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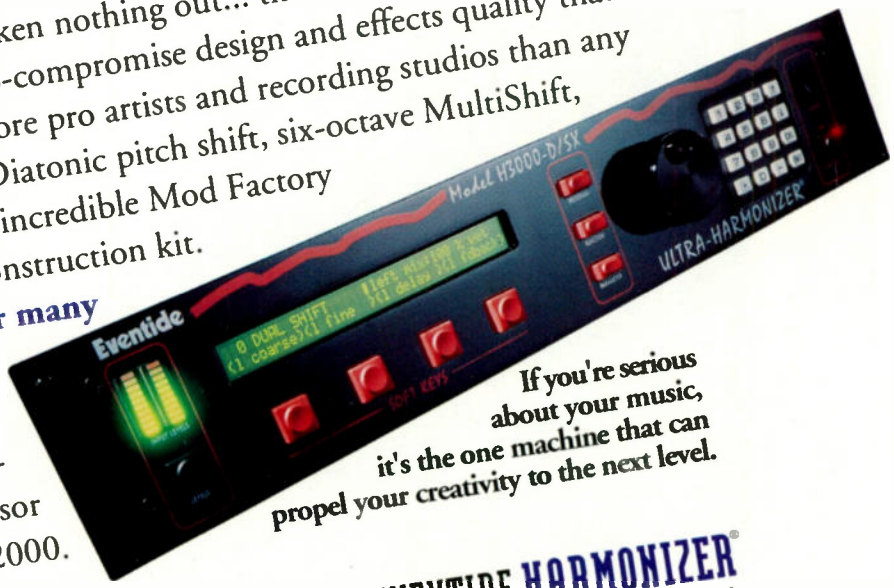

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The Recording Engineer

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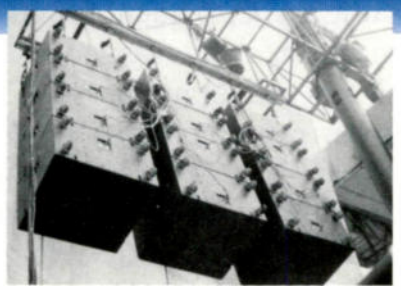
Broadcast Audio



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Sound Reinforcement

The Electronic Cottage

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About the Cover

● Jim Becher's Ariel Music Design's Long Island, NY, studio exemplifies what stunning results can be attained in a small or moderate-sized studio. Read all about it in *A Picture Is Worth A Thousand Songs*, starting on page 11.

THE NEW db MAGAZINE

Many of you are seeing **db Magazine** for the first time, some by our expanded circulation, some by picking up this issue at our booth at the AES Convention. .How can we refer to a magazine in continuous publication since 1967 as new? Simple!

In June of this year, **db Magazine** joined with **Romaine Pierson Publishers**, an established firm, in business over one hundred years.

You are reading the *new* **db Magazine** thanks to the people at **RPP**. Now **db** has an entirely new look and feel. A versatile art department has used its resources to bring you a magazine that is easy to read and with more colorful articles, as you see in this issue. The seasoned circulation department has already helped **db** reach more audio professionals than ever before. Because of their skills, we now offer the industry's best blend of qualified readers, covering the wide variety of fields within audio engineering.

In this issue, you'll visit a mid-sized recording-service studio on Long Island, NY. You'll also read about big sound-reinforcement speakers, highlighted in our article on the new (also historical) *Harwell Systems*. Plus, **db**'s twenty-seven year history enables us to go back into the vaults and come up with such gems as the *Historical Perspective*, another feature in this issue. In addition, you'll find out about a way to take meaningful measurements at a broadcast station, right in the shadow of the transmitter. And there's so much more in this issue.

Again, to those seeing **db Magazine** for the first time, welcome. To those faithful readers who know us well, stay with us as we grow. Stay in control with **db**! LZ

