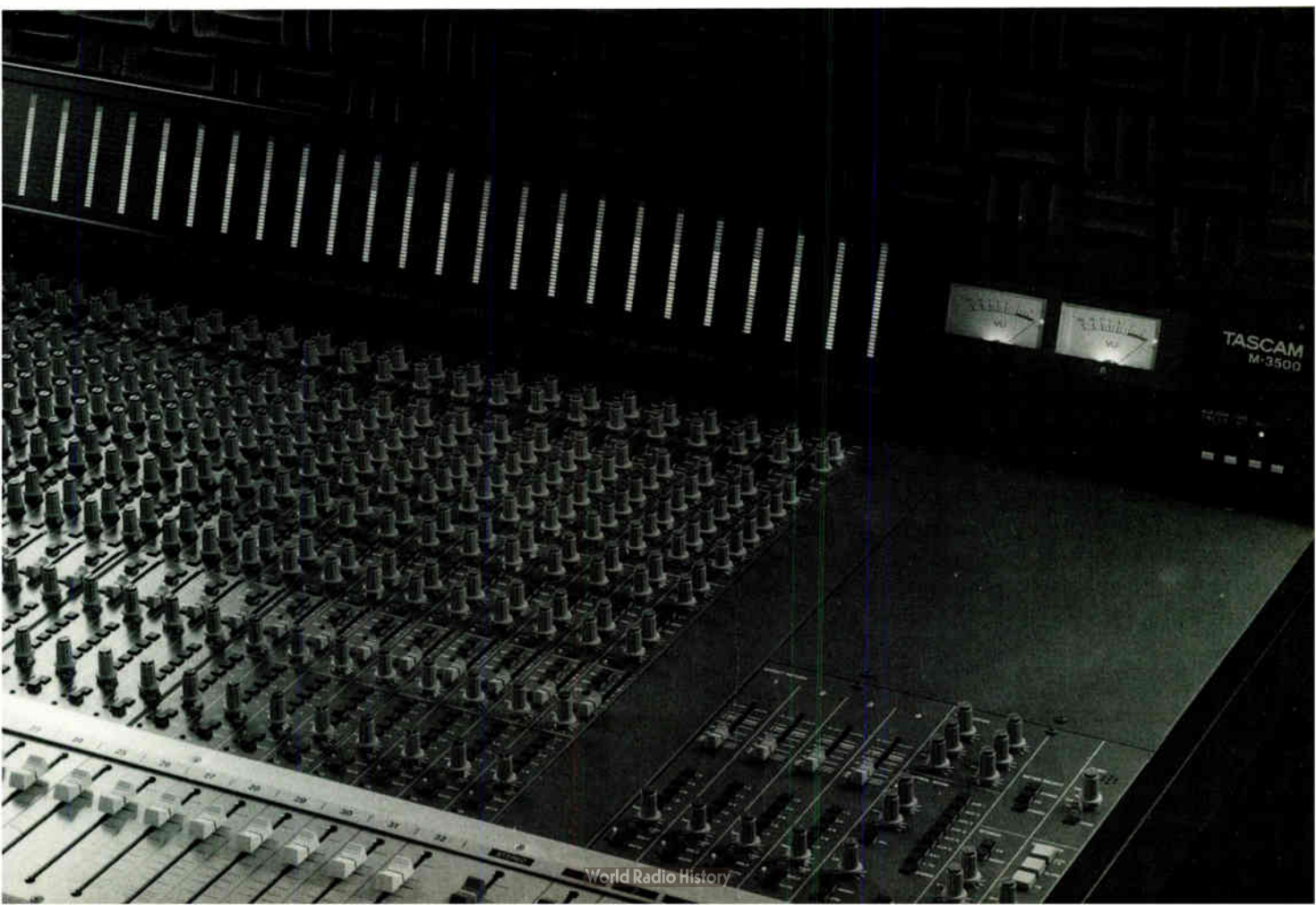
manufacturers about \$7.50, and four are required for a stereo three-head deck. The company has developed 1-inch x 2-inch hybrids to greatly reduce space requirements, but a set of four will cost manufacturers \$72. Work continues on a single IC version of the circuit, which is expected to be available early in 1991 for about \$5 (\$20/set).

For duplicators, the Model 422

switchable B-, C- and S-type encoder may be ready as soon as October. Dolby S software has been high-speed duplicated on a prototype basis in cooperation with Warner Bros. Staats was pleased enough with the results to distribute some samples at the show, encouraging evaluation of S-type's listenability on B-type equipped players. He also announced the completion of Dolby's software licensing manual, which he sees not as a fixed

work, but as a regularly updated forum for the exchange of information in the duplication community. In that same spirit, we'll be back next month with more on the doings at the ITA seminar...

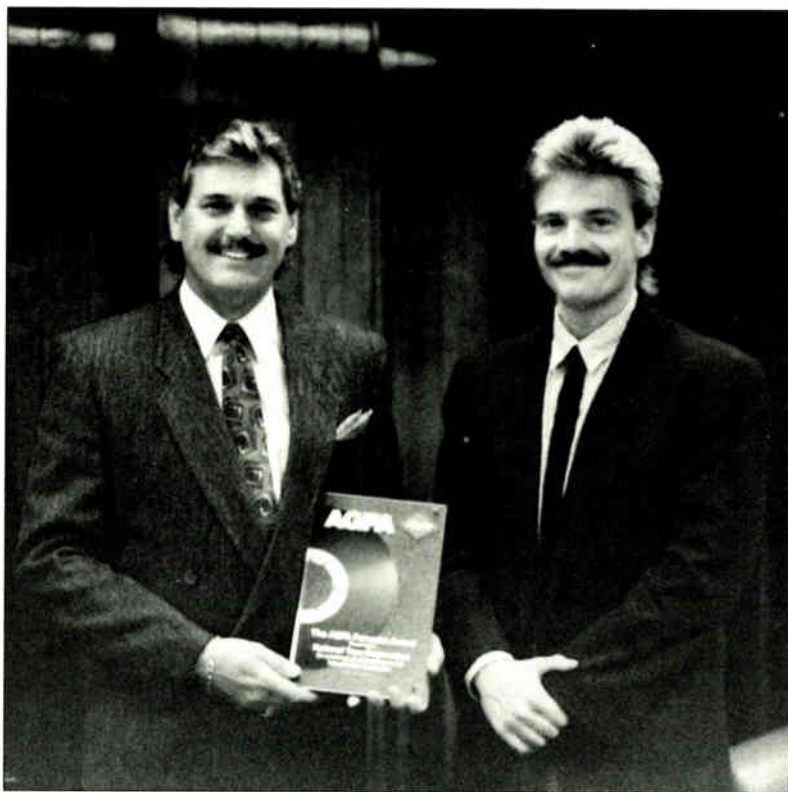
(Those who need a complete and exact record of the event may order cassettes of some or all of the proceedings from Tape Productions at [800] 658-5914.) ■



by Philip De Lancie

TAPE & DISC NEWS

Jerry Hutchinson and Andrew DaPuzzo displaying the Agfa Pancake Award received by the National Tape Corporation of Nashville for excellence in prerecorded audio cassettes.



Concerned about the potentially adverse environmental impact of the \$1.5 billion video and audio cassette shells produced annually in the U.S., Shape, Inc., is developing the industry's first "environmentally responsible" line of shells. The company is making design and engineering changes that will make cassettes easy to disassemble for recycling. Cassettes will also be marked to identify the type of plastic used. A videocassette incorporating the changes is scheduled for production starting at the end of this summer, with further products to follow.

♦ ♦ ♦

The FBI, culminating a six-month investigation in cooperation with U.S. and Canadian recording industry associations, has seized more than 76,000 allegedly pirated CDs in a raid on the US Optical CD plant in Sanford, Maine. The discs

are said to have contained unauthorized compilations of works by top pop, jazz and classical artists on major labels. Confiscated documents apparently indicate that the seized goods, valued by the FBI at over \$1 million, were initially headed for Japan. No charges had been filed as of press time, but according to the RIAA, criminal investigations are continuing.

♦ ♦ ♦

While uncertainty continues as to the long-term prospects for consumer DAT, Sony has already developed a new tape-based digital audio technology that could have advantages in consumer applications. At a recent "Techno-Fair" in Tokyo, the company showed a prototype of a miniature

"memo recorder" that stores two hours on a 2.5mm wide, metal-evaporated tape in a cassette measuring a mere 30 x 21.5 x 5 mm (1.17 x 0.84 x 0.2 inches). Sony may be ready to market the unit this year in Japan for about \$700, with blank tapes at about \$7. The design uses 12-bit, non-linear quantization and a 32kHz sampling rate to achieve an 80dB dynamic range within a 10Hz to 15kHz bandwidth. Could those specifications be improved to rival those of the CD if Sony decided to apply the technology to the music market? Stephen Burke of Sony America says, "There are no indications that it couldn't be upgraded."

Particularly interesting about the device are a couple of innovations that move away from the VTR-based design of DAT and its predecessors. Unlike tracking systems in which the playback head faithfully "traces" recorded tracks, the

**NEWS
FLASH!**
*Agfa Tape
Business
to be
purchased
by BASF.
Story in
"Current,"
page 9.*

path of the memo recorder's playback head is not aligned to the recorded tracks by means of a control track. In this "non-tracking" system, multiple playback traces are made for every recorded track. The usable portions of data from each are combined in semiconductor memory to recover complete information. The unit also features a "non-loading" system, in which a tape guide built into the cassette replaces the functions of the vertical guide and guide pin usually found in VTRs. This allows the drum to be brought into the cassette to make tape contact, eliminating the need for bulky loading mechanisms.

• • •

The International Tape/Disc Association has released a schedule of upcoming events. The 1990 Super Seminar on Special Interest Video is planned for October 2-3 in Marina del Rey, Calif. November 5-7 is the Magnetic and Optical Media Seminar in Scottsdale, Ariz., followed on November 20 by the General Membership Meeting and Update Seminar in New York City. Finally, for those really planning ahead, the 21st Annual Seminar for the Magnetic and Optical Media Manufacturers and Related Industries will be held in Tucson, Ariz., March 20-24, 1991. For further information, contact ITA at (212) 643-0620.

• • •

National Tape Corporation of Nashville has been honored by Agfa for advancing science, art and innovation in entertainment software manufacturing. NTC received Agfa's Pancake Award for excellence in prerecorded audio cassettes. With a capacity of 100,000 to 125,000 cassettes per day, the company is said to be one of the nation's largest custom duplicators. In announcing the award, Agfa cited NTC's proprietary modifications to high-speed duplication gear that result in "superior sound."

Agfa is also working on its 1990 Audio Award, conducting a worldwide search for "the rock/pop music cassette that best exempli-

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fies the creative interplay of music, technology and design." According to Agfa marketing manager Teri Sosa, the intent is to honor those who "advance the art and technology of the prerecorded cassette medium." Details on contest entry may be obtained from local Agfa reps or Agfa in Ridgefield Park, N.J.

♦ ♦ ♦

Optical Disc Corporation is initiating a certification program for users of its 610-A Laservision-standard videodisc recorders. Certification is granted based on required periodic scheduled maintenance and evaluation of recorded discs. Participating facilities receive free maintenance labor, equipment discounts and cooperative marketing opportunities from ODC.

The company also announced adding an optional CLV recording capability, allowing the 610-A to record hour-long programs, which, when played on a Pioneer LD-V8000, offers full interactivity features previously available only on 30-minute CAV discs. Among the facilities taking advantage of the extended CLV capabilities is LucasArts Editing, which has selected the 610-A to support its EditDroid disk-based editing system. ODC is also shipping a new CX encoder/decoder. The model 617 uses companding to improve laserdisc analog audio signal-to-noise ratio by up to 14 dB.

SPICES

Maxell has announced a proprietary Ceramic Armor Metal Particle technology to enhance the durability of metal tapes. The company claims that tapes featuring the ultra-thin ceramic layer have been proven in comparative tests to "have the lowest bit error rate in the industry."...**Bernie Grundman Mastering** (Hollywood, Calif.) has installed a Studer Editech Dyaxis in the newly redesigned Room 3. The system includes a 760MB hard drive, time-scaling software and the Excellerator/DSP card...Two new high-speed duplicating tapes have been

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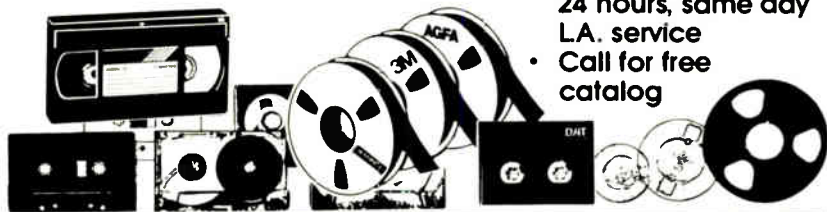
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introduced by **Ampex** (Redwood City, Calif.). The Type I formulations are Ampex 617 for C-60 and 618 for C-90. The tapes, targeted toward high-volume duplicators of shorter-length industrial product, are supplied on color-coded interlocking hubs featuring larger flange mounting pads for reduced runout at high speeds...**Lyric** of Skovlunde, Denmark, has announced three placements of its P-4400 master loop bins and accompanying slaves in the West German market. The systems, capable of 80:1 duplication, have been purchased by Record Partner, Bauer Studios and Te Bi To...Relocating from Los Angeles to Denver is **duplication equipment brokerage**, a dealer of used audio and video duping gear. The company's new home includes a demo room...**Otari's** thermo-magnetic system for high-speed video duplication has been upgraded. The new model from the Foster City, Calif.-based company has been designated the T-700 MK-II...**American Helix** of Lancaster, Pa., has integrated a five-position, full-color automated printer into its CD Production Module. The screen printing process will allow photographs and detailed four- and five-color artwork to be reproduced directly on CDs. The plant has also recently doubled its capacity...**DADC**, Sony's Terre Haute, Ind., CD replicating facility, promoted Scott Bartlett to vice president, sales and marketing...Four new members joined the board of the **International Tape/Disc Association** to fill vacancies until the annual meeting in November: Larry Zimmer of Kodak, Philip Micciche of Dysan International, James Fiedler of MCA and Peter Thomason of American Sound and Video... Complete videotaped recordings are now available of all sessions at February's **International CD-ROM Conference and Exposition**. The 20 tapes may be purchased for \$650, or individually for \$35 each, from G.T. Recording in Seattle. ■

Tape & Disc editor Phil De Lancie is a mastering engineer at Fantasy Studios in Berkeley, Calif.

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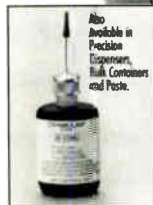
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C O A S T

L.A. GRAPEVINE

by Amy Ziffer

Update on the HARP Matter

On April 5, 1990, the Los Angeles City Planning Commission held a Home Occupation hearing at City Hall (see June "Current"). Terry Williams of Lion Share represented the Hollywood Association of Recording Professionals; and the Homeworkers organization was also represented. HARP is especially concerned over how the ordinance will be enforced; policing of home-based businesses is obviously no easy matter. HARP is recommending adoption of a Long Beach ordinance which states that no clients are allowed in the home, and only the owner can engage in business there. Presumably this would preclude renting out a studio to outside producers and engineers, but would not limit the

—CONTINUED ON PAGE 150

Bernie Taupin, Bob Schaper and James Newton Howard (l to r) back Elton John at his recent session at Larrabee Studios of West Hollywood.



SESSIONS & STUDIO NEWS

NORTHEAST

Sigma Sound Studios of New York City has been busy with the following artists and producers: **Lou Reed, Terry Riley, Aretha Franklin, Burning Spear** and **B.B. King**...Producer **Michael Chapman** was at **Messina Music** in New York City mixing **Lita Ford's** new record, *Hungry*. **William Wittman** was the engineer...Reggae artists **Israel Vibration** recorded and mixed their latest release, *Praises*, at **Lion and Fox Recording** in Washington, DC, with **John Fox** at the controls...**PCI Recording Services** of Rochester, NY, was the chosen studio for the upcoming *HBO at Wimbledon* music recording sessions. **Jay Inc.** produced the session with strings and horn arrangements by members of the **Rochester Philharmonic Orchestra**. PCI's **Steve Forney** handled engineering and mixing...**The Stereo MCs** flew in from the UK to **Calliope Productions** (NYC) to overdub and mix their new album for Island Records, with **Scott Harding** engineering...In Philly, **Teddy Pendergrass** utilized both of **Kajem Victory's** facilities to record his new LP. Engineering the session was **Gene Leone, Joe Alexander, Jon Smeltz** and **Mitch Goldfarb**...**Donny Osmond** came in to **Cove City Sound** (Glen Cove, NY) to record vocals for one of his new songs for his forthcoming solo album. **Ric Wake** produced and **Bob Cadway** engineered with assistant engineers **Dan Hetzel** and **Tom Yezzi**...At **The Power Plant Recording Studios**

(Kensington, MD), **Adam West** (a.k.a. the TV Batman) was in viewing scenes and listening to the original music score to the motion picture *Maximil*. **Mickey Rat** composed, arranged, orchestrated, conducted and produced the score...