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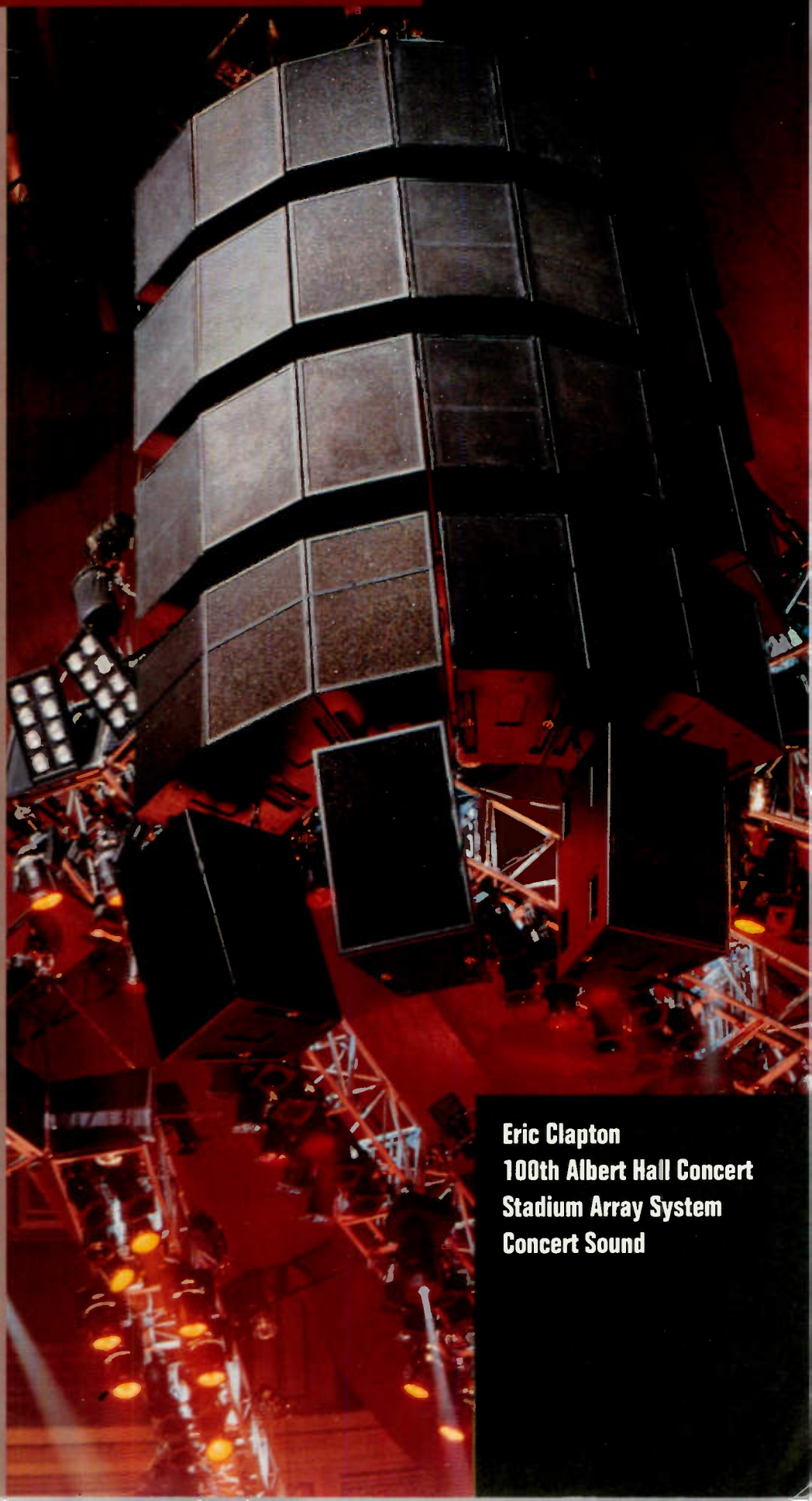

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100th Albert Hall Concert
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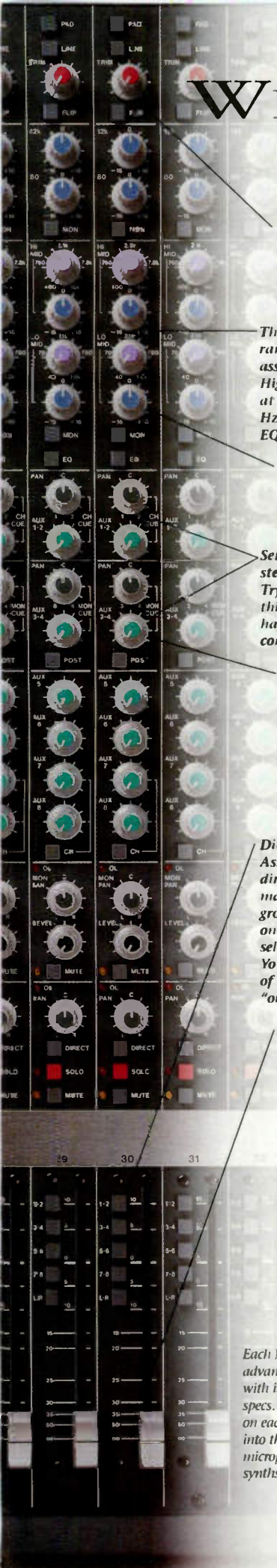

Balanced mic and unbalanced line inputs with phantom power and 20dB pad accommodate the widest range of input signals.

The only console in this price range with true Split EQ, each assignable to monitor or channel. High-frequency shelving control at 12 kHz, low frequency at 80 Hz for smoother, more musical EQ results.

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Setting up two independent stereo cue mixes is no problem. Try this with other mixers in this price range, it just won't happen or you'll have to compromise something.

The most versatile AUX section in its class; rivaling expensive high-end consoles. 8 sends total, 2 in stereo. Send signal in stereo or mono, pre- or post-fader. Available all at once. Return signal through any of 6 stereo paths.

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Feel those 100mm faders! Turn those smooth and responsive knobs! They feel and work better than any other in its class. The M-2600's physical design takes the aggravation out of recording and lets you focus on the process of creating music. Everything is 'right where it ought to be'. Try it for yourself.

Each M-2600 channel features advanced-design mic pre-amps with incredibly low-distortion specs. Plus you get phantom power on each channel. Feed anything into the M-2600 from condenser microphones to line input from synths and sound modules.

For your personal or project studio, don't settle for anything less than a dedicated recording console. Some may try to convince you that a "multi-purpose mixer" works fine for multitrack recording. But don't take their word for it. The compromises, hassles and workarounds just aren't worth it.

Want proof? Ask your salesman how a multipurpose mixer handles these common recording situations. But listen carefully for workarounds, repatching schemes and other compromises. Then compare it to how easily the M-2600, a *true* recording console, sets up and does things.

SITUATION Separate headphone mixes for the talent and the producer. The talent wants a reverb-wet mix, but the producer wants it dry. Everyone wants it in stereo.

Compromise: Multi-purpose mixers require you to sacrifice 4 AUX sends and tape returns to get 2 stereo headphone mixes; but you need those sends/returns for outboard effects! What a dilemma.

M-2600 Solution: With a few buttons, assign up to two, independent stereo AUXs to be used as headphone mixes. Everyone hears the mix they want — and you've still got four AUX sends and returns free for signal processing gear.

SITUATION You're EQing tape tracks to get just the right sound. You're using the shelving EQ for the monitor mix, and the sweepable mids for the channel buss. Still, the drummer wants a certain frequency out of his mix — a job for the sweepable mids.

Available with 16, 24 or 32 inputs, the M-2600 is optimized for digital recording. Don't wait till your first session to discover the compromises and hassles other boards will put you through.

Compromise: Few multi-purpose mixers have EQ assignment. You're stuck with the shelving EQ on the monitor mix, and the sweepable mids on the channels *(if they even have split EQ)*. You've got no choice. Good luck trying to explain this to the drummer.

M-2600 Solution: Assign the shelving EQ, the sweepable EQ, or both to either the monitor or channel buss as necessary. The entire EQ section is splittable and assignable and can work in tandem.

SITUATION Mixdown. You're sending tracks to effects units for added studio polish. You want to take advantage of true stereo effects. How do you do it?

Compromise: Most multi-purpose mixers have fewer AUX sends than the M-2600's eight. Usually only in mono. And, some sends are linked, so you can't send them to different signal paths. So you settle for only a few effects, or forego stereo effects altogether.

M-2600 Solution: Pick one: 8 mono sends or 1 stereo and 6 mono sends or 2 stereo and 4 mono sends. Each with its own level control and separate output jack. So you can use true stereo effects and still have sends left over for effects. Send the effects signals back via 6 stereo returns.

That's not all! The M-2600 doesn't compromise sound, either. You'll appreciate the new TASCAM sound — low-noise circuitry and Absolute Sound Transparency™. It all adds up to the perfect console for any personal or project studio — combining great sound with recording-specific features you'll need when recording, overdubbing and mixing down. Features you can get your hands on for as little as $2,999 *(suggested retail price for the 16-input model).*

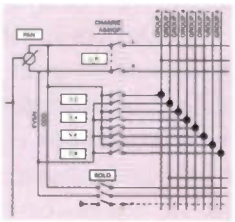
So forget compromises. Invest in a true recording console. The TASCAM M-2600.

DING, MOST OTHER CONSOLES MPROMISING SITUATION.

Only the M-2600 provides two independent stereo cue systems. Demanding performers can hear the submix or scratch tracks the way they want, so they'll perform better. Meanwhile, the control room or producer's mix is unaffected. You can accommodate everyone involved in the production — without interrupting the creative flow.

Best of all, using the cue mixes doesn't involve tying up your valuable AUX sends.

Use more effects/signal processing gear on more tracks with the M-2600. Use two (count 'em) true stereo send/returns to support stereo effects units. Plus, you still have 4 fully-assignable AUX sends left over for other gear. A total of 8 AUX sends — more than nearly any other console — anywhere. Better yet, you can use them all at once. No compromises. At mixdown, you can actually double your inputs so you can mix in all those virtual tracks. Just press the "Flip" switch. No repatching. No need to buy expensive and space-eating expansion modules.*



The incredibly flexible design of the M-2600 means signal routing is versatile and accomplished by the touch of a button, instead of a tangle of wire. Our decades of mixer experience has resulted in an ergonomic design that's exactly what you need: a board that speeds and facilitates recording and mixdown. Everything is where you intuitively think it should be. Dedicated solo and mute indicator lights on every channel, on master AUX sends, stereo returns, and each of the 8 busses so you always know exactly what you're monitoring. Plus, SmartSwitches™ protect you against redundant or canceling operations.