NORTHWEST

New Albion Records artist **Jerry Granelli** broke in **Mobius Music's** (San Francisco) new Studer A827 24-track recorder

Mobius Music's new Studer 24-track recorder



while completing *On Music*. The tracks were produced by Lee Townsend, engineered by **Oliver DiCicco** and assisted by **Jane Scolieri**. The music engages works of poetry (Rilke, Menhire, Cummings) set to improvised compositions and features vocals by **Rinde Eckert**...**Triad Studios** of Redmond, WA, reports

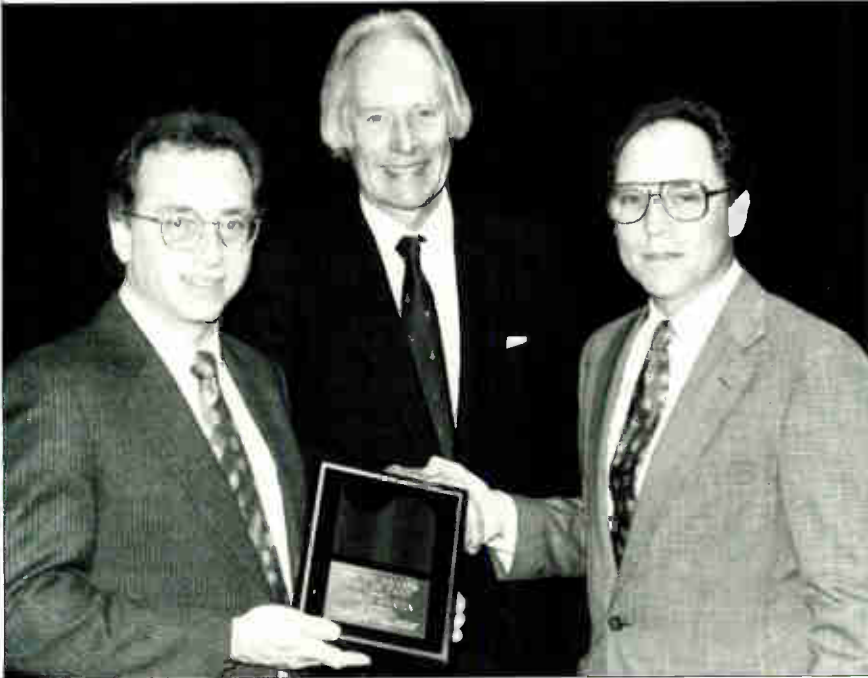
Bloodgood remixed songs for upcoming feature-length concert video. **Tom Hall** engineered the project...**Alpha & Omega Studios** of San Francisco had **Shanghai Pearl** in working with veteran rock producer **Sandy Pearlman**. **Paul Mandl** and **Anne Maria Scott** shared the engineering duties...At **Ironwood Studios** in Seattle, engineer **Paul Scoles** recorded a new album with jazz guitarist **Larry Coryell**...At **Music Annex** in Menlo Park, CA, afro-funk band **Kotoja** mixed their polyrhythms in Studio C with producer **Jim Dean**...At **Starlight Sound** of Richmond, CA, **Digital Underground** was in working with engineer **Steve Counter** on a song for an upcoming Dan Aykroyd movie...Recent session work at **Reciprocal Recording** of Seattle includes: engineer **Rich Hinklin** working with **Prayer Muffin**,

C O A S T

GEORGE MARTIN INDUCTED into TEC HALL OF FAME

Legendary record producer George Martin (center) was presented with the Hall of Fame Award for *Mix* magazine's 1989 Technical Excellence & Creativity (TEC) awards.

The award, voted to Martin last year, was presented to him at the APRS annual trade show by David M. Schwartz (left), editor-in-chief, and Hillel Resner, publisher of *Mix*.



Adrian's Childhood and **Hammerbox**; and engineer **Chris Hanzsek** working with the **Young Fresh Fellows**...At **Dave Wellhausen Studios** of San Francisco, **David Grisman** and **Maria Muldaur** were cutting tracks with engineer **Gary Mankin**...

SOUTHERN CALIFORNIA

Cornerstone Recorders of Chatsworth reports **Jeffrey Osborne** doing overdubs with producer **Peter Wolf** and engineer **Paul Erikson**...At **Devonshire Studios** of North Hollywood, **Van Morrison**, **Chick Corea**, **Herbie Hancock** and a variety of other performers had a jam session for a Showtime series, produced by **Ken Ulrich**. Also at

Devonshire, **Dweezil Zappa** was in completing vocals for his new release on Barking Pumpkin Records...**Summa Music Group** of Van Nuys had producer **Jeff Lorber** in Studio A remixing **The Busboys'** "The Boys Are Back in Town" for *Another 48 Hours*. **Alan Meyerson** engineered with the assistance of **Scott Blockland**...At L.A.'s **Lion Share Recording Studios**, **Earth, Wind & Fire** cut horn and vocal overdubs and mixed their new single, "One World," which will be used as part of the GoodWill Games ceremonies. **Maurice White** produced and **Paul Klingburg** engineered with the assistance of **Guy Defazio**...Engineer **Guy Charbonneau** and **Le Mobile** (a

—CONTINUED ON PAGE 144

N.Y. METRO REPORT

by **Randy Savicky**

Wanting to bring in more rock 'n' roll clients, BMG Recording Studios has acoustically overhauled Studio D and has added a 56-input Solid State Logic SL 4000 G Series console. According to studio manager Hank Meyer, the George Augspurger-designed control room has been preserved. Other equipment at BMG includes Sony PCM-3324 digital and Studer A827 analog multitracks and Harmonia Mundi Acustica digital audio processors.

The most recent meeting of the New York section of the Audio Engineering Society, held at BMG Studios, featured section chairman David Smith, chief engineer at

—CONTINUED ON PAGE 167

Buster Poindexter and company at work on the single "International Playboy" at Bayside Sound, Bayside, NY. Top row (l to r): John Ficarrotta, engineer; John Johnson, producer; Buster; Larry Thomas, producer. Bottom row: Steve Salem and David Eng, executive producers.



—FROM PAGE 143, SESSIONS AND STUDIO NEWS
remote based in North Hollywood) were recording live tracks on location for the forthcoming Doors movie with music supervisor **Budd Carr**, music producer **Paul Rothchild** and director **Oliver Stone**...At **The Rock House** (L.A.), **Larry Robinson** was remixing **Randy Jackson's** new single for A&M Records. **Fred Howard** engineered with **Scott Seymann** assisting...**Entourage Studios** of North Hollywood recently had **Jose Feliciano** in cutting brass, vocals and percussion with **Tony Peluso**, **Keith Blake** and **Mike Scott** engineering the sessions...At L.A.'s **Mad Hatter Recording Studios**, **Sheila E.** was doing vocal

overdubs on her newest song, "Droppin' Like Flies." Producer was **David Gamson**, and the engineer was **Steven Shelton** (with assistant **Darren Mora**)... At **Dodge City Sound** of Glendale, **Tim Feehan** was producing **Jimmy Osmond's** solo album; **Legs Diamond** were recording their next album, produced by **Michael Prince** and **Roger Romeo**; and **Mach 1** was cutting their new album with **Meralie Dodge** producing...**Bad Company** stopped by **Paramount Recording Studios** in Hollywood to do some radio edits for their new label, Atco Records...

SOUTHWEST

Veteran L.A. record producer **Snuff Garrett** decided to produce a television soundtrack in Arizona. Universal Studios' **B.L. Stryker**, starring Burt Reynolds, will have its scoring done at **Tempest Recording** (Tempe, AZ) and **Chaton Recording** (Scottsdale, AZ). Garrett opted for the Phoenix-based project and the local talents of **Clarke Rigsby**, engineer and musician, and **Kevin Stoller**, composer and musician...**Funkenstein Recording Studio** of Dallas reports a busy month. Owner **Mike Taylor** took the band **Silence Obscure** to an MTV dance show; **Lesson 7** and **International Thief Thief** combined forces to do an industrial rap tune, which was produced and mixed by **Mark Griffin**; and **Nuevo Amanecer** did a ten-song package for an anxiously waiting record company in Mexico City. The band finished the last song at 4 a.m., and at 4:30 a.m. they were on the road to Mexico...

SOUTHEAST

At **Ultrasonic Studios** of New Orleans, the **Neville Brothers** completed recording their new single, "River of Life," which will appear on their upcoming A&M release (tentatively entitled *My Brother's Keeper*). Drummer and Late Night Band alumnus **Steve Jordan** produced, and **Don Smith** engineered the sessions...In Nashville, TN, **Recording Arts** reports the following activity: **Lionel Cartwright** was tracking and doing overdubs for an upcoming album with producer **Scott Hendricks** and engineer **Ed Seay**; **Gene Wilson** was tracking, doing overdubs and mixing tracks for a Christmas album with producers **Scott Hendricks** and **Tim Dubois** and engineer **Mike Clute**; **Gene Watson** was doing overdubs for an upcoming LP with producer **Greg Brown** and engineer **Chris Hammond**...In Atlanta, **Glenn Phillips** was in at **Musiplex** mixing tracks for the LP *The Supreme Court*. **George Pappas** was at the console, assisted by **Dale Abbott**...**New Memphis Music** (Memphis, TN) had **Dexter Haygood** and his group **Rock Bottom** working on his first album release in association with the **Kerry Gordy Company**...Current activity at **New River Studios** (Fort Lauderdale, FL) includes guitarist **Jeff Beck** recording the music score for the movie *Days of Thunder* starring Tom Cruise. The producer was **Hans Zimmer** with engineer **Jay Rifkin** at the board...At **Criteria Recording Studios** in Miami, the **Allman Brothers** were working on a reunion album. Pro-

—CONTINUED ON PAGE 146

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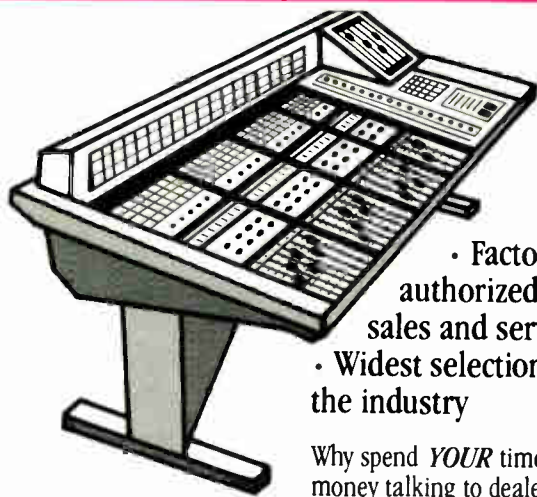


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ducer **Tom Dowd**, a veteran of The Allmans' past offerings, lent a guiding hand. The LP was engineered by **Jay Marks** with assistance from **Andrew Roshberg**...**The Bennett House Studios** of Franklin, TN, had **Tammy Wynette** in working on a single for performance during the American Country Music Awards ceremony with producer **Bob Montgomery**, engineer **Gene Eichelberger** and assistant engineer **Shawn McLean**...**Robbie Collins**,

SPARS



B E A T

During the last week in April, SPARS member studios all over the country were involved in a nationwide session. On April 28, students and professionals alike gathered to take the SPARS National Studio Exam. SPARS members who administered the test included Soundworks West in L.A.; Music Annex in San Francisco; the University of Colorado at Denver; Doppler Studios in Atlanta; Universal Recording in Chicago; Pro Sound and Video in Boston; Clinton Recording of New York; Mason Hall Studios in Fredonia, N.Y.; the Recording Workshop in Chillicothe, Ohio; Sigma Sound Studios in Philadelphia; Cook Sound and Picture Works in Houston; Steve Lawson Productions in Seattle; and the Trebas Institutes in Vancouver, Montreal and Toronto.

A SPARS committee, working closely with the Educational Testing Service of Princeton, New Jersey, developed the exam five years ago. It is a diagnostic tool to help individuals evaluate their knowledge and skills in ten different audio recording areas including music, electronics, studio operations and maintenance. According to SPARS executive director Shirley Kaye, "You can't fail the exam; you simply learn where your strengths and weaknesses are. We've found that employers recognize and support the exam as

—CONTINUED ON PAGE 147

owner and manager of **Underground Sound Studio** (Athens, GA), reports the studio has been fully booked with such artists as **The Skinpops**, **Hillbilly Frankenstein**, **Love Tractor**, **The Deacons**, **Lotion** and numerous others...**Red Horse Productions** of Nashville, TN, reports **Don Michael Sampson** has been completing tracks for a new album at **Creative Recording** with **Bradley Hartman** at the board...

—CONTINUED ON PAGE 149

—FROM PAGE 146, SPARS BEAT

a means of standardizing studio knowledge and find it helpful in hiring. Those who have taken the exam have found it valuable in job placement and career advancement. They can choose to have their scores kept confidential or officially reported to the professional audio community."

The SPARS agenda for 1990-1991 has plans for a complete revision of the exam. The staff contracted the Educational Testing Service, and a committee is in the works to handle the update and revision. We hope many of the SPARS Educational Associate Members will participate in the revision. These members include the following: Alabama State University, Art Institute of Fort Lauderdale, Fla., Berklee College of Music, Brigham Young University, Center for the Media Arts, Full Sail Center for the Recording Arts, Fanshawe College, Hutchinson Technical Institute, Institute for Audio Research, Lebanon Valley College, Manhattan School of Music, Mason Hall Recording, New York University, Northeast Community College, Recording Workshop, Trebas Institute, University of Colorado at Denver, University of Lowell, University of Miami, and University of Southern California. A meeting of these educational associates is planned for September at the L.A. AES show. SPARS Manufacturer Advisory Members have been approached to help fund the revision.

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—Pete Caldwell,
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NORTH CENTRAL

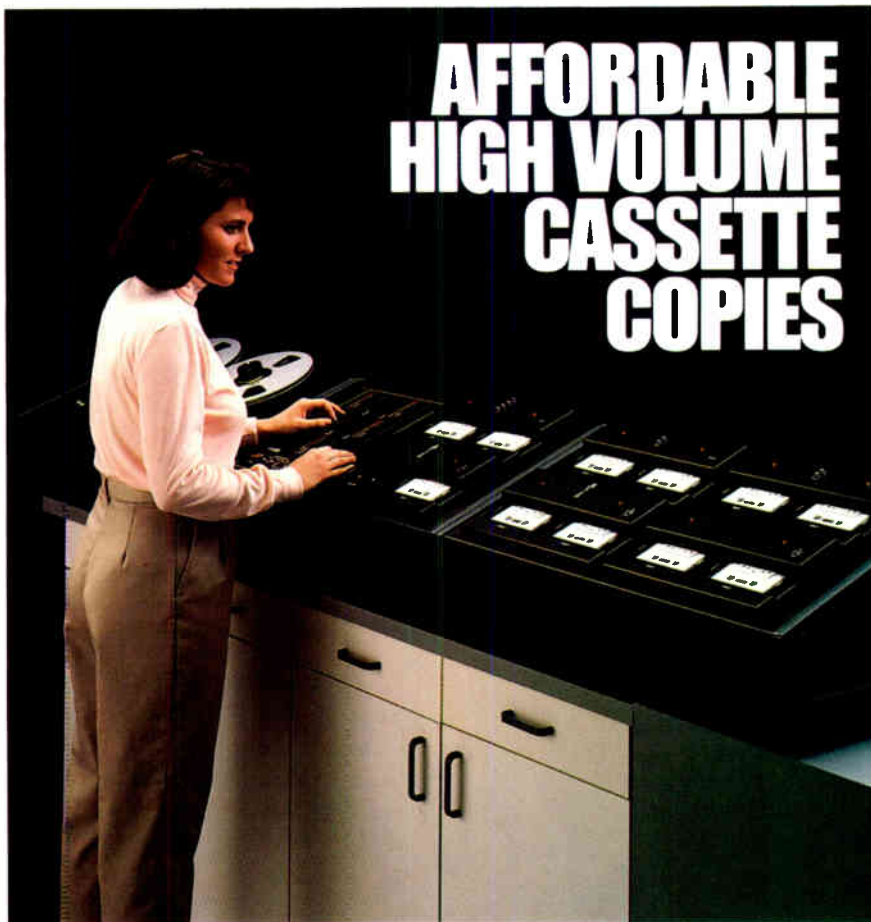
At **Hatchery Studios** of Warren, MI, **Dave Sell** engineered the following sessions: **Don Whitaker** was in to record three country and western songs; **Nina Kessler** came back to remix her demo; and **Kenny "the K" Kakowski** recorded a song to honor Vietnam veterans...In East Lansing, MI, **Diver** was in to produce a custom remix of his single "Lost in Space," with guitar tracks laid down by studio co-owner **Kevin Brown**...Recent activities at **Ajax Recording Team** in Fort Wayne, IN, included completed album projects for the **Mighty Golden Tones** and **Run Spot Run**. **Craig Harding** was at the board with **Michael Patterson**...At **V&R Recordings** of Overland Park, KS, **Shooting Star** finished final mixes of their new album for Enigma Records. Bandleader **Van McLain** produced the album and **Eric Elwell** engineered...At **United Recording Studios** in Kansas City, MO, **Kiss** stopped in to cut guitar and keyboard tracks for a forthcoming release. **Paul Stanley** produced the session, while **Dan Billings** and **Mike Frazier** shared engineering duties...The **JB Allstars** (James Brown's original horn section) stopped in at **Avalanche Recording Studio** (Denver) cutting tracks for their newest album, produced by **Richard Mazda**, engineered by **George Counnas** and assisted by **Chuck Edwards**...