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Kid's Stuff— Children's Music Boom Hits

John Barilla

Over the past few years there has been an unprecedented surge of interest in children's music. While the market has always existed, baby-boomers now in the midst of parenting have demanded a greater variety and higher degree of creativity from the purveyors of children's media. The major communications giants (Disney, Warner, et al.) have responded by pumping up the record stores with colorful packaged releases from well-known artists and famous cartoon characters. This marketing blitz from the big companies is as predictable as it is blatant, but it tells only a small part of the story. In fact, it is only the tip of the proverbial iceberg. What is the meaning of this ground swell of activity, and how much of this music is being recorded in the compact (or home-based) studios—*The Electronic Cottages*?

Ready for some good news? Well, despite the monopolization of record store displays by major labels, the vast majority of children's music is created in electronic cottages, and is released and promoted by the artists themselves. This creative flurry is no passing fad; it is a grass-roots movement on the part of musical artist/educators who are committed to providing quality entertainment for youngsters. While only a few of them will ever become nationally recognized, many of them will make a tidy living from concerts and the sale of their tapes and CDs—all on a regional basis. *The Electronic Cottage* is the natural choice of such artists who need to turn out a high-quality product at a reasonable cost.

CASHING IN ON FAMILY VALUES

According to Howard Leib (a New York-based attorney specializing in children's entertainment law), the official (RIAA) sales figure for children's music represents major releases only and hence accounts for only about 10 percent of the actual kids' market; the other 90 percent, said Leib in a recent telephone interview, is produced in smaller studios for under $15,000. Attorney Leib concluded, "There is a high demand for good quality, but cost-efficient recording alternatives. A producer with such a studio can do well in the marketplace."

That is an encouraging prognosis for those of us who make music in an electronic cottage and are seeking markets that are accessible. What seems to be occurring is that children's music specialists — who are often very involved in educational circles (as teachers and/or parents)—have found a built-in regional market for their recordings as they perform at workshops, concerts, festivals, fairs and other local venues. Parents are always on the lookout for high-quality music for their children and are frankly bored with the limited number of releases offered by the major labels. According to Leib, there are only around 32 children's artists signed to major labels, so parents have found a greater selection among independent artists.

While no one has been able to quantify the depth of the children's market, experts in the field agree that the market is very quickly expanding. A recent conversation with P.J. Swift, a children's radio producer whose base is in Santa Cruz, California, revealed that children's radio is making inroads in many major markets. For example, Radio Oz (a commercial radio network for kids based in Minneapolis) is cur-

rently being switched into eighteen major markets.

Likewise, Ms. Swift's own show, *Pickleberry Pie* is now heard on eighty public radio stations. Interestingly, Swift noted that she also prefers doing production for her syndicated show in (you guessed it) a home-based studio.

Finally, there are indications that more independently produced kids' music will find its way into the new generation of educationally oriented kids' stores. The leader in this genre is a newly formed chain called *Noodle Kadoodle*. Featuring an outstanding selection of classic and novel educational toys, games, crafts, computer software, video and audio products, *Noodle Kadoodle* is much more open to independently produced CDs and cassettes. According to Jill Jarnow, the music buyer for *Noodle Kadoodle*, only 20 to 30 percent of the children's music sold at their stores comes from major labels. That means 70 to 80 percent of the product comes from independent children's artists. (You will never find those kinds of proportions in commercial record stores!)

With that as a background, let me share with you some *hot tips* on the subject of recording and producing children's music. To illustrate, we will focus on one independently financed children's music project currently being recorded in my own electronic cottage—*Elisa and The Kids Kazam*.

Children's artist, Elisa

Elisa and The Kids Kazam (Adam and Luke)

ELISA AND THE KIDS KAZAM

Like many of the new children's artists, Elisa is a music educator who over the past seven years has developed an innovative early childhood music program at the East Woods School (a private school in Oyster Bay, New York) that involves songs, movement, storytelling and musical improvisation. Elisa jokes that all her songs for the album are "kid tested and approved"—meaning they

have been refined in the classroom. There are no duds on this album; all of the songs have been worked and reworked until Elisa is convinced, beyond a shadow of a doubt, that children connect with the songs in a big way. This is Elisa's strongest virtue as a children's artist: she knows what makes kids tick.

While Elisa plays guitar and sings (and I provide MIDI programming to color the tracks), The Kids Kazam—who are primarily Elisa's sons Adam and Luke, and a few other talented children from the East Woods School—really give the album the spontaneous feeling so necessary in a kid's recording; it becomes Elisa playing and singing *with* kids, rather than *to* them. Of course, it is this unpredictable element, this "wild card" thrown into an otherwise neatly shuffled deck, that sets good children's music apart from the slickness of mainstream pop.

CAPTURING KIDS' VOCALS

Kids fare surprisingly well in the studio when they know what to expect. If you are directing a vocal session with several kids singing at the same time, make sure each child knows exactly what to expect before you attempt to record. Let them practice the parts a few times live in the control room—before you saddle them with headphones and microphones, making sure everybody is singing the same words, starting and stopping at the same time. When they do get in front of the microphone, give them time to laugh, giggle and say goofy things on mic; let them enjoy the sound of their voice with reverb in a short session before you start recording. Patience is the operative word here. Once they get it out of their system they will be more docile and able to take direction. Sending an adult female out to sing along with the kids as a guide, can also be very helpful keeping the kids on pitch. The adult female's voice (especially if kept relatively off-mic) will blend well with the kids' and not detract from the youthful tone.

Microphone setup is relatively simple in my sessions. I set a microphone vertically (pointing toward the ceiling) at the height of the smallest child and have everyone gather round in a circle facing the mic. I instruct them to sing in the general direction of the microphone, but not to crane their necks trying to reach it. In fact, I usually begin by placing the kids one to two feet away from the mic so the sound gets a chance to blend in the room. I listen carefully, and if anyone is too loud, I ask them to step back, and *vice versa*; but I do not try to iron out all the wrinkles in the vocal blend. It's nice to triple or quadruple kids' tracks, with each track featuring a particular kid's voice as being dominant. Then, when mixing the tracks, a more realistic stereo perspective can be had by panning the tracks at various degrees to the left and right.

Kids being kids, the vocal group will sometimes get louder than you want. Children may fluidly slip from singing to shouting in the midst of a performance, so they need to be reminded of the difference. Still, the vocals should be compressed or limited to provide protection against overloading the tape, and gated to help tighten beginnings and endings. Avoid using any EQ during recording, as it could be regrettable later; some kids have nasal, spiky-sounding voices that could get exaggerated, so save your EQ for mix down.

On mix down, some discretion is needed regarding which tracks to feature, and which to hide. That's why it's best to record more tracks than you actually need, so that you can select the strongest, or if necessary, make a composite track of all the best performances. (Remember, kids are unpredictable!) If this Darwinian selection of tracks leaves you too few voices and you wish you had a few extra kids singing, adding a few randomly spaced delays will give the illusion that more kids were singing.

Oh, one last tip that I learned from my sessions with *Elisa and The Kids Kazam*. Make sure someone has the foresight to buy plenty of snacks and drinks for the kids. Kids are metabolic dynamos and they burn up a lot of calories just jumping around. A snack at the right time can help charge them up for an enthusiastic performance.

Recording kids' music can be a lot of fun and can bring out the big kid in you. It can also be financially rewarding, both for the artist and the studio owner. db

If your computer is on-line and you are interested in getting specific questions answered about the market for children's music, you will find the Children's Entertainment Association accessible through the internet. Just E-mail your questions to ASKCEA and national coordinator Howard Leib will personally respond to your questions.

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A warm, pristine, musical, British sounding EQ because it *is* British. The four band EQ (with in-out switch!), features fixed point shelving high and low frequencies with center points of 12 khz and 70 Hz respectively. The peak/dip upper mid band sweep is continuously variable from 500 Hz to 15 khz, lower mid band from 35 Hz to 1.5 khz. All bands feature 14 db boost and cut at 18db per Octave.

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Stereo Inputs

Stereo inputs featuring more EQ than most consoles have on their *mono* inputs. With two sets of inputs per channel and an A/B switch, you have the flexibility to select between 4 stereo sources (keyboards, CD etc.) For multitrack recording, used in conjunction with the 4 AUX/tape returns, you can bring in 8 tracks of tape while still tracking all of the other 10 inputs and getting a full function studio monitor feeds as well!

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6 discrete auxiliary sends selectable pre-fader/EQ (for monitor or studio headphone sends) or post fader (for effects sends) Routing and flexibility not found on mixers costing hundreds, even thousands more!

AUX Reverse Routing

Full function stage monitor console, ***it's that simple!*** Routing switches via our unique source reverse switch allows the console to be converted from a recording/Front-of-House sound reinforcement board to an expandable 18:6 stage monitor console with a fully selectable engineer's cue mix.

Faders

As is the standard on all professional mixers of its class, the GL2 boasts full throw 100 mm Alps™ faders for thousands of hours of smooth, seamless operation.

Master Section

Four discrete subgroups, left and right outputs, and the AUX reverse section allow the GL2 to adapt in ways impossible on other compact mixers.

Tools, not toys.

Under the Hood

Careful attention to detail, as in individual circuit boards for each channel, fastidious component selection, and the best of British engineering all combine to establish the highest standard of performance... performance that is daily tested and confirmed anew.

The GL2 is the worlds first multi-function mixer perfectly suited for Front-of-House Monitor, and Multitrack recording. ■ The ultimate in flexibility, this compact rackmount unit reveals a world of new opportunity — the ability to adapt. ■ In basic format, the **GL2** is a 16 by 4 by 2 by 1 system for quality Front-of-House mixing, but at the touch of a button it's instantly configured as a 16 by 6 plus 1 Stage Monitor mixer. Another button and you're set up for digital Multitrack recording. No fuss — no compromise — no limitations for the future. Our unique SYS-LINK™ system gives the **GL2** the means to grow as you do. Designed and built by engineers that have been bringing you audio tools with the superb specifications and quality you expect from Allen & Heath. ■ Audition the latest tool for the working professional at your nearest Allen & Heath dealer or call us for more information.