STUDIO NEWS

The Chicago City Council unanimously voted to grant landmark status to the **Chess Records and Studio** building at 2120 South Michigan Avenue. Started by the Chess brothers, this legendary building was the birthplace of many blues and rock 'n' roll tracks that changed the face of modern music. When the **Rolling Stones** recorded at Chess they honored the studio with the song "2120 South Michigan"...**Sound Logic Recording** of Garland, TX, moved to a studio complex that has quite a history. The first 24-track in the Southwest witnessed **Willie Nelson** cut *Red Headed Stranger* and other gold records, and **Paul McCartney and Wings** mix their 1976 live album. The room was built by Glen Pace in 1975 and overhauled in 1988...**The Rocket Lab** is opening San Francisco's first CD mastering and digital editing facility. Lucasfilm's **David Schwind** designed the room, and the studio manager is **Nancy Evans**...**Tina Weymouth** and **Chris Frantz** installed a Magnum (TAC's 24-bus in-line recording console) in their studio in Connecticut, where it was used to record the **Tom Tom Club's** new al-

bum...**Northwest VideoWorks** in Portland, OR, has taken delivery of its third Sony D-2 composite digital VTR. The new machine was added to accommodate an increased demand for D-2 duplication...**Creative Audio Enterprises** has begun doing business under the name **Duplicating Plus** (Bloomington, IN). The company will provide audio and video duplicating services; remastering services; and storage and archiving of important recordings and masters...With the acquisition of Tascam's M-600 and M-512 16-track mixing consoles to the Recording Arts Department of the **South Mountain Center for the Performing Arts**, Phoenix Union High School hopes to

become a fertile training grounds for the next generation of audio recording professionals. The Recording Arts Department will feature a MIDI room and hands-on training for aspiring audio engineers, producers and artists. Noted studio owner and designer **Eduardo Fahyad** consulted with school officials on the project...**Craig Huxley**, owner of **The Enterprise** (Burbank, CA), acquired three Mitsubishi 32-channels with Apogee filters and three X-86 2-channel high-sampling digital recorders to complement its Neve VR72 console. **Crosby, Stills & Nash** recently worked at The Enterprise on their single celebrating the opening of the Berlin Wall. ■



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—FROM PAGE 142, L.A. GRAPEVINE

owner's ability to act in those capacities. The matter didn't come to any conclusion, however, since the wording of the ordinance before the commission was deemed inappropriate. It went back to the drawing board for another hearing in a couple of months. Homeworkers could not be reached for comment.

Optical Radiation Corp. and Eastman Kodak Co. together held the world premiere demonstration of Cinema Digital Sound at the Director's Guild Theatre in Hollywood on May 3. Cinema Digital Sound is the official name for a 6-channel system of digitally encoding film soundtracks on 70mm and 35mm motion picture prints, using what they say is basically the same technology used by compact discs. The six channels are left, right, center, left and right surrounds and subwoofer; there are also control and time code tracks. Heads for playback of the digital audio can be mounted on existing theater projectors, and the anticipated cost for convenience per screen is approximately \$15,000. At the present time, it is only available on 70mm, but 35mm prints with CDS are expected to be available in early 1991. The first CDS release will be *Dick Tracy*.

Approximately 1,000 people attending the event were treated to a short demonstration film produced by Visualize Productions of Santa Monica and directed by Jerry Kramer (Michael Jackson's award-winning *Moonwalker*, *Hurrah for Hollywood!* Showtime special). At the conclusion of the demo, it was announced that the CDS playback system installed in the Director's Guild Theatre for the purpose of the demo would remain there as a gift from Optical Radiation.

Eastman Kodak's involvement in CDS is in the form of a new film, Digital Sound Recording Film 2374, which is necessary for the process to work. Processing costs of the new film are said to be no higher than for those currently in use. One of the more interesting possibilities opened by CDS is multilanguage prints, in which all but the desired language would be "filtered" out. In addition, ORC envisions people using its control track to automate theater functions such as "turning speakers on and off, adjusting audio levels, directing sound to specific speakers, dimming house lights, and opening and closing curtains," not to mention



In our July article on recording schools, we misidentified a photo. The top photo is actually Institute of Audio Research in New York City; below is Full Sail Center for the Recording Arts in Winter Park, FL. Our apologies to these fine institutions.

special effects generated in the theater. CDS could have a lot to offer theater-goers. (In his "Juxtapositions" column next month, Mel Lambert takes an in-depth look at the new system.)

Studer Revox hosted a party May 10 to celebrate the move of its Western regional headquarters to a new 3200-square-foot sales and service facility in Van Nuys (who says the Valley has no culture?). The company also introduced the D820-48 48-channel DASH recorder, with a price tag of \$249,000, to the Los Angeles market. It's another six months until the product will be available, but the initial reaction was very positive, according to Western regional manager Tom Jenny. Jenny mysteriously alluded to some special features the D820-48 will have that the company isn't prepared to announce yet.

Meanwhile, back in the studio world, SoundWorks West (formerly Hitsville), has an artist in who's SO BIG they're not telling anyone who it is. Michael Jackson? He's working at his own place. Madonna? She's on tour. Who's left? This correspondent has her suspicions, but promises of

—CONTINUED ON PAGE 167

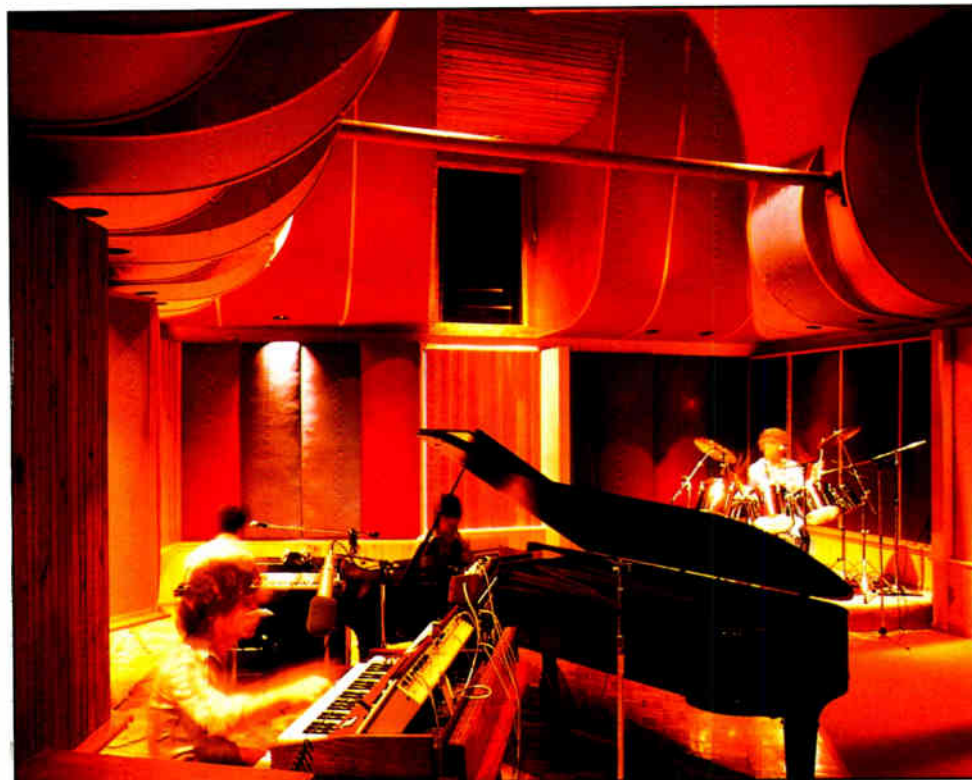
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DESIGNERS

& SUPPLIERS

Information in the following directory section is based on questionnaires mailed earlier this year and was supplied by those facilities listed. *Mix* claims no responsibility for the accuracy of this information. Personnel, equipment, locations and rates may change, so please verify critical information with the companies directly.



Studio A at Trackmasters, located in Buffalo, NY, specializes in commercial audio recording. Originally a church interior, the spacious John Storyk-designed room features a high ceiling with exposed wood vault ties. Photo: Bob Wolsch.

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Mix listings procedure: Every month, *Mix* mails questionnaires to recording studios and/or other vital facilities and services for the recording, sound and video production industries. There is a nominal charge to list a Boldface Listing (name, address, contact) and an Extended Listing (equipment, credits, specialization and photo or logo). If you would like to be listed in a *Mix* Directory, write or call the *Mix* Directories Department, 6400 Hollis Street #12, Emeryville, CA 94608; toll free 800-344-LIST!

Upcoming Directory Deadlines:

North Central/Canadian Recording Studios: **August 16, 1990**
 Mastering, Pressing and Tape Duplication Facilities: **September 17, 1990**
 Northwest Recording Studios: **October 17, 1990**

LEGEND: SD: Studio Designer; **AC:** Acoustical Consulting; **SES:** Studio Equipment Supply; **EI:** Equipment Installation; **MR:** Maintenance/Repair Services; **ER:** Equipment Rentals.

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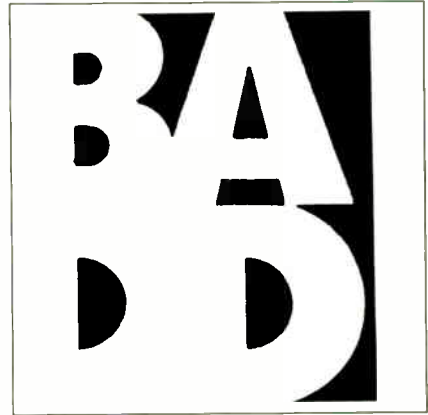
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AUDIO VIDEO RESEARCH GROUP; *FD, EI, SES, MR, AC;* 106 Main St.; Watertown, MA 02172; (617) 924-0660; FAX: (617) 924-0497. Contact: Octavio Brito, Les Arnold. *Services/Specialization:* Accurate qualification of the needs and resources of the audio/video professional is the difference between staying in business or not. Whether you own an 8-track demo room or a 24-track multimedia facility, AVR will support your venture. We offer design, sales and installations coupled with an extensive technical maintenance program. Our optional 24-hour plans and warranted used equipment listings enhance your final project without crippling your bank account. Our staff has "hands-on" experience audio/video engineering and production, giving AVR a wider perspective than most. This results in a personalized and thorough approach to all clients, no matter the size. When you need vintage equipment, expert design and technical service, the best in new gear or audio/video consultations, you will find a positive alternative in AVR. Our business is keeping you in business.

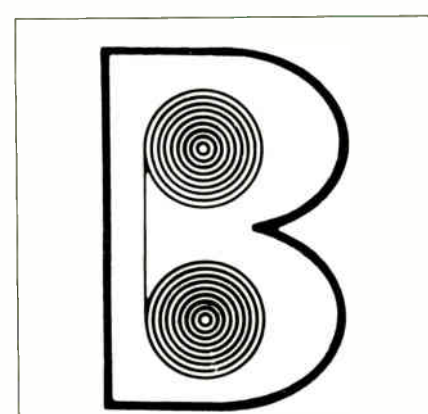
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BENCHMARK ASSOCIATES/DOWNTOWN DESIGN; *FD, AC;* 425 E. 63rd St.; New York, NY 10021; (212) 688-6262. Contact: Vin Gizzi. *Services/Specialization:* Architectural and acoustic design, construction management, acoustic testing and measurement. Design services include: preparation of drawings, construction documents and specifications; coordination of structural, mechanical and electrical engineering;



BENCHMARK ASSOCIATES/DOWNTOWN DESIGN
New York, NY

building department submissions. Acoustic testing includes: noise and isolation; impulse and frequency response; impedance, phase and group delay; distortion; reverberation and decay time. Typical projects: recording studios and control rooms, home studios, audio-for-video mix rooms, video production stages and control rooms, radio and television studios.



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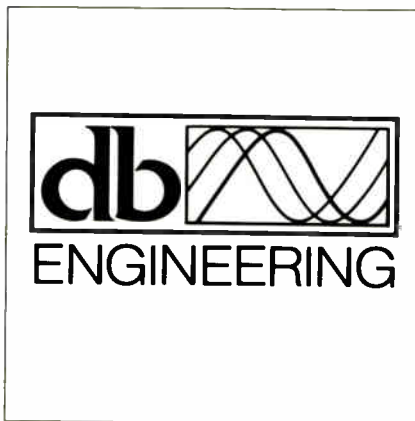
CYLINDER SYSTEMS, INC.; *FD, EI, SES, MR, AC;* 160 West End Ave., Ste. 17N; New York, NY 10023; (212) 877-4843. Contact: Ira H. Kemp.



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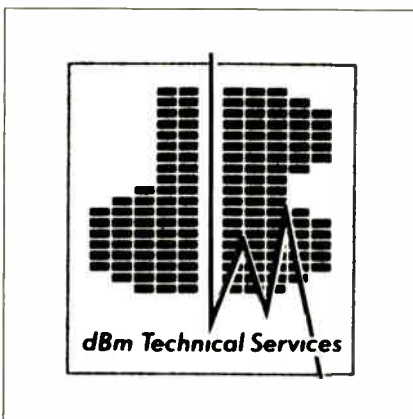
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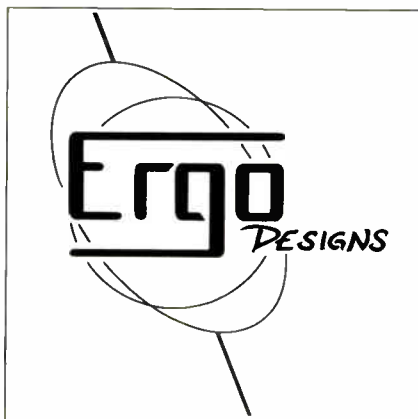
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DREAMHIRE
New York, NY

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HOT HOUSE PROFESSIONAL AUDIO; *FD, EI, SES, AC, ER;* 275 Martin Ave.; Highland, NY 12528; (914) 691-6077; FAX: (914) 691-6822. Contact: Richard Rose. **Services/Specialization:** We provide turnkey system design and installation right down to the fax machine and specialize in custom, state-of-the-art studio monitor systems featuring Tannoy dual-concentric, PAS coaxial, Genelec and Hot House self-powered loudspeakers, Hartley 16Hz co-polymer subwoofers, braided Teflon composite and silver Kimber Kable, Perreux, Australian monitor, Hot House Mosfet and VTL tube amplifiers, and Anechoa and D-Vibe absorbers. Another primary focus is world-class FX packages incorporating the computer-driven Qantec XLC, Marshall 5402 time modulator and AR300 tape eliminator, Drew Y-expressor, Eventide H300 and vintage, reissued H910 Harmonizers and Omnipressor, Drawmer M500, 1960 and 200/300 Series dynamic processors, AKG ADR-68K reverb/sampler, Aphex exciters and dynamics processors, CAD Polyframe, Klark-Teknik



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MARTIN AUDIO VIDEO CORPORATION; SES: 423 W. 55th St.; New York, NY 10019-4490; (212) 541-5900; (212) 489-4750 (parts); FAX: (212) 541-9128. **Services/Specialization:** A Video Services Corporation company and an affiliate of A.F. Associates Inc. Martin Audio has over 25 years of experience in the sales, installation and servicing of audio equipment for recording, broadcasting and post-production. In addition to over 200 major lines of equipment, Martin is the exclusive New York-area source for Amek, GLW (Harrison) and Sound Workshop consoles, Otari's MTR and DTR lines of analog and digital tape recorders, Lexicon Advanced Products signal processors, Sanken microphones, Lexicon Oous, Alpha Audio DR-2, Sonic Solutions and Digital Dynamics digital workstations, Soundmaster synchronizing systems and Dolby SR (spectral recording) multitrack processors. Martin also offers our customers the latest MIDI synthesizer and digital sampling hardware and software with extensive applications

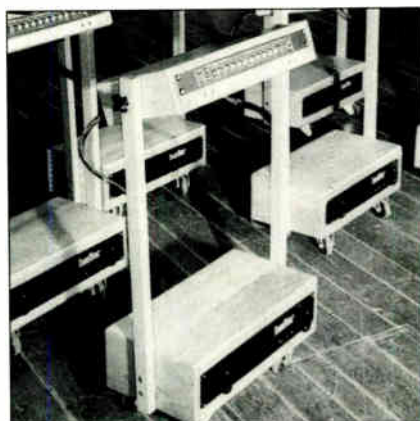
expertise. Among the musical product lines available are Akai, Digidesign, Dyaxis, E-mu, Korg, Kurzweil, Mark of the Unicorn, Opcode, Optical Media and Sycologic, most of which are on display in a complete, working MIDI studio/demo room. Martin Audio also features the largest Pro Audio parts department in New York. Rentals of AV products are done through VRI Scharff Rentals.