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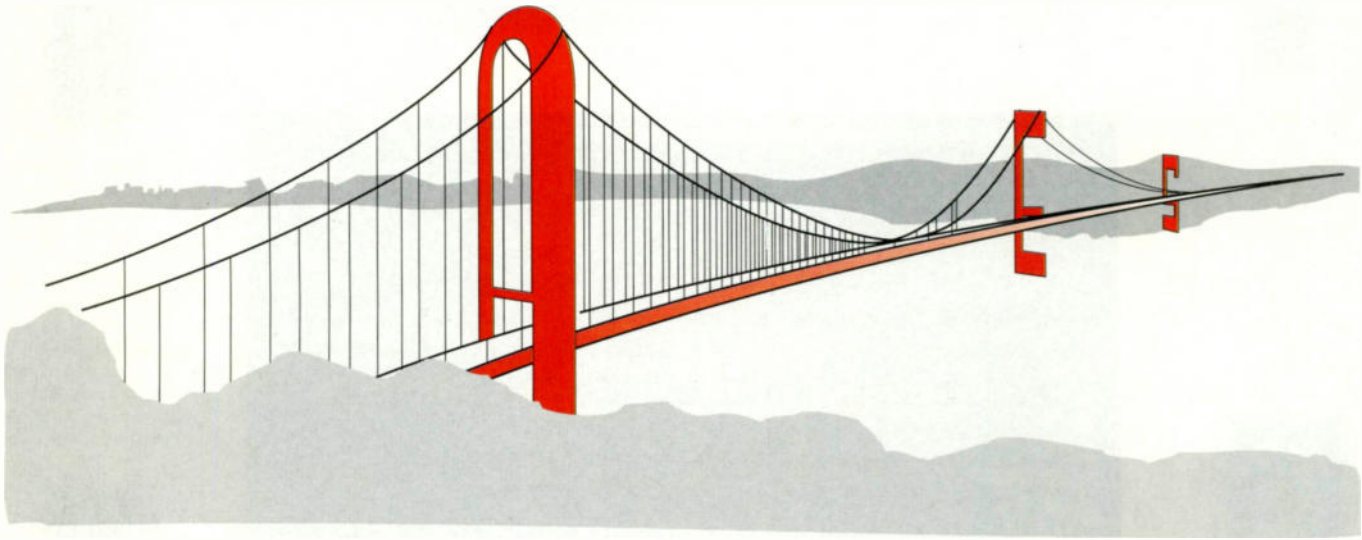

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A Picture Is Worth A Thousand Songs—Ariel Music Design

We recently caught up with young entrepreneur James Becher, who is creating quite a stir in the music and visual graphics scene on Long Island, New York. This is an interview with Jim, as we sat down for an informal stream-of-consciousness conversation in one of his studios.

Larry Zide and Jim Becher

I began by asking Jim, why don't you start us off by introducing yourself, and tell us a little bit about your company and the type of services you provide?

"I own and operate a complete music production and graphics design company called Ariel Music Design. My company is unique because, not only do we provide full music production, which includes everything from writing and/or arranging to recording and digital mixing, but we also have complete in-house real-time cassette duplication (see the **db Magazine** September/October 1993 issue), and do our own cassette jacket and CD cover designs and layouts, both in black and white and full four-color separations. We've also recently developed a new technique to output our own laser-separation negatives, the

Figure 1. A view of the studio at Ariel Music Design

Figure 2. Racks of synthesizers are at arm's reach.

quality of which closely rivals that of conventional imagesetters, but the cost to the customer is less than half of what a service bureau would typically charge for the same service. Because that is still another in-house service that we can provide, it means there is a much faster turn-around time for the completion of a project."

I must admit you've got my curiosity aroused. However, before you discuss this cutting-edge technology, tell us a little about your background, who you have worked with, and how you got started in this business.

Jim's response: "Well, I've served as product specialist and digital keyboard clinician with M.T.I. (Music Technology Inc.), working on the original Synergy project with Tom Piggott, Stoney Stockell and Wendy Carlos. I have also been a consultant to European manufacturers Crumar and Siel, and while in Japan, was involved with development and sound design of Korg's M-1 MIDI Workstation electronic keyboard. *The Songwriter's and Musician's Guide to Making Great Demos*, published by Writer's Digest Books, lists me as technical editor and consultant, and I have co-written a book which includes cassette tape tutorials with Janis Ian, John Barilla, and Teri Muench entitled *The Song Writer's Work Shop*, also published by Writer's Digest Books. I've also played keyboards and synthesizers on hundreds of recording sessions, and because I was never completely satisfied with the final results of my efforts during these sessions, I decided to build my own studios and produce music and graphics the way I felt it should be done."