MUSICLAN
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MUSICLAN INTERNATIONAL LTD.
Parkslope, NY

MUSICLAN INTERNATIONAL LTD.; FD, EI, SES, MR, ER: 190 Sixth Ave.; Parkslope, NY 11217; (718) 622-2491. Contact: Bradley M. Feldman. **Services/Specialization:** MusicLAN International designs integrated production facility environments for the 1990s. Imagine being able to access and control any piece of equipment in your facility regardless of where it is located. How about being able to share and tap into hundreds of thousands of sound samples, patches, sequences and automated mixes. Maybe you'd also like to keep constant (and accurate) track of equipment, production supplies, tape libraries, session information, billing, employee scheduling and studio bookings. We make all of these solutions possible through the MusicLAN™. MusicLAN International Ltd. exploits Local Area Networking (LAN) technology to integrate your facility with concurrent fiber optic MIDI, digital audio, video and computer control lines. We offer nationwide custom design, installation and 24-hour service/support/upgrade contracts as well as comprehensive in-facility and 100 percent leasing. Let us show you how your facility can actually be profitable and efficient! Please contact us for a detailed brochure or consultation.



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Bearsville, NY


NASSA DESIGN & MANUFACTURING; FD, EI, SES; PO Box 367; Bearsville, NY 12409; (914) 679-9544. Contact: Kenneth W. Lonas. **Services/Specialization:** You can't always get what you want from the major manufacturers of studio equipment enclosures and technical furniture. Nassa Design specializes as a custom design and manufacturing service. From a single bay audio rack to a complete video edit suite, Nassa will work with you to make sure that your equipment is housed attractively, efficiently and uniquely. Ask around, ask your friends, ask George Benson, ask Jan Hammer, ask Atlantic Studios (a complete reference list is available). Chances are you've already been impressed with a Nassa Design installation. In addition to our custom services, Nassa also supplies a number of production items, including console speaker shelves, a unique overhead racking system, non-conductive rack rail, Synclavier keyboard tables and tenbus cue stations. Call or write for more information regarding our custom design service, our custom manufacturing facility and our complete studio installation skills.



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NETCOM; FD, 931 Teaneck Rd.; Teaneck, NJ 07666; (201) 837-8424. Contact: Jim Tronolone.

NEW YORK TECHNICAL SUPPORT, LTD.; FD, EI, MR, 35 Hardscrabble Hill; Chappaqua, NY 10514; (914) 238-4171. Contact: Greg Hanks, Rose LoPresti. Services/Specialization: New York Technical Support, Ltd. is a full-service maintenance firm that caters to the technical needs of the recording, film and broadcast industries. We provide design, consultation, installation and repair services. Our specialties include: custom design and fabrication, computer modeling and simulation of control room ergonomic design, installation and wiring services, tape machine care and repair, power and ground distribution, analysis and fault finding, EMT tuning, modification and refurbishment, and scheduled contract maintenance service. We are factory-trained, equipped and recommended to service: Ampex, MCI, 3M, Neve, Otari, Sony, Studer, Trident, SSL. For more information please call.



NORTHEASTERN COMMUNICATIONS
CONCEPTS, INC.
New York, NY

NORTHEASTERN COMMUNICATIONS CONCEPTS, INC.; FD, AC; PO Box 1853, Grand Central Station; New York, NY 10163; (212) 972-1320. Services/Specialization: Inspire the creativity of your clients, engineers and producers with something your competition cannot buy—a fully integrated electronic, acoustic and visual environment—custom-designed for the way you work by New York's most prestigious studio designers. Only NCC offers you the choice of standard, modular and CGA™ acoustical packages to match the performance of your equipment and your budget. NCC's proprietary Controlled Geometry Acoustics™ frees you from the restrictions of obsolete Live End/Dead End® technology, while eliminating early reflections. And with our total systems approach, NCC custom equipment and cabinetry will enhance your productivity and you'll never again fumble with audio, video or MIDI cords on the back of your outboard or keyboard gear. We'll even design the electrical power and environmental systems to keep you and your equipment comfortable and static free. Benefit from our experience with successful projects exceeding \$10,000,000. Buy your equipment from a distributor, but plan for your competitive edge with NCC.

PANDEMONIUM AUDIO; FD, EI, SES, AC; 16 Dorchester Dr.; Manhasset, NY 11030; (516) 365-7810. Contact: C.P. Pores.

PARSONS AUDIO; FD, EI, SES, MR, AC; 192 Worcester St. (Rte. 9); Wellesley Hills, MA 02181; (617) 431-8708. Contact: Mark Parsons. Services/Specialization: Equipment Sales—Parsons Audio is New England's sole authorized source for Amek consoles, Sony professional recorders and consoles, Dolby noise reduction, Lexicon 480L, Audio Precision test and measurement sets, and Benchmark preamps and DAs. Other featured products include RPG diffusors, Otari, Yamaha, TimeLine, Digidesign, Sound Tools, Sony and Panasonic DATs, Wheatstone, Akai, Tube-Tech, Nakamichi and dozens more. Expert System Consultation and Design. Parsons Audio's staff has been serving New England's professional audio community since the 1970s. Specialties include all types of recording, production, broadcast and sound reinforcement systems. Subspecialties include console and recorder selection, digital audio recording/editing, audio systems for video and film, and MIDI and music production systems. Technical Services—in partnership with Alacronics (see

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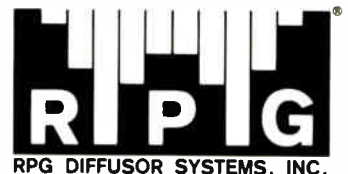
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Alacronics' listing above), include complete acoustical and electrical design, construction, installation, maintenance, modifications and repairs. Alacronics is an authorized service center—New England's largest—for all types of professional audio equipment, keyboards and synthesizers.

ROR AUDIO RESEARCH; FD, EI, SES, MR, AC, ER; 161-14 Union Turnpike; Flushing, NY 11366; (718) 969-3660; (718) 969-3792. Contact: Shimon Ron.

TED ROTHSTEIN; FD, EI, SES, MR, AC; 280 Park Ave. S.; New York, NY 10010; (212) 475-5064; FAX: (212) 475-4877. Contact: Ted, Eric or Addy. Services/Specialization: Ted Rothstein has been designing, manufacturing and servicing multitrack consoles, parametric equalizers, monitor systems, and other electronic and acoustic innovations since 1970. A representative list of clients and professional users of Ted Rothstein designs would include these recording studios: Orlando: Full Sail, London: Roger Water's studio and July 1990 "Wall" at the Berlin Wall, Pink Floyd's Britannia Row, Marcus Musik; Bogota, Columbia: Audiovision; Reykjavik, Iceland: Hjodrit Studios, Brussels, Belgium: Studio Katy; Tokyo: Noah; New York: Tamarand Digital Studio, A&R, Bearsville, Power Station, Electric Lady, Sorcerer Sound, MSP, Skyline, Interface and the new mix room at 321 Studios (formerly Record Plant); Los Angeles: Record Plant; Connecticut: Ace Frehley (KISS) studio. Mastering rooms: Sterling Sound, Frankford Wayne Discos, Clubs and Restaurants: Tokyo: Rock & Roll Diner; Bangkok: NASA, Spaceadrome; New York: Spo-Dee-O-Dee, The Sporting Club, America, The Falls; Los Angeles: L.A. Stock Exchange, New York Health & Racquet Club Yacht; Hard Rock Cafe; Reykjavik, Tokyo, Cancun, New York, Dallas, Boston, Washington, D.C., Acapulco, Singapore, Orlando.



RPG DIFFUSOR SYSTEMS, INC.
Largo, MD

RPG DIFFUSOR SYSTEMS, INC.; SES, AC; 12003 Wimbledon St.; Largo, MD 20772; (301) 249-5647. Contact: Dr. Peter D'Antonio. Services/Specialization: The RPG Diffusor System is a complete acoustical treatment system for the music industry. Current products include: QRD Diffusor™—broad-bandwidth sound diffusion; Abdiffusor™—broad-bandwidth sound absorption; Triffusor™—triangular variable acoustics module with absorptive, reflective and diffusive sides; Biffusor™—two-sided abdiffusive/diffusive performance partition; Omnidiffusor™—two-dimensional QRD diffusor with hemispherical coverage; Flutterfree™—non-absorptive hardwood flutter control molding and bass absorbing slat resonator; Ensemble™—orchestral acoustical shell; Chorister—choral shell; Attenuator™—inexpensive fabric wrapped fiberglass panels with bass absorbing cavity; Plexifusor™—

transparent QRD™ diffusor and the Diffractal™—a new one- or two-dimensional fractal sound diffusor with unlimited bandwidth. Recent clients include Peter Gabriel, Bath; INXS, Sydney; Miami Sound Machine; Whitney Houston, NJ; Walter Becker, Mau; Hitokouchi-Zaka, Tokyo; Telarc, Cleveland; DMP, Stamford; Sony Classical, NY; PolyGram, NY; Carnegie Hall, NY; Cincinnati Music Hall; Houston Grand Opera; Full Sail, Orlando; MTSU, Murfreesboro.

MIKE SHEA PRECISION MEASUREMENT; FD, EI, MR, AC; PO Box 723; New York, NY 10276-0723; (212) 477-4982.

SHEN MILSON & WILKE, INC.; AC; 6 E. 39th St.; New York, NY 10016; (212) 725-2552. Contact: Fred Shen.

SONEX-SOURCE; AC; 58 Nonotuck St.; Northampton, MA 01060; (413) 584-7944. Contact: Win Ridabock.

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JOHN M. STORYK, A DIVISION OF WALTERS-STORYK DESIGN GROUP; 134 Main St.; New Paltz, NY 12561; (914) 255-2255. Contact: Beth Walters. Services/Specialization: John Storyk has provided design and construction supervision services for the professional audio recording community since 1969—completion of Jimi Hendrix's Electric Ladyland Studios. Mr. Storyk studied architecture at Princeton and Columbia universities. He has been responsible for over 400 world-class audio recording studios; radio stations; video facilities; as well as small clubs and theaters—including private studios for Whitney Houston, Bob Marley, Ace Frehley, several NPR-associated radio stations, and dozens of the nation's

leading commercial audio recording facilities. Recent projects include: 6-studio complex for Full Sail/Platinum Post, Orlando; studio installations for Soundshop, Nashville; and Crawford Post, Atlanta; private studio design for Taylor Dane's producer—Rick Wake; HDTV video post facility for Rebo Video, New York City; Hollywood's newest commercial audio post facility—5-studio complex for the L.A. Studios—Margarita Mix; installation of the newest room for Howard Schwartz Recording, New York City; completion of Woodstock, N.Y.'s 15,000 sq.ft. Bearsville Theater.

STUDIO CONSULTANTS, INC.; FD, SES, AC, ER; 321 W. 44th St.; New York, NY 10036; (212) 586-7376. Contact: Doug Simon.

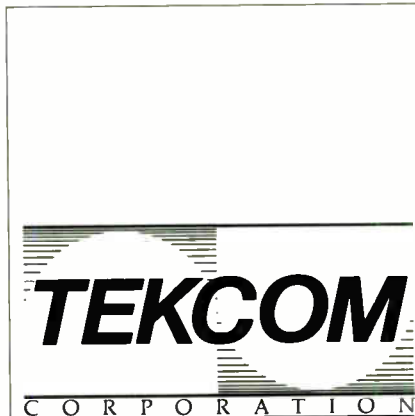
STUDIOTEK; EI, MR, ER; PO Box 526; Bryn Mawr, PA 19010; (215) 525-3605. Contact: Chris Gately, Jeremy Birnbaum.



SYSTEMS DEVELOPMENT GROUP
Poolesville, MD

SYSTEMS DEVELOPMENT GROUP; FD, EI, AC; 18601 Darnestown Rd.; Poolesville, MD 20837; (301) 972-7355. Contact: Bernie Chlop. Services/Specialization: Systems Development Group is a full-service design/build company for music recording, video editing, ADR suites, multimedia presentation spaces and board rooms. Original design or expansion of existing space. Specializing in acoustical environments and technical/electronic configurations. Services include: design, turnkey installation, project management, construction documents/costing/materials lists, and system performance and testing. All construction drawings are generated with CAD, providing the client with two- and three-dimensional views of the design and feature testing. SDG is also the manufacturer/distributor of the Art Diffusor line of diffusion products. The original Art Diffusor, made of various wood stocks. Available in 15" x 15" x 15" x 30" panels. The Track Art Diffusor, made of fire retardant, treated polyethylene foam. Available in 24" x 24" panels for standard track acoustic ceilings. The Art Diffusor Form, a site-licensable form for construction of monolithic concrete diffusor surfaces.

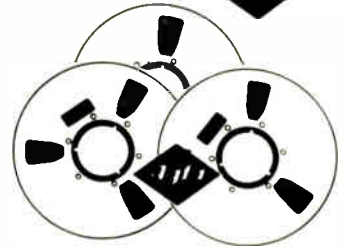
TECHNICAL SERVICE SPECIALISTS, INC.; FD, EI, MR, AC; PO Box 540, Astor Square Mall; Rhinebeck, NY 12572; (914) 876-3999; FAX: (914) 876-8632. Contact: Mr. Wasserbach, B.E.E.E.



TEKCOM CORPORATION
Philadelphia, PA

TEKCOM CORPORATION; EI, SES, MR, AC, ER; 1020 N. Delaware Ave.; Philadelphia, PA 19125; (215) 426-6700. Contact: Lou Maresca, L. Richard Feld. Services/Specialization: TekCom is the leading supplier of professional audio
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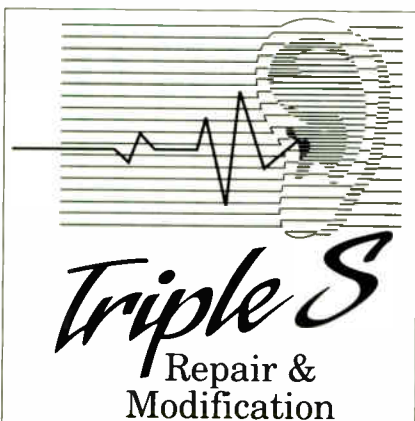
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THE TOY SPECIALISTS
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THE TOY SPECIALISTS; SES, ER; 333 W. 52nd St.; New York, NY 10019; (212) 333-2206; (800) 445-3330. Contact: Bill Tesar, Rita Tesar. Services/Specialization: The Toy Specialists is a fast-growing company specializing in pro audio and MIDI instrument rentals. By combining personal, expedient service with expert technical assistance 24 hours a day, seven days a week, the company has developed an enviable status in the U.S. rental marketplace. The Toy Specialists carry the largest inventory of digital tape and hard disk recorders anywhere. Most notably the Mitsubishi X-880, X-850, X-86HS, Sony 3348, 3324, 1630 and AMS AudioFile V. For classic tube buffs, our selection of equalizers, limiters and microphones is unrivaled. MIDI is our middle name. We stock a full line of computers, synthesizers, drum machines, synchronizers and interface boxes. Some of our most recent clients include Madonna, Phil Collins, Prince, Whitney Houston, Carly Simon, Run D.M.C.