I understand you've worked with such notables as Jon Anderson from ***Yes****, Verdine White from* ***Earth Wind and Fire****, Ed Gagliardi from* ***Foreigner****, Bobby Rondinelli from* ***Rainbow****, Kenny Aronson and Thommy Price from* ***Billy Idol****, and* ***Meatloaf****. These are all seasoned professional recording artists. Did you learn anything from working with these people that you could directly apply to the way you have structured your business, and are there any techniques you've picked up along the way that you find useful, in the way you approach putting together a musical package or presentation?*

Said Jim, "The single most important thing I have learned while working with such seasoned professionals is to maintain a high level of integrity throughout a project. Whether you're making a record or CD (cassettes included), or designing a magazine, brochure or even a simple flyer, it is extremely important to be consistent (consistently good of course!) from the beginning to the end. That may initially appear to be an obvious practice, but too often a lot of thought is given to the actual recording or making of a record or CD, and not enough consideration is given to the packaging of that product and how the product is to be marketed and distributed. This lack of thoroughness admittedly applies more to the young, hopeful "fresh out of the gate" recording artist or artists rather than to seasoned professionals. Remember too, that the big distributors and record companies also have large budgets and a full staff of experienced personnel to get the job done. Ariel Music Design offers the highest level of integrity throughout a project so that the greatest possible chance for success of a product can be achieved."

Jim, let's say I want to make a master recording in your recording studio, for example. Now, I don't play any instruments, but I've got what I think are some pretty nice songs that I put together on my Casio keyboard that I purchased from K mart, and I can hum to you what I hear as being the basic melody for each of the songs.

Can you take us, if you will, through the steps of putting the music together and recording it so that it sounds like a record and is good enough to be heard on the radio? Explain the recording process, any tips, tricks and techniques you would use, and then how you would go about duplicating tapes and designing and producing the artwork for the final package.

Jim's reply: "Well, Larry, that is a fairly loaded request, so here goes! First, we would sit down and "pow-wow" at my studio to decide where we want to go with your material. That is, we would discuss the type of instrumentation and orchestration that would be used, the style and direction of the music (pop, rock, country-western, classical, etc.), and the type of vocal treatments that will be used. Because you mentioned that you are perhaps not the most accomplished vocalist in the universe (did you say that?), we would decide whether a male or female lead vocal would be used, the number of background vocal parts and tracks to be used, and whether those parts to be sung are male, female, or both. We would then listen to your compositions to get ideas about parts, sounds, and arrangements.

"I would then make a rough work tape from your Casio to my cassette machine so that I have a working copy of your songs in their raw original form. Once this basic groundwork is laid out, I would send you home, so that I could live with the tape, listening to it many times so that I may become intimate with each and every song. It is very important that I become as familiar with every nuance of each song, so that I am as "inside of" and close to the song as you are. Then the personality of the song can begin to come to life. Then, still working by myself, I would sit down in front of my digital keyboards and computer and begin to lay-out and program each song. You see, with the use of a MIDI computer-based sequencer, keyboards, and drum machines, any sound texture can be realized, and complete electronic orchestration is possible—the performance of which can be digitally recorded and saved on disk to be recalled at any time in the future.

"I am a firm believer in using both digital and analog synthesizers. I don't ever see one technology replacing the other, mainly because each type of synthesis and synthesizer using a particular type of synthesis has its own sonic personality. I also have a very large MIDI arsenal, and one of the advantages of having so many sound sources is that utilizing an extensive MIDI set-up virtually eliminates the need of having to record any of the instrument sounds onto analog tape. The only musical parts necessary to record onto tape are vocals and any acoustic non-MIDI instruments. MIDI music production is certainly the norm of the nineties—all "the big guys" from Whitney Houston to Phil Collins make records using MIDI. Phil Collins, for those who may not know, is a drummer as well as a lead vocalist. When he lays-down drum parts, he uses MIDI-controlled electronic drums performed into a sequencer.

"Another advantage to making music with MIDI is that, unlike a multi-track analog tape recorder, the MIDI sequencer does not suffer from the problems of noise, tape hiss, and the deteriorating sound quality that is experienced when bouncing tracks, because when bouncing or merging the tracks, only MIDI data is bounced, not the actual audio sound.

"Another neat thing the sequencer allows you to experiment with is time compression and time expansion. With time compression, you can adjust the sequencer to speed up the tempo of a specific passage or entire musical section without changing the pitch of the sound. Time expansion creates the opposite effect. The sequencer may be set to slow down the tempo without affecting the pitch. This is certainly an advantage over conventional tape recording in which the pitch is affected and changed when the tape machine speed is run faster or slower.

"The bottom line is that with MIDI an entire electronic orchestra can be born – literally from within the confines of the recording studio. From the "fat" timbre of analog synthesized strings and bass, to the crisp edge of digital bells and chimes, and not to mention the realism of digitally sampled sounds, the potential of MIDI can be unleashed with full force, fulfilling and satisfying every one of my musical dreams and passions!"

I'm impressed, but can you tell us more?