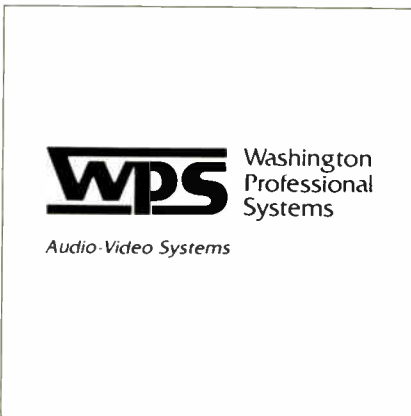
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TRIPLE S; MR; 228 Washington Ave., Bellevue, NJ 07109; 1600 Broadway; New York, NY 10019; (201) 751-0481 (in NJ); (212) 832-0072 (in NY). Services/Specialization: After 14 years of providing the music industry with superior quality service and custom design, Triple S has become one of the industry's largest and most complete technical-support facilities in the nation. We are factory-authorized to service over 60 manufacturers. Our technical staff is comprised of some of the biggest names in the industry for custom-designing equipment ranging from hot-rodding Marshalls to building MIDI communication networks for the recording and broadcast industries. Many of the world's most accomplished artists have trusted the service and design of their amps, keyboards, guitars and studios to Triple S. Bands like Bon Jovi, Billy Joel, Judas Priest, Hall and Oates, Cindy Lauper, Deep Purple, U2 and many more have relied on Triple S for years. So if your equipment is in need of repair, updating to current specs or a full-blown high-performance overhaul, the only name you need to know is Triple S.

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VISUAL MUSIC TECHNICAL SERVICES; FD, EI, SES, MR, ER; 235 E. 13th St., Ste. #3-D; New York, NY 10003; (212) 505-9281. Contact: Jay Henry.

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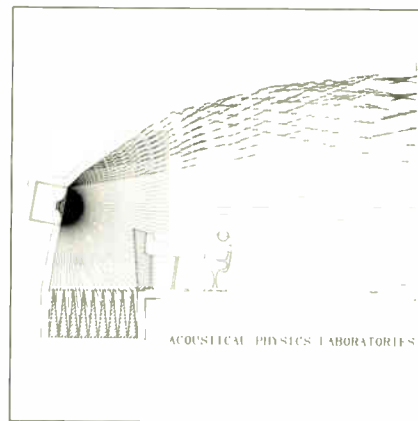
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WASHINGTON PROFESSIONAL SYSTEMS; FD, EI, SES, MR, AC; 11157 Viers Mill Rd.; Wheaton, MD 20902; (301) 942-6800; FAX: (301) 946-3241. Contact: Greg Lukens, Rob Forman. Services/Specialization: Washington, D.C.'s prime source for technical know-how and the proper hardware to solve your audio needs. We specialize in analog and digital recording systems, audio-for-video, synchronization and editing systems. WPS maintains a staff of design, construction and installation professionals to supply our clients with the complete turnkey installation. Manufacturers we represent are Sony, Lexicon, Dolby, Dyaxis, JBL/Soundcraft/JREI, Time-Line, Alpha Boss/2, Otari, JVC, Meyers, Tannoy, Soundtracs, AMS, Tascam, Eventide, Aphex, BSS, Neumann, Amek Mozart, Genelec. Among our clients are Peabody Conservatory of Music, Omega Audio, Premier Recording, Soundsters, Sheffield A-V, Hit & Run Studios, NFL Films, Maryland Public Television, Interface Video, Atlantic Video, Loomis Productions, High-Heel Studios and Star-Tech Studios. WPS is the mid-Atlantic dealer for Amek products, including the new Mozart and Lexicon Opus random access, digital, audio production system. Recent Opus installs include Henninger video and interface video. WPS has recently expanded its operations by adding a Delaware Valley Office; call (609) 273-8688.

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ACOUSTICAL PHYSICS LABORATORIES; FD, AC; 3877 Foxford Dr.; Doraville, GA 30340; (404) 934-9217. Contact: Bill Morrison. Services/Specialization: Acoustical Physics Laboratories specializes in the design, analysis and installation of control rooms, studios and monitoring systems. Through the use of TEF® System 12 computer analysis, dual-channel FFT measurements, CADD acoustical models and acoustical scale models, high-accuracy designs are developed, installed and performance certified. Control rooms and monitoring systems are designed for first-arrival frequency and time-domain accuracy. Each design incorporates correct room/monitor/console/equipment geometry combined with spectrally accurate diffusion and absorption to achieve room monitoring accuracy. Acoustical Physics Laboratories designs,



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Doraville, GA

supplies and installs high-accuracy monitoring systems that incorporate cone and soft-dome drivers in time-correct three-way alignments. This proven approach to monitor system design results in the highest levels of time- and frequency-domain accuracy combined with the lowest levels of distortion and coloration. All designs CADD prepared and presented in precision architectural E-size drawings with written, detailed specifications. Hard copy TEF® computer plots document all stages of design work from the initial model testing to the monitor design and the final installation.

B.A.E. (BLEVINS AUDIO EXCHANGE); SES; PO Box 101238; Nashville, TN 37224; (615) 391-0429. Contact: Randy Blevins.

M.A. BENINGTON COMPANY; EI, SES; 2459 Cuchura Dr.; Birmingham, AL 35244; (205) 988-0707. Contact: Mike Benington.

BIG BEAR AUDIO VIDEO, INC.; EI, SES, MR, ER; 1419 E. Second St.; Sheffield, AL 35660; (205) 381-6812. Contact: Lane Sutherland, Larry Sutherland, Peter Akers.

BLEVINS AUDIO EXCHANGE (B.A.E., INC.); SES, MR; PO Box 101238; Nashville, TN 37224; (615) 391-0429; FAX: (615) 391-0456. Contact: Randy Blevins. Services/Specialization: Blevins Audio Exchange (B.A.E., Inc.) is one of the largest full-service brokerage companies in the country. They sell and refurbish all kinds of studio equipment, from vintage tube gear to complete studio packages. Equipment is displayed in a 5,000 sq. ft. warehouse, with new equipment arriving daily. They also handle the Studer Dyaxis workstations and are continuously adding new product lines and services. A current list of available equipment is just a phone call away.

CAPE DIXSON ASSOCIATES; FD, AC; 1925 Century Blvd., Ste. 4; Atlanta, GA 30345; (404) 633-8861. Contact: Timothy W. Cape.

COMMUNICATIONS ENGINEERING, INC.; FD, EI, SES, MR, AC; 8530 Cinderbed Rd., Ste. 300; Navington, VA 22122; (703) 550-5800. Contact: Carlos Fernandez, Larry Brody. Services/Specialization: Engineering/management and technology consultation to the communications industry. Engineering technical design, fabrication and installation of communications systems, from small audio/video rooms to television, editing, production and post-production, teleconferencing, satellite, microwave systems, acoustics design. Extensive use of CAD/CAE (computer-aided design/computer-aided engineering) and computerized management tools from start to finish of projects. Turnkey installations.



DREAMHIRE
Nashville, TN

DREAMHIRE; ER; 1217 16th Ave. South; Nashville, TN 37212; (615) 321-5544; FAX: (615) 321-0928. Contact: Patty Sprague. **Services/Specialization:** Dreamhire in Nashville has now been in business for a mere 18 months and is already gaining a reputation in the South as a major source of rental equipment, particularly digital audio recorders. The rapidly growing inventory now includes two Mitsubishi X880 and one Otari DTR-900 recorders, all with Apogee filters fitted. DASH machines featured are the Sony PCM-3348 48-track and PCM-3324A 24-track, with the latest addition being the first Akai A-DAM DR-1200 12-track digital recorder available for rental in the USA. Digital 2-track machines are also carried along with one of the most varied selections of outboard equipment, microphones, samplers, keyboards, synth modules, drum machines and noise reduction available for rental in the USA. Also featured is the only Focusrite 12-channel sidecar desk ever made, which is capable of interfacing with SSL consoles.

STEVEN DURR AND ASSOC.; FD, AC; 6216 Bresslyn Rd.; Nashville, TN 37205; (615) 352-0218. Contact: Steven Durr.

tact: Mike Peters, Bill Evans, Tim Dixon, Rick Bolen. Don Kendrick, Gray Peck. **Services/Specialization:** Reliable Music has been serving pro audio and music retail needs in the Southeast for over 25 years. We have a progressive staff with hands-on experience in sound reinforcement, tape recording and broadcast equipment. Our keyboard division is thoroughly versed in MIDI application for recording and live performance. We offer major brands and service on the equipment we sell. Our installation crews specialize in church, club and studio systems. For information on recording and broadcast equipment, contact Mike Peters; for sound reinforcement, contact Bill Evans; for church sound design/installations, contact Don Kendrick, and for lighting systems, contact Gray Peck. Monday through Saturday, 10 a.m. to 6 p.m.

STAGE & STUDIO CONSTRUCTION SERVICES, INC.; EI, SES, MR; 1002 Wake Forest Rd.; Raleigh, NC 27604; (919) 834-6380. Contact: Greg B. Shriver, president; Paul Gabriel, op. mgr.

STUDIO SUPPLY COMPANY; FD, EI, SES, MR, AC, ER; PO Box 305132; Nashville, TN 37230-5132; (615) 391-0050. Contact: John Alderson.



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NATIONAL SOUND ENGINEERING; FD, EI, SES, MR, AC; 6500 McDonough Dr., C-9; Norcross, GA 30093; (404) 447-0101; (800) 541-9140; FAX: (404) 447-1355. Contact: Tom Hayward. **Services/Specialization:** Unlike music stores that offer very little in the way of acoustical or technical skills, we provide a broad base of recording, broadcast and video equipment lines. This is coupled with a "second-to-none" warranty program and a genuine knowledge of acoustical criteria, which we are not too proud to share with you. Whether your needs are as simple as a cassette or R-DAT to the complexity of an audio/video multitrack production studio, we'll be right beside you from start to finish. Design, equipment, installation, service. Let us make your dream come true...NSE.

NELSON'S ELECTRONIC SYSTEMS; FD, EI, SES, MR, AC, ER; PO Drawer 580, 1600 S. Oates St.; Dothan, AL 36302; (205) 793-7797. Contact: Ed Nelson.

GASTON NICHOLS PROFESSIONAL AUDIO SERVICES; FD, EI, SES, MR, AC; 5337 5th Terrace S.; Birmingham, AL 35212; (205) 591-7346. Contact: Gaston Nichols.

QUALITY SOUND & VIDEO; FD, EI, SES, MR, AC, ER; 833 Bragg Blvd.; Fayetteville, NC 28301; (919) 483-1212; (800) 548-0775. Contact: Mark N. Lynch.



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STUDIOWORKS
Charlotte, NC

STUDIOWORKS; FD, EI, SES, MR, AC; 1018 Central Ave.; Charlotte, NC 28204; (704) 375-1053; (800) 438-5921. Contact: Mike Edwards. **Services/Specialization:** Studioworks is the team with working experience in recording and pro audio. Studioworks is closely associated with Reflection Sound Studios, which means you can talk with the people who have actual session experience with the equipment they sell and real-world experience in studio acoustics (both design and construction). Studioworks has supplied recording companies all over the country and has been a leader in sales of consoles and full turnkey systems. In fact, over 60 session-proven lines of equipment and supplies are available. We also offer complete consultation about systems for recording film sound, broadcast, theater sound and sound contracting. Studioworks is very interested in helping the "Artist Studio" get a good start as well building multimachine 24-track complexes. We want to begin a long-term relationship with your company and back it with experience.

SYNERGETIC SERVICES, INC.; FD, EI, MR, AC; 1926 NE 1st St.; North Miami Beach, FL 33162; (305) 947-7372. Contact: Ross Alexander.

TECHNICAL AUDIO SERVICES; EI, SES, MR; 306 Ridgeland Dr.; Greenville, SC 29601; (803) 233-6608. Contact: David Rochester.

TECHNICAL AUDIO SYSTEMS; FD, EI, SES, MR, AC, ER; 6040-E Northbelt Dr.; Norcross, GA 30071; (404) 840-7893. Contact: Ron Montgomery, Steve Starnes.

TODRANK RAYMOND ASSOCIATES; FD, AC; 2101 June Dr.; Nashville, TN 37214; (615) 885-6553; FAX: (615) 883-3944. Contact: Bob Todrank. **Services/Specialization:** 20 years industry experience. TEC Award winner for studio design. Prompt, efficient and individualized services. Specializing in studio and technical facility design; pro audio systems consulting; acoustical consulting services; RPG & LFD diffusion; custom monitoring systems; traditional as well as LEDE® design concepts; technical documentation services. Exclusive U.S. distributor of the Boxer, all soft-dome control room monitoring systems. Recording studio monitoring evaluations and recommendations. On-site TEF®, TDS and 1/3-octave analysis services. Additional specialization in digital audio workstations technology and systems design. Full computer-aided design and drafting facilities. Equipment selection assistance. Acoustical consultation services for architects. Latest projects include the Federal Bureau of Investigation, The Reel Thing, Pyramid Recording and Cook Sound Studios. All services are available internationally.

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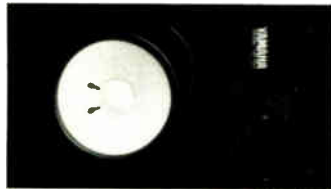
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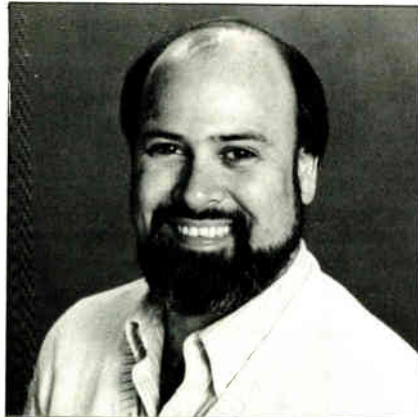
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SOUTHEAST

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& SUPPLIERS

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TOPHAM AUDIO, INC.; SES, MR, ER: 4403 Vineland Rd., Ste. B-3; Orlando, FL 32811; (407) 649-6444. Contact: Joe Guzzi.

VENUE DESIGN GROUP; FD, AC: 1002 Wake Forest Rd.; Raleigh, NC 27604; (919) 834-8580. Contact: Greg Shriver, Deborah McDonald. Services/Specialization: Designers of performance and production environments for commercial and corporate audio and video production facilities, theaters and videoconferencing applications. We specialize in the integration of state-of-the-art electronics with traditional architectural, mechanical and electrical design professionals. Range of services includes initial feasibility studies, pro-forma budgeting, architectural layouts, electronic systems functionals, contract documentation, through construction administration and post-of-performance testing. Specialties include acoustical treatments and isolation, ultraquiet HVAC systems, technical earthing systems, 11.5 interfaces, power conditioning, automated videoconference systems, etc. Our national and international clientele include many Fortune 500 companies through local production houses. Drafting department operates on AutoCad Rel. 10; Modem/FAX: (919) 834-7189.

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Minnesota, Missouri, Nebraska, North Dakota,
Ohio, South Dakota, Wisconsin

AUDIO ART SYSTEMS; FD, EI, SES, MR, AC: 403 SW 8th St.; Des Moines, IA 50309; (515) 282-3223. Contact: Patrick McManus.

AUDIOLINE, INC.; FD, EI, SES, MR, AC, ER: 2323 J Blue-mound Rd.; Waukesha, WI 53186; (414) 785-9166. Contact: John Loeper, president, Doug Mitchell, sales manager.

AUDIOLINE, INC.; FD, EI, SES, MR, AC, ER: 368 W. Ontario; Chicago, IL 60610; (312) 988-9166. Contact: Brian Bristo, branch manager.

AUDIOLINE, INC.; FD, EI, SES, MR, AC, ER: 4049 Penn-sylvania, Ste. 100; Kansas City, MO 64111; (816) 931-9166. Contact: Denny Bergstrom.

AVC SYSTEMS/VIDEO MIDWEST; FD, EI, SES, MR, AC, ER: 7901 Computer Ave. S.; Minneapolis, MN 55435; (612) 832-3232. Contact: Bob Olsen.

GAND PRO AUDIO; FD, EI, SES, MR, AC, ER: 780 Frontage Rd.; Northfield, IL 60093; (708) 446-4263. Contact: Bob Tjarks.

HY JAMES—THE AUDIO PROFESSIONALS; FD, EI, SES, MR: 24166 Haggerty; Farmington Hills, MI 48024; (313) 471-0027; (800) 875-5550. Contact: Henry Root, Tom Greenberg, Jay "Hot Sam" Barth. Services/Specialization: Digital audio: Otari DTR-900; Lexicon Opus; Digital Dynamics Pro Disc; Digidesign Sound Tools; Yamaha DMP7D digital mixing system, Sony, Fostex and Ramsa R-DAT recorders.



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ICB AUDIO COMPANY; FD, EI, SES, MR, AC, ER: 2036 Reading Rd.; Cincinnati, OH 45202; (513) 651-0800. Contact: Ian Budd.

JAMIESON AND ASSOCIATES, INC.; FD, AC: 5200 Willson Rd. #300; Minneapolis, MN 55424; (612) 920-3770. Contact: Rich Jamieson, VP.

PRO-TECH SERVICES, INC.; FD, EI, SES, MR, AC, ER: 1922 Fargo; Des Plaines, IL 60018; (708) 699-8937. Contact: David Jack.

RENT FX/SG AUDIO; SES, ER: 445 W. Erie, Ste. 201; Chicago, IL 60610; (312) 266-1901; FAX: (312) 266-1904. Contact: Chris Kirby, Larry Schara, Sue Gosstrom.

SG AUDIO/RENT FX; FD, EI, SES, MR, AC, ER: 445 W. Erie St., Ste. 201; Chicago, IL 60610; (312) 266-1901; FAX: (312) 266-1904. Contact: Larry Schara, Susan Gosstrom, Chris Kirby. Services/Specialization: SG Audio is the first full-service pro audio dealership centrally located in the River North section (just north of the loop) of downtown Chicago. SG Audio specializes in full turnkey installations, new and used equipment sales, full onsite or in-house service, and has an extensive rental stock through our associate company Rent FX. Presently SG carries about 50 product lines featuring items such as the Eventide H3000SE, Drawmer M500, the Lexicon LXP series and many others in between for effects, Neotek, DDA and Soundtracs consoles, DAR and ADAP II workstations, TimeLine synchronizers, Milab, Beyer, Sanken and Sennheiser mics; installation/sales facility for Apogee filters and Audio Kinetics automation. If you would like to list any equipment for sale, receive our sales flyer, or have any questions on gear, wiring or technical, please feel free to call or fax us at your convenience.

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SOUND ACOUSTICS, INC.; FD, EI, SES, MR, AC: 6437 Cecelia Cir.; Minneapolis, MN 55435; (612) 941-2124. Contact: Tom Tucker, George Bailey. Services/Specialization: A

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WAB SYSTEMS; SES, ER: 3908 54th St.; Des Moines, IA 50310; (515) 253-9924. Contact: Gary.

SOUTHWEST

Arizona, Arkansas, Las Vegas, New Mexico, Oklahoma, Texas

AUDIO SPECIALTIES COMPANY; EI, SES, MR: 13416 Brookgreen; Dallas, TX 75240; (214) 239-2230. Contact: Mike Moree.

A.V. MEDIA DIV. OF MEDIA COMMUNICATIONS CORP.; ER: 2727 W. Southern Ave.; Tempe, AZ 85282; (602) 438-2959. Contact: Ann Bonanno.

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RUSS BERGER DESIGN GROUP, INC.; FD, AC: 4004 Beltline Rd., Ste. 110; Dallas, TX 75244; (214) 661-5222. Contact: Russ Berger. **Services/Specialization:** Offering full-service acoustical consulting and design services, our staff has accomplished over 400 recording, broadcast and film studios. Our work has been twice honored with a TEC Award for studio design. Recent projects include Battery Studios in NYC, private studios for Steve Miller, new audio and video post rooms for ABC TV in NYC, Middle Tennessee State University's new 90,000 sq.ft. mass communications complex, JC Penney's new 19,000 sq.ft. recording and broadcast facilities, USA Today and W*USA TV facilities in D.C., NBC *Saturday Night Live* edit suite in NYC, The National Capitol Music Building studios in DC, WLS and WLUP Radio in Chicago, schematic design for Virgin Studios in the UK, Bill Young Productions in Houston, American Multi-Cinema, United Artists, General Cinema and Lucasfilm THX theaters.

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BILL HOLFORD SOUND, INC.; *FD, AC, 5418 Grape Rd.; Houston, TX 77096; (713) 665-7554. Contact: Bill Holford.*

LD SYSTEMS, INC.; *FD, EI, SES, MR, AC, ER, 467 W. 38th St.; Houston, TX 77018; (713) 695-9400. Contact: Dennis Cotton, Bruce Coffman. Services/Specialization: LD Systems is a multifaceted professional sound and lighting company providing complete production services, equipment sales and rental, consultation, systems installation and repair services. Professional products include Amek, Tascam, Adams-Smith, Lexicon, JBL, Soundcraft, Dyaxis, Neumann, Bryston, Eventide, Ramsa and others. Complete and functional showroom facility for all products as well as on-location demonstration if desired. Total service and support for all products represented. Design and consulting services are our specialty. Factory-authorized service center for everything we sell as well as on-site service available. Full-service audio and lighting rental featuring a large selection of Sennheiser and HME wireless microphones, Toa and Turbosound speakers, Crest and QSC power amps, Soundcraft and Yamaha mixing consoles, theatrical-type effect lighting, smoke and fog machines, Rosco, Theatre Magic, Leprecon and a variety of fixtures from PAR 38s to 64s.*

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STUDIO SUPPLY COMPANY; *FD, EI, SES, MR, ER, 9978 Monroe #304; Dallas, TX 75220; (214) 358-0050. Contact: Leland Burns. Services/Specialization: Nashville's Studio Supply Company in the Southwest serving Texas, Oklahoma, Louisiana and Arkansas. Top-end equipment for the recording professionals. Otari tape machines and consoles sales and service. Otari multitrack sales rep for SW area. Also selling and servicing Amek/TAC, DDA and Soundcraft consoles. We are not in the production business, we are in the business of servicing the pro audio/studio industry. Our staff carries years of experience and expert advice. Dealership includes: Crown, Dolby, Adams-Smith, AMS, Hafler, Lexicon, Hill, JBL, White, Westlake, Sankin, Klark-Teknik, Milab, Drawmer, AKG, Ramsa/Panasonic, Sony digital and much more! Our service department performs factory labor on Otari, TEAC/Tascam, Fostex, Revox tape machines.*

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DAVID L. ADAMS ASSOCIATES, INC.; *FD, AC, 1701 Boulder St.; Denver, CO 80211; (303) 455-1900. Contact: David Adams, Harold L. Happe.*

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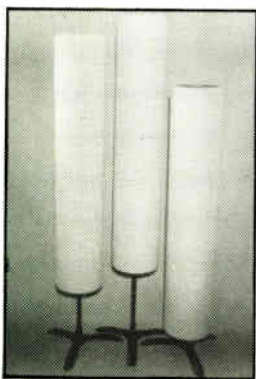
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DAVID CARROLL ELECTRONICS; *FD, EI, SES, 805 Gilman St.; Berkeley, CA 94710; (415) 528-8054; FAX: (415) 526-1982. Contact: David Carroll, Max Rossmassler. Services/Specialization: David Carroll Electronics provides engineering and design consultation, custom prefabrication of equipment wiring, and complete systems installation services. We serve a wide range of markets, including semipro audio and video studios, equipment rental companies, music groups, and college and university educational facilities, as well as comprehensive design/build projects for major film, video, broadcast and corporate customers. Client list: Lucasfilm Ltd., Zoetrope Studios, Saul Zaentz Film Center, Apple Computer (Apple-TV), One Pass Inc., Dolby Laboratories, Mills College, Los Medano College, Russian Hill Recording, KPCC-TV (Houston), radio KPFA, etc.*

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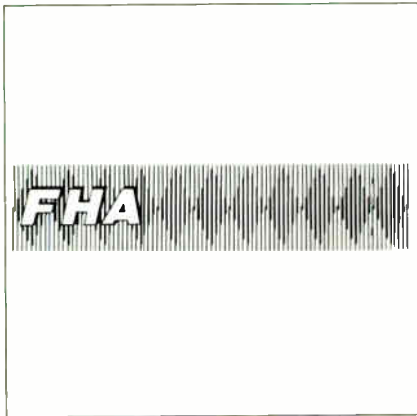
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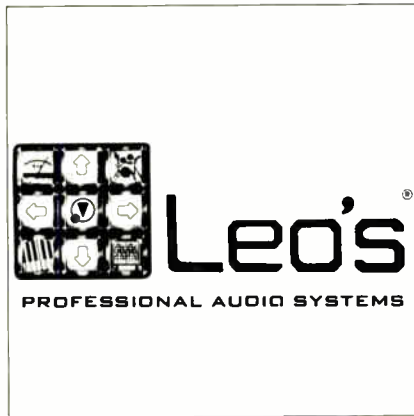


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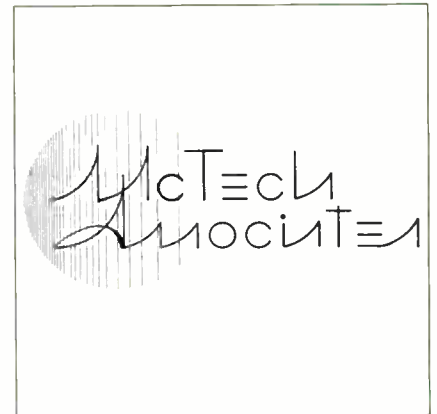


LEO'S PROFESSIONAL AUDIO INC.
Oakland, CA

Yamaha, Korg, Ampex Tape and ADC. We inventory Canare and Monster Cable as well as Switchcraft and Neutrik connectors. Our particular emphasis is computer-based audio production and presentation systems, with a specialization in multimedia and digital audio production solutions. We offer studio planning, consultation, sales and installation of facilities from two tracks to whatever capacity is desired, automated or not. Our rental department offers a variety of sound reinforcement, recording and signal processing equipment for short-term needs. We service all major brands of audio equipment.

LISTENUP PROFESSIONAL DIVISION; EI, SES, MR; 999 S. Logan St.; Denver, CO 80209; (303) 778-0949. Contact: Norm Simmer. **Services/Specialization:** ListenUp is a full-service pro audio/video dealer that has been serving the Rocky Mountain region for over 15 years. You'll find everything you need at the lowest prices. ListenUp represents more than 100 manufacturers like: Allen & Heath, Auratone, Ampex, AKG, Biamp, BBE, Bose, Cetec Vega, Crown, DeltaLab, DOD, E-V, Eventide, Fostex, Furman, Hallex, HME, JBL, JVC/Klipsch, Lexicon, Nakamichi, NEC, Neumann, Numark, QSC, Shure, Soundcraft, Tascam, UREI, Yamaha and more. Our service department is factory-trained, and our analysis equipment includes: Crown/Tecron TEF System-12.

ME RTA and the Sound Technology tape recorder test system. Our experienced and knowledgeable sales and technical staff and the finest selection of products make ListenUp the premier professional dealer in the Rocky Mountain region.



MCTECH ASSOCIATES
Oakland, CA

MCTECH ASSOCIATES; FD, EI, MR, AC; 484 Lake Park Ave., Ste. 341; Oakland, CA 94610; (415) 848-7917. Contact: Mack Clark. **Services/Specialization:** McTech Associates provides audio system design, engineering and technical support services for the Northern California film, video and recording industries. We serve all levels of facilities from the homegrown 8-track, through the individual film composer/sound designer, on up to world-class recording and film mix rooms. Being well-versed in all aspects of production, we can offer qualified advice and service in modifying or upgrading your existing facility to best suit your needs. Excellence in problem-solving is a specialty exemplified by trouble-shooting to the component level, resolving synchronization anomalies, or interfacing digital or MIDI equipment. We are grateful for the continued good faith and confidence of our clients: Different Fur, Alpha & Omega, Soma Sync Studios, Audio Production Group, One Pass Video, Solid State Logic, Lucasfilm Ltd., Russian Hill Recording, Starlight, Spark, Sierra West, Zoetrope and others.

THE 1990 TEC AWARDS Celebrate Excellence!

**The Biltmore
Los Angeles, California
Sunday, September 23, 1990
6-10:30 pm**

Mix magazine invites you to attend the hottest event of the year as the audio industry pays tribute to the outstanding technical achievements and creative contributors of 1990.

The sixth annual Technical Excellence & Creativity Awards will be presented at the The Biltmore, 506 S. Grand Avenue, Los Angeles, on the second evening of the AES Convention.

For tickets and other information, contact Karen Dunn, Executive Director, at (415) 420-0144.

A benefit for the House Ear Institute and audio education scholarships.



NORTHWEST
DESIGNERS
& SUPPLIERS



MIRROMERE AUDIO
 Denver, CO

MIRROMERE AUDIO; FD, EI, SES, MR, AC, ER; 4975 Jackson St.; Denver, CO 80216; (303) 320-6763. Contact: Ron Oren. **Services/Specialization:** Full line of professional audio sales, service and installation. Complete acoustical design and consultation services from blueprint to hard copy analysis for recording studios, broadcast, multi-use facilities and touring reinforcement. Standard line and custom panel manufacturers. Installation hardware manufacturers and suppliers of high-quality loudspeaker cabinetry, manufacturing proprietary systems or industry standards. Studio furniture systems for recording, broadcast and touring packages. Complete maintenance, modification and reconfiguring facility with factory-trained technicians. Supplier of magnetic tape 1/4-inch to 2-inch, analog or digital. Analysis equipment featuring Bruel & Kjaer, Crown, IVE, Neutrik and Sound Technology. Audio production and test equipment rentals available. Innovative approach to the implementation of audio systems with 20+ years of practical application.

RICHIE MOORE, PH.D., ACOUSTICS & TECHNICAL AUDIO; FD, EI, MR, AC; PO Box 2206; Novato, CA 94948; (415) 897-6462. Contact: Richie Moore, Ph.D. **Services/Specialization:** Studio design, acoustics design and consultation, equipment evaluation and installation, and installation and maintenance from a musician and mixer's point of view. Over 25 years experience as a recording engineer and producer, with the last ten years specializing in the design, construction and maintenance of commercial and musicians' studios. Small studios are a specialty. Use of proprietary CAD program ACOUSTICALC™ works out most of the problems of room design before construction. My goal is studio systems that work as if I were mixing myself. Some of the studios I have done are The Plant Studios, Studio "D" Recording and Mothers Recording Studio in Sausalito, CA; R.O. Studio and ATR Studios in Contra Costa; and home studios for Johnny Colla and Bill Gibson of Huey Lewis and the News, and Jonathan Cain of Bad English/Journey. I have also just completed a renovation of the control room of Falcon Studios in Portland, OR. I don't sell equipment, so studios are put together to the taste of the client. After all, in recording, it is "how it feels."

CHIP MORGAN BROADCAST ENGINEERING; FD, EI, MR, AC; 104 Timson Dr.; Folsom, CA 95630; (916) 983-9834. Contact: Chip Morgan.

MORGAN SOUND, INC.; FD, EI, SES, MR, AC, ER; 2004 196th SW, Ste. 2; Lynnwood (Seattle), WA 98036; (206) 771-7257. Contact: Charles Morgan, Bill Stevens, Susan Morgan. **Services/Specialization:** Our retail store carries a large selection of electronics, speakers and other equipment for studio recording and sound reinforcement, with most major brands represented. A complete repair facility is on site for electronics and speaker repair, with factory-trained technicians offering warranty coverage for many lines. Our rental department also has a wide selection of outboard processing, mics, etc., available. Studio and system designs are available, as well as TEF® computer analysis and acoustical consultation.

PAOLETTI ASSOCIATES; FD, AC; 40 Gold St., 2nd Fl.; San Francisco, CA 94133; (415) 391-7610. Contact: Chips Davis, Kurt Grafy. **Services/Specialization:** Chips Davis and Kurt Grafy lead the Paoletti Associates design team for studios, control rooms and post-production facilities. Davis was the recipient of *Mix* magazine's prestigious international award

PAOLETTI
 ACOUSTICS/AUDIOVISUAL

Chips Davis
 Principal Studio Designer

PAOLETTI ASSOCIATES
 San Francisco, CA

for Technical Excellence and Creativity in Acoustics and Studio Design, an accolade he duly deserves, having pioneered the LEDE™ (Live End/Dead End) concept that is now commonly applied to studios and control rooms by most knowledgeable designers. Paoletti Associates designers have extensive, hands-on experience evaluating sound environments and mixing for records, television and live performances. They are also highly recognized as authorities on the practical use of acoustic energy control and TEF™ (Time Energy Frequency) measurements for recording, broadcast, post-production, home and MIDI environments. Davis is frequently sought after to design, evaluate and improve studio facilities based on clients having experienced sound produced in rooms that he has designed. Paoletti Associates has provided acoustical and audio-visual consulting services on more than 2,000 projects throughout the United States and abroad.

PERFORMANCE AUDIO; EI, SES, MR, ER; 2358 S. Main; Salt Lake City, UT 84115; (801) 466-3196. Contact: Clay Anderson.

PRO MEDIA; EI, SES, ER; 3563 San Pablo Dam Rd.; El Sobrante, CA 94803; (415) 222-0307. Contact: Ellen Goldstein.

PS TECH; FD, EI, MR, AC; 3960 Laurel Canyon Blvd., Ste. 118; Studio City, CA 91604; (818) 762-4013. Contact: Pat Schneider.

DENNIS RICE STUDIO SERVICES; FD, EI, MR, AC; 337 Appalachian Way; Martinez, CA 94553; (415) 930-7815. Contact: Dennis Rice.

RLS ACOUSTICS

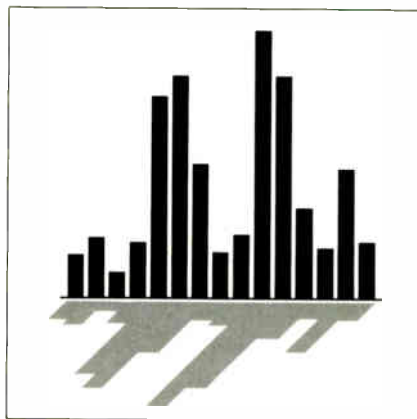
RLS ACOUSTICS
 San Francisco, CA

RLS ACOUSTICS; FD, AC; 300 Brannan St., Ste. 610; San Francisco, CA 94107; (415) 541-0818. Contact: Randy Sparks, Michael Stocker. **Services/Specialization:** At RLS Acoustics we provide quality design, engineering and consulting services. Whether you're expanding existing facilities or starting a new organization, we'll work with you in the development of your concept. Reinforcing your ideas with solid engineering principles and innovative design solutions, we can build a strong foundation for your successful venture. Our experience in technical facilities can help you avoid costly mistakes. Proprietary engineering software, along with our CAD system, enables our personnel to arrive at design solutions quickly and provide complete construction and systems installation documentation. If you're interested in creating a state-of-the-art audio control room, designing a recording studio with a variable acoustic environment, incorporating accurate stereo audio into your video production suite, installing an audio-for-

video synchronization system, or anything in between, call us. Recent projects include: business TV facilities for Hewlett-Packard Corp. and Tandem Computers, Inc.; audio production and film-to-tape facilities for One Pass, Inc.

CHARLES M. SALTER ASSOCIATES, INC.; AC; 130 Sutter St., 5th Fl.; San Francisco, CA 94104; (415) 397-0442. Contact: David Schwind, Elizabeth Cohen, Ph.D., Thomas Schindler, Steve Thorburn P.E. **Services/Specialization:** Consultants in acoustics and audio-visual design offer the following services: Architectural acoustics: designing room acoustics, sound isolation and noise control for performing arts centers, audio recording, production/post-production facilities and broadcast studios. Engineering acoustics: controlling noise and vibration from mechanical, ventilation, plumbing and transportation systems. Sound system design: integrating electroacoustical systems and architectural acoustics; electronically enhancing room acoustics; reinforcing music and speech in theaters, halls, arenas, shopping centers, meeting and boardrooms; and designing sound masking systems for offices. Audio-visual systems design: developing audio-visual requirements for media rooms and presentation facilities; preparing audio-visual design requirements into contract documents; carrying out acceptance tests to document system electrical, visual and acoustical performance; and training system operating personnel. Acoustical research/technology assessment: setting performance goals, assessing the market, and designing product concepts for audio technology and acoustical products.

SMITH, FAUSE & McDONALD, INC.; FD, AC; 44 Montgomery St., Ste. 1212; San Francisco, CA 94104; (415) 421-1370. Contact: Ken Fause, Peter McDonald. **Services/Specialization:** SFMI provides acoustical engineering, electroacoustic, audio, video and tech power/grounding system design, specification, test and evaluation. Offices in both San Francisco and Los Angeles have completed over 1,000 projects in the last ten years. Focus is integrating reinforcement and recording design in institutional, educational and sports facilities. Projects/clients include: Lorimar Teleproductions, JVC, Wonderland, Bell & Howell, Director's Guild of America, Group W, Cable, City Los Angeles Department of Telecom, UCLA Theater Arts, ASU Fine Arts, CSULB, CSULA, SDSU, Bloomsburg State College, Aura Systems, Ambassador Television, Schulman Video, Action Video, KBK, KULR, NBC Radio, Teletronics, Jim Messina, Buzzy's Recording, Audio Engineering Associates, Wintergarden at Battery Park, New York Hard Rock Cafe, Dallas Hard Rock Cafe, Bill Graham Presents, 1984 Los Angeles Olympic Committee, Japan America Theatre, McCallum Theatre, Kenneth Norris Theatre, Phoenix Civic Plaza, Harrah's Reno, Caesar's Atlantic City, Mile High Stadium, McNichols Arena, Arco Arena.



SOUND RESEARCH ASSOCIATES
 San Jose, CA

SOUND RESEARCH ASSOCIATES; FD, AC; 1650 Zanker Rd., Goble Bldg., Ste. 120; San Jose, CA 95112; (408) 436-6040. Contact: Tom Paddock. **Services/Specialization:** Sound Research Associates is experienced in developing a systematic approach to your acoustic requirements. Included are initial design documents, background noise criteria, project management and performance verification services. SRA utilizes practical engineering techniques, and our engineering associates are qualified to provide effective and economical solutions to acoustic, isolation and vibration problems. With over 13 years of experience, SRA relies on proven and predictable construction methods to ensure a successful and accurate acoustic environment. SRA features quality Bruel & Kjaer test instruments and analyzers. Our client list includes: the Grateful Dead, George Winston, Stanford University Computer Research in Music and Acoustics, Different Fur Ltd., Joan Baez, Huey Lewis and the News, Windham Hill Records, Bob Weir, The Tubes/Todd Rundgren, Mickey Hart, Jerry Garcia, Seagate Magnetics, One Pass Video, E-mu Systems, Exxon Corporation and Fox Corporation.

PAUL S. VENKLAZEN AND ASSOCIATES, INC.; FD, AC; 1711 16th St.; Santa Monica, CA 90290; (213) 450-1733. Contact: Jerry P. Christoff.

WILSON, IHRIG & ASSOCIATES, INC.; *FD, AC*; 5776 Broadway; Oakland, CA 94618; (415) 658-6719. Contact: Red Wetherill. **Services/Specialization:** WIA has been in the forefront of architectural and engineering acoustics consulting for over 22 years. Our services in studio design include control of noise and vibration, HVAC noise control, room acoustics and audio systems—from programming to final checkout. We combine extensive laboratory and field testing capabilities with practical and cost-effective design. Projects handled by our principals include: the Dallas Communications Complex; Melintz Hall, UCLA; Loughheed Building, Banff Centre for the Arts; and numerous other studios.

SOUTHERN CAL/HAWAII

ACOUSTIC SERVICES OF CALIF.; *MR, AC*; 6709 Ethel Ave.; North Hollywood, CA 91606; (818) 763-9587. Contact: Richard Lomax.

AMEK/TAC U.S. OPERATIONS; *SES*; 10815 Burbank Blvd.; North Hollywood, CA 91601; (818) 508-9788. Contact: Sue Jones.



AMOS STUDIO DESIGNS
Northridge, CA

AMOS STUDIO DESIGNS; *FD, AC*; 18901 Malden St.; Northridge, CA 91324; (818) 701-0761. Contact: Ron Amos. **Services/Specialization:** Amos Studio Designs is an acoustic design, engineering and construction firm specializing in every phase of studio building. I can develop a working set of plans for you, or I will build it for you from a vacant lot through every phase of construction to a complete studio that is everything you ever dreamed of. I also do remodeling and acoustic consulting. Do you have a room that isn't acoustically right? Does your studio need to be fine-tuned to visual and audio perfection? Then please call and make an appointment. Please feel free to inquire for more information and references. I have just touched on a small portion of the services I offer. Amos Studio Designs Lc. #511404.

ASSOCIATED PRODUCTION MUSIC; *SES*; 6255 Sunset Blvd., Ste. 820; Hollywood, CA 90028; (213) 461-3211. Contact: Jerry Burnham. **Services/Specialization:** Suppliers of production music and sound effects libraries representing KPM, Bruton and Sonoton, Broadcast One, APM mini package—"The Best of the Best"—from KPM and Bruton, all on 30 CDs. Bruton Gold Classics, the Coombe library of re-recorded hit songs, sound FX—The Library, SFX library from KPM, APM audio for video/film facility.

AUDIO DESIGN SERVICES, INC.; *FD, EI, SES*; 18740 Oxford St. #310; Tarzana, CA 91356; (818) 609-9220. Contact: Dale Kredell.

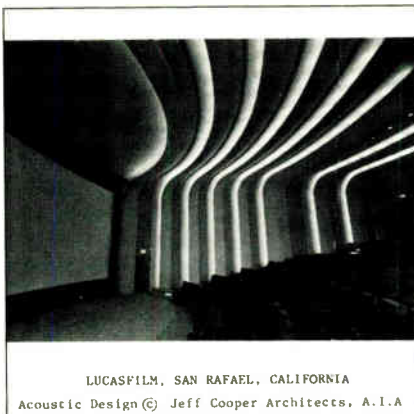
AUDIO SERVICES CORPORATION; *SES, MR, ER*; 10639 Riverside Dr.; North Hollywood, CA 91602; (818) 980-9891. Contact: Richard Topham Jr.

AUDIO UPGRADES; *FD, EI, SES, MR*; PO Box 7551; Mission Hills, CA 91346; (818) 780-1222. Contact: Jim Williams.

BELCAN TECHNICAL SERVICES INC.; *FD, AC*; 6110 San Fernando Rd., Ste. 211; Glendale, CA 91201; (800) 229-7243. Contact: John Mayberry.

THE BERTECH ORGANIZATION; *SES*; 14447 Califa St.; Van Nuys, CA 91401; (818) 909-0262. Contact: Lee Berman.

JEFF COOPER ARCHITECTS, A.I.A./SYNERGY GROUP; 4766 Park Granada, Ste. 106; Calabasas, CA 91302; (818) 887-9100. **Services/Specialization:** Architects and builders for the entertainment industry. Specializing in: recording studios, film studios, video post-production studios and theaters. Clients include: Directors Guild of America, Academy of Television Arts & Sciences, MCA-Universal Studios Burbank Studios, Warner-Hollywood, Saul Zaentz Film Co., Capitol Records,



LUCASFILM, SAN RAFAEL, CALIFORNIA
Acoustic Design © Jeff Cooper Architects, A.I.A.

JEFF COOPER ARCHITECTS, A.I.A./SYNERGY GROUP
Calabasas, CA

PolyGram Records, Mann Theaters, Cannon Films, Columbia Pictures, Lucasfilm, Steven Spielberg. Plus UCLA, Australian Film and Television School, and others. **Services:** architectural design, acoustic consulting, electrical, mechanical and audio engineering, interior design, cost estimating, construction management. The new 1986 edition of *Building a Recording Studio* by Jeff Cooper is available through this office.

DESIGN FX AUDIO; *ER*; PO Box 491087; Los Angeles, CA 90049; (213) 838-6555. Contact: Gary Ladinsky. **Services/Specialization:** Design FX Audio is a digital audio rental company. We specialize in state-of-the-art effects and digital recording equipment including Sony PCM-3348 and Mitsubishi X-880/850 digital multitrack machines. Our staff is comprised of music professionals able to help access equipment needs and to answer technical questions. Design FX Audio provides fast, efficient 24-hour service at competitive prices. We cater to the recording, film and video fields. Contact David, Steve or Gary.

GEFEN SYSTEMS; *SES*; 5068 San Feliciano Dr.; Woodland Hills, CA 91364; (818) 884-6294. Contact: Hagai Gefen. **Services/Specialization:** The M&E organizer system—sound effects and production music database search program with interfaces to Sony CDK-006 auto disc loader, Soundtouch



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Woodland Hills, CA

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ALAN GORDON ENTERPRISES, INC.; *SES, MR, ER*; 1430 Cahuenga Blvd.; Hollywood, CA 90028; (213) 466-3561. Contact: Fred Ginsburg.

GUAM ELECTRO-TECH; *FD, EI, MR, AC*; PO Box 21029, Guam Main Facility; Barrigada, 96921 Guam; (671) 632-4980; FAX: (671) 632-4959. Contact: Koji L. Yoshimoto.

INTELLIGENT SERVICES; *EI, SES, MR, AC*; 3230 Gallion Cir.; Riverside, CA 92503; (714) 359-0619. Contact: Chuck Herson.

LAKESIDE ASSOCIATES, INC.; *FD, AC*; 4790 Irvine Blvd., Ste. 105-276; Irvine, CA 92720; (714) 838-3893. Contact: Carl J. Yanchar.



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MIX THE RECORDING INDUSTRY MAGAZINE

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LOVETT AUDIO/VIDEO SERVICE; *El, MR;* PO Box 2004; Burbank, CA 91507; (818) 362-1034. Contact: Rodney Lovett.

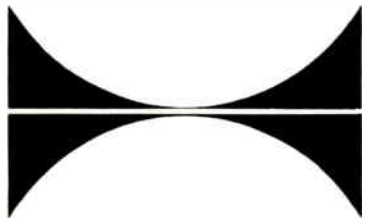


Micworks Inc.
Audio Engineering & Supply

7398 Center Ave.
Huntington Beach
CA 92647

MICWORKS INC.
Huntington Beach, CA

MICWORKS INC.; *SES, MR, ER;* 7398 Center Ave.; Huntington Beach, CA 92647; (714) 898-7373. Contact: Michael Troke. **Services/Specialization:** Micworks is one of the leading equipment suppliers in California representing over 100 major lines of equipment. Micworks' staff has been providing installation, sales, rental, repair and design service of audio equipment for recording, post-production, broadcasting and sound reinforcement industries for over a decade. From network studio rooms to home recording studios, from multitrack facilities to small church installations, we cover it all. Our customer list stretches from N.Y. to Bangkok, from Holland to L.A.



PERCEPTION INC.
consultants in acoustics

PERCEPTION INC.
Los Angeles, CA

PERCEPTION INC.; *FD, AC;* PO Box 39536; Los Angeles, CA 90039; (213) 857-4912. Contact: G.L. Augspurger. **Services/Specialization:** G.L. Augspurger and his associates continue to produce innovative designs for film and television production as well as music recording studios. Current projects include work for Geffen Records, CBS Records International, Doppler Studios, Precision Lacquer, Master Sound Recording, New England Digital, Alex Van Halen, Erich Bulling, Bryan Adams, Unitel, University of Miami, MCEG Productions and Vintage Recorders. Custom monitor loudspeakers have been designed for Summa Music Group, Studio Take-One Tokyo, Soundcastle, Electric Lady, Dennis Lambert Productions, Studio 55 and The Enterprise. These designs all incorporate a proprietary new high-frequency horn that has been in development for more than two years. Perception Inc. provides professional consulting and design services to architects and studio owners as well as extensive acoustical testing facilities.

PROFESSIONAL SOUND & MUSIC/MUSICIANS REPAIR SERVICE; *FD, El, SES, MR, AC;* 3089 54th St.; San Diego, CA 92105; (619) 583-7851. Contact: Mike Krewitsky, Shane Alexander.

PROFESSIONAL SOUND CORPORATION; *SES;* 10639 Riverside Dr.; North Hollywood, CA 91602; (818) 760-6544. Contact: Al Kvist.

PROGRESSIVE AUDIO VIDEO; *FD, El, MR, AC;* 534 N. Gardner St.; Los Angeles, CA 90036; (213) 653-1526. Contact: John Musgrave.

RACK ATTACK; *ER;* Hollywood, CA 90068; (818) 998-1024. Contact: Cheryl. **Services/Specialization:** We rent Akai, API, Aphex, AMS, dbx, Drawmer, Eventide, E-mu, Focusrite, GML, Korg, Lexicon, Publison, Neve, Quantec, Roland, Sontec, Summit Audio, Yamaha, Teletronix, TC Electronic, Trident, Tube-Tech and UREI. Specializing in rentals of outboard equipment utilizing remote TT or 1/4-inch patch bays, our rack systems facilitate quick and easy installation to any control room or console. We also rent individual pieces Example: "The Shortguy System" at \$165 includes the following: Lexicon 480L, Lexicon PCM70, Lexicon PCM42, TC Electronic 2290, Eventide H3000SE, Yamaha SPX1000, Yamaha REV5. Over 85 channels of Neve EQ, limiters and microphone preamplifiers available.

SOUND SOLUTIONS; *FD, El;* 1505 11th St.; Santa Monica, CA 90401; (213) 393-5332. Contact: David Epstein.

Sound Werks

SOUNDWERKS
Agoura, CA

SOUNDWERKS; *FD, El, SES, AC;* 5375 Oak Park Ln., Ste. 193; Agoura, CA 91301; (818) 991-7580. Contact: Michael Cook. **Services/Specialization:** We are professional sound engineers and are familiar with your business, be it a live venue or a home studio. Our involvement can be as little or as much of the project as our clients desire. The areas we specialize in are: commercial and home studio design; construction/renovation management; equipment procurement and installation; consultation/instruction. We pride ourselves on giving the best service possible at an excellent price.

studio bau:ton
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STUDIO BAU:TON
Los Angeles, CA

STUDIO BAU:TON; *FD, El, AC;* 3757 Wilshire Blvd., Ste. 207; Los Angeles, CA 90010; (213) 251-9791; FAX: (213) 251-9795. Contact: Peter Maurer, Peter Grueneisen, George Newburn. **Services/Specialization:** To create the cutting edge sounds of today's performing arts, musicians and producers depend on sophisticated technical equipment, just as contemporary architecture relies on the science of construction. studio bau:ton works within the dichotomies of both these fields. We design the space for the acoustic requirements of the sound engineer, while trying to match the creativity of the artists with architectural means. The varied acoustic requirements of listening and recording spaces become the primary

generators of form and space. These limitations compel us to continuously look for new architectural solutions. studio bau:ton likes to look at every project as a whole and to offer comprehensive services, covering all aspects of the architectural design, acoustic consultation and engineering, equipment selection and interface wiring, electrical and mechanical design, cost estimating and construction management as well as interior design. Clients: Soundworks West, Encore, LaFace Records, Walter Becker, Harris Music, Koz Music, Bob Crewe.

SUPERSONIX (DIV. OF STONE CORPORATION); *FD, El, MR, AC;* 2417-C Round Top Dr.; Honolulu, HI 96822; (808) 941-0012. Contact: Andrew Stone Hartnett.

THEATRE DESIGN ASSOCIATES; *FD, El, AC;* 2218 W. Olive Blvd., Ste. 284; Burbank, CA 91506; (818) 887-9784. Contact: Clyde McKinney, Michael Karagosian.



WATERLAND GROUP
Los Angeles, CA

WATERLAND GROUP; *FD, AC;* 1680 N. Vine St. #608; Los Angeles, CA 90028; (213) 469-7754; FAX: (213) 469-6757. Contact: Vincent A. Van Haaff. **Services/Specialization:** Waterland Design Group offers design and construction supervision for audio, video and motion picture production and post-production facilities. The emphasis is on architectural design and planning, with an eye toward the aesthetic and comfort of use, interior and exterior. Simple modular design, adapting to constant innovation in electronic and production technology is a Waterland trademark. Certain technical, structural, architectural, acoustical and governmental rules apply to each project, but these are only to be seen as a loose framework that invites the designers, the client, engineers and artists to fulfill an idea. Waterland is the mediator between that framework and the creative process and sets out to make decisions where confusion and delays may be imminent. Waterland Design Group (Japan) 4-26-15-B2, Sendagaya, Shibuya-ku, Tokyo 151, Japan; (03) 479-3848, fax (03) 479-3889; (Europe) Via Frascati 7, 20149 Milano, Italy; (02) 481-5395, fax (02) 469-4535.

WEST L.A. MUSIC; *FD, SES;* 11345 Santa Monica Blvd.; Los Angeles, CA 90025; (213) 477-1945. Contact: Rick Waite

WESTLAKE AUDIO; *FD, El, SES, MR, AC, ER;* 7265 Santa Monica Blvd.; Los Angeles, CA 90046; (213) 851-9800. Contact: Larry Deeds, Margy Mark.

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ANNEX DIGITAL AUDIO, INC.
Vancouver, BC, Canada

ANNEX DIGITAL AUDIO, INC.; *El. SES, MR, ER:* 1216 Granville St.; Vancouver, BC, Canada; (604) 682-7432; **FAX:** (604) 682-6650. **Contact:** Kerry Corlett. **Services/Specialization:** Authorized dealers for PostPro and Synclavier (New England Digital), Sound Tools (Digidesign), Dyaaxis (Studer/Editech), Macintosh computers, A-DAM, DD1000 and samplers (Akai), Eill (E-mu Systems), Sony, Yamaha, Tascam, Tannoy, Roland, Allen and Heath, plus a complete selection of support products. Clients include all major facilities in Vancouver and many throughout Western Canada. If you're considering an investment in digital audio equipment, speak to the people who specialize. We can provide a unique perspective as a firm that evaluates, markets, leases, maintains and helps develop digital audio products full time. The brands we are authorized to sell are a powerful statement of the trust leading manufacturers have in Annex Digital Audio Inc. In the 1990s, no facility is too small to be involved with digital audio. Let us assist you to make the right choices. Consulting, long-term leasing, rentals, training.



FRANCIS DANIEL
Paradiso Lugano, Switzerland

FRANCIS DANIEL; FD, AC: Beurivage Au Lac #7, Via Geretta 2; Paradiso Lugano, 6900 Switzerland; (091) 54-64-91; (212) 874-0590 (in USA). **Contact:** Francis Daniel. **Services/Specialization:** Studio design for the serious project. I am a professional consultant in architectural acoustics, working on diverse projects throughout the world. I can work with your architect and contractor, or provide you with all or part of a turnkey project team, depending on your needs and location. Many successful facilities have been built in the past without any of this kind of professional support, as we all know. But in today's competitive international market, you have less room for error—acoustical mistakes; ergonomic mistakes; visual mistakes; project management mistakes; they all cost money. If you have a serious project, not necessarily large, but an undertaking that you know you cannot afford to get even partly wrong, I would like to talk with you. **Equipment:** MLSSA/Dolch 386, with ACO, Schoeps, Shure mics; B&K test instruments—Nos. 1621, 1624, 1625, 2215, 2230, 2231, 2511, 2635, etc.; Ivie PA-41; two CAD workstations with Autocad; numerous commercial and proprietary acoustical programs.



DREAMHIRE
London, UK

DREAMHIRE; ER: 18 Chaplin Rd.; London, NW2 5PN UK; (01) 451-5544; **FAX:** (01) 451-6464. **Contact:** Nick Dimes. **Services/Specialization:** Dreamhire in London was established over five years ago and, as a result, we now carry possibly the largest selection of pro audio and musical equipment available for rental in Europe. A vast inventory includes digital

—LISTING CONTINUED ON NEXT PAGE

—FROM PAGE 150. L.A. GRAPEVINE

exotic food and drink did naught to crack her source, one of the few remaining people in town who can keep a secret.

Rumbo Recorders in Canoga Park is constructing a third studio, with completion expected mid-June. Designed by producer Greg Edward, co-owner "Captain" Daryl Dragon and chief engineer Jim Mancuso, it will feature a refurbished Trident Series 80 taken from Studio B, an Otari MTR-90, a Tascam DAT recorder, a Sony mastering deck, as well as a second 24-track for lockups. Studio B will be outfitted with a new Trident Series 80-C 40-input board. "We're looking at it as a relaxed place you can camp for six weeks and do overdubs," Mancuso stated. "We are cutting no corners in the design, both in the facilities and in the creature comforts."

L.A. keeps getting bigger all the time. Now it stretches all the way to Santa Barbara, where a residential studio with 32-track Mitsubishi digital and 24-track Otari analog multitracks, Neve V Series console with Flying Faders and Necam 96, two pent-houses, and an on-call limousine is being constructed. "It's so people can get out of L.A. and relax," according to owner Vaughn Mordenti, stressing that it will be "a clean and sober studio" with 16,000 square feet of space, a patio garden on the roof, closed-circuit security cameras and secure underground parking. VLM Recording Studios, at 1532 State Street, looks like it's going to be top-of-the-line all the way. The target for opening is August/September, and you can call for booking info now at (805) 569-1272.

Next month...a report on Show Biz Expo. Meanwhile, you can contact me by phone at (818) 341-1951. You can fax to the same number, but the fax must be preceded by a voice call. By mail, I can be reached care of the *Mix* office at 19725 Sherman Way, Suite 380, Canoga Park, CA 91306. You can also fax directly to the *Mix* office at (818) 709-6773. ■

—FROM PAGE 143. N.Y. METRO REPORT

Sony Classical, discussing "the manufacturer's tweak digital audio"—jitter reduction (Sony and JVC), split conversion (Nakamichi), corrected conversion (Studer), push/pull conversion (Panasonic), zero distor-

tion (Tascam), differential reconstruction (Spectral), noise-shaped dither (Harmonia Mundi Acustica and Apogee), and adaptive oversampling (Wadia and Krell).

Gotham Audio Corp. named Manny's Pro Audio as its area-exclusive dealer for SPL SX2 Psychoacoustic Processor.

The 1990 TEC Award nominations included a strong cross section of the New York creative scene, including the following: Power Station and Skyline Studios (recording studio category); Masterdisk and Sterling Sound (mastering facility); Effanel Music (remote recording facility); Walters-Storyk Design Group (acoustics/studio design company); and the Institute of Audio Research (recording school/program).

In one of the more intriguing sessions in town, TRA Productions is preparing a compact disc project for the Deaver Corp. that combines four Kurzweil digital workstations, an opera singer, a digital audio tape recorder and Timeline Lynx SAL time code modules.

Fred/Alan Inc. producer Chris Strand completed audio sweetening of a series of on-air TV promos for the new "HA" comedy network at ABC Radio Production Group, which was standardized on Agfa PEM 469 mastering tape. Mary Lou Grisell was principal engineer.

John Alberts of Howard Schwartz Recording served as audio post-production mixer for the Rolling Stones' "Steel Wheels Tour" TV special. The Atlantic City concert was originally recorded by Effanel Music under the supervision of Randy Ezratty and Bob Clearmountain. The program was edited at Broadway Video.

Barry Diament and Rob Fraboni of Barry Diament Audio have remastered the entire Bob Marley Island Records catalog for release on the Tuff Gong label.

The seminar on "Direct Response Entertainment Marketing," sponsored by EPM Communications, covered music and movie merchandising, product sampling, and the use of 900 numbers.

Please send press releases with the latest news on your facility or company directly to me at my office (RPS Communications, 520 Arthur Street, Centerport, NY 11721). You can reach me by phone at (516) 423-4038, or by fax: (516) 423-6155. ■

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—LISTING CONTINUED FROM PREVIOUS PAGE

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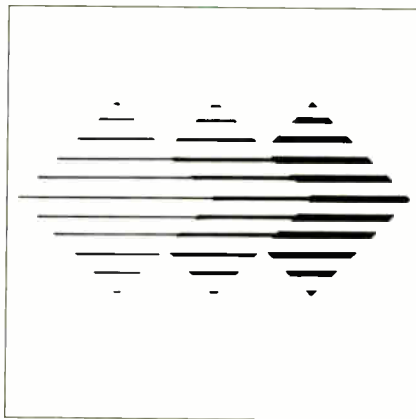


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pearances; neatness and harnessing perfection are major factors. Because equipment often changes, tight harnessing and perfect-length harnesses can cause problems. The key to wiring for change is to determine an appropriate level of dress-out. For instance, if you are wiring for a 24-track tape machine on XLR connectors, don't build a perfect harness that breaks out the cable across the back of the machine. When you want to use a different make of machine, that harness will have to be cut apart. It's better to make a "squid," where all pairs are of equal length and long enough to span the connector panel of the largest machine available. Similarly, the cable dress in the rear of equipment racks should be loose enough to allow the moving of gear from one position to another, or replacing a cable without necessitating the redress of the entire rack. After a few years of use, the harnesses and cables are going to be helter-skelter. So start out with an "organized mess" that will intrinsically maintain that same level of organization, despite changes.

Multipair and Connectorization Techniques

Using multipair cable can greatly reduce fabrication and installation time, due to its lower handling costs and because you can fabricate and bench-test multiple circuits simultaneously. As cable is available from two to 48 pairs, you can often obtain a convenient pair count that will work. Try to use cables with pair counts equal to or less than the typical multipin connector for a given piece of equipment. For example, if a console has eight pairs on each connector, then use 8-pair cable. Splitting larger, multipair cables over multiple connectors becomes cumbersome. Assemblies become difficult to fabricate, complicated to install and harder to test. You'll find it more convenient to use smaller cables and combine them into larger groups when necessary.

Many brands of multipin connectors are available, and if the installation warrants it, it is often handy to provide disconnects for equipment that otherwise may be interfaced with individual XLR connectors or barrier strips. For example, most 24-track machines are terminated in XLRs, and for maximum flexibility we provide a wall-mounted multipin disconnect where the "squid" plugs in. Dolby XP-24 units and other

If you are wiring for a 24-track tape machine on XLR connectors, don't build a perfect harness that breaks out the cable across the back of the machine. It's better to make a "squid," where all pairs are of equal length.

noise reduction units can also be connectorized, speeding installation and service. For connectorization of this type, check with the other studios and rental companies in your area to determine if standards are already in use. There are too many disparate ways to wire a connector—don't invent a new one if you can help it!

Multipin Patch Bays

In facilities where many multitrack machines must be shared among several rooms, an economical, easy-to-use alternative to individual patching is the multipin patch bay. Each connector can make 24 circuits at a time, in a one-to-one relationship. The cost per patch point is radically lower than wired jackfields, and patching time and errors are reduced.

Grounding and Shielding

A full discussion of audio grounding and shielding techniques is a much larger subject than I can discuss in this article, but here are a few key points:

1. To meet NEC and local codes, as well as provide a safe work environment for operators and engineers, all equipment should be grounded through the "third wire" in the power cord. Therefore, provide the best possible ground on the AC outlets by using isolated ground receptacles and separate ground conductors to a ground bus bar located in the technical power panel. This grounding system is not as ideal from an audio standpoint as an independent ground system, but we must live with it.

2. At the minimum, all audio input stages in the facility must be balanced.

Preferably, all outputs should be balanced, as well. If equipment exists with unbalanced inputs, use a transformer or an external electronic balancing box.

3. Lift one end of all audio shields to prevent ground-loop current from being injected into the ground terminals of your equipment. Almost all commercial audio equipment is sensitive to currents injected in this manner, and this translates to hum and buzz in the signal. Ideally, for the minimum high-frequency cross talk, all shields should be lifted at destination and grounded at source. But as soon as a patch bay is introduced into the picture, with its bused ground, all that goes out the window and you can decide which end to lift based on practical considerations such as "what's easier?" We generally connect shields at the equipment and drop at the patch bay.

All of these topics relating to the wiring of large audio facilities should be considered during the design of any type of space, although all will not apply in every situation. Through years of experience providing large and small installations for Lucasfilm, Apple Computer, One Pass, Inc., and others, my company has learned how to avoid the common pitfalls that cause a failure in design. Our approach is one of common sense and practicality. My summary of that approach, I hope, has provided some guidance. ■

David Carroll operates David Carroll Electronics in Berkeley, Calif., whose recent clients include Lucasfilm Ltd.'s Skywalker Ranch, Dolby Labs and Russian Hill Recorders.

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