"Even when I mix, I use MIDI to automate most of the crucial moves. All MIDI instruments that respond to controller #7 (MIDI volume), will respond to software fader movements from the computer. This allows the volume changes to be

recorded into the sequencer, which stores them as part of the song that is currently being mixed. This means that while I am mixing a particular song I can listen more objectively to the dynamics of the music without being distracted by having to perform a lot of "acrobatic" fader and channel muting moves. I think that having an objective ear during the mix is especially important, because with today's music there is a definite tendency toward overproduction and too many things going on at the same time, and it just leads to overkill. Very often, the song gets lost or buried in the very production that's designed to bring it to life. I've always felt that fancy production is no substitute for poor song writing. Fancy production may give the appearance of a polished product, but as you know, and especially in the case of trying to squeeze life from a dead song, appearances can be deceiving. It's so important to have strong melodies, intelligent and sensible arrangements, and artful lyrics as the raw materials for a successful song," said Jim.

So, with so much hi-tech equipment available today at ever dropping prices, genuine talent and song writing skills still cannot be manufactured, or even cloned and duplicated by the computer?

Jim's response: "Bingo! ...I also think it is very encouraging to see so many manufacturers of electronic musical instruments working together in further developing the specifications of MIDI. There is really no limit to what MIDI can do, and I will continue to create electronically orchestrated music, with the security of knowing that MIDI is here to stay."

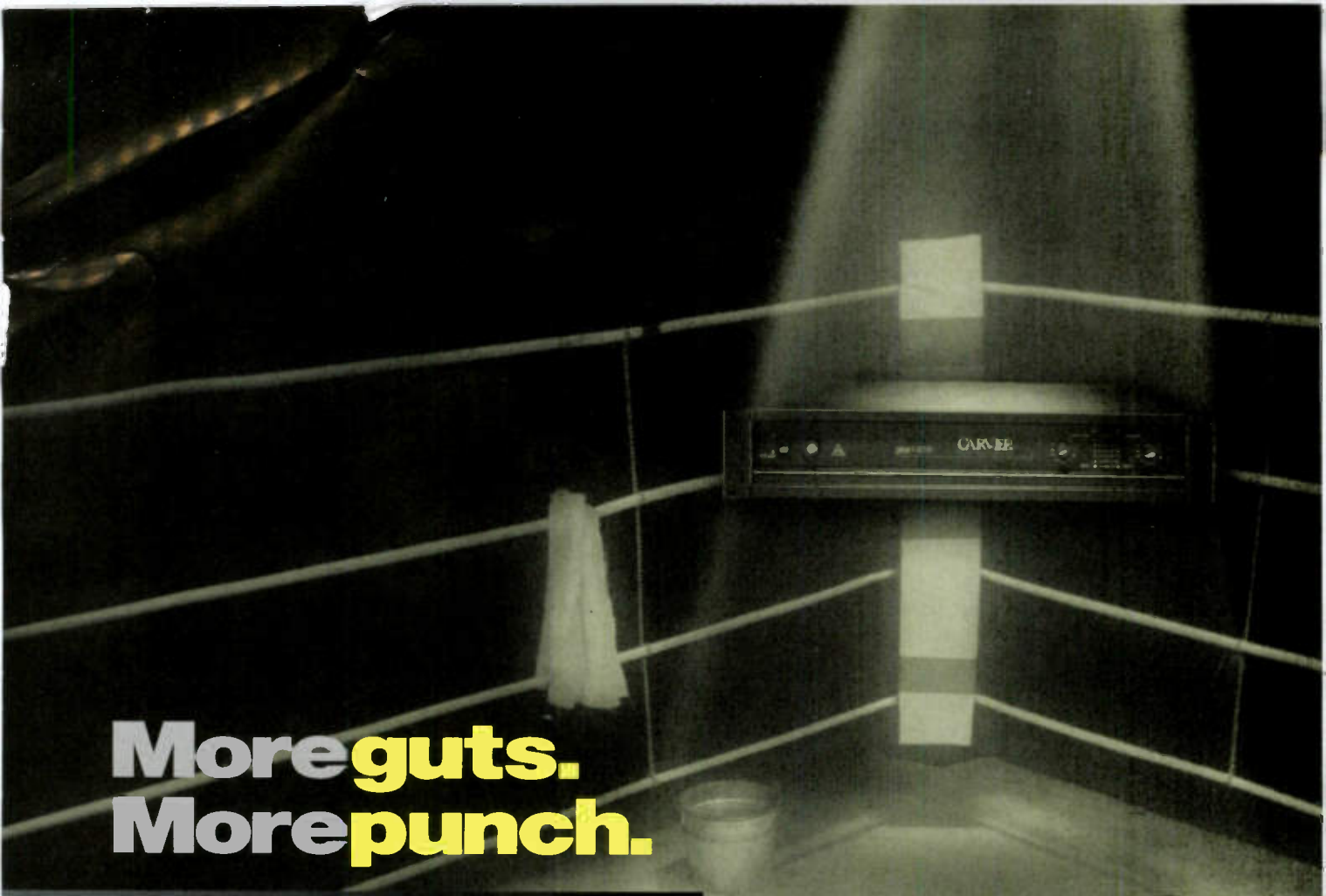
Now that my compositions are recorded and tastefully mixed, I need to make duplicate copies of the master tape to send out to record companies and perhaps to music publishers. I assume that the music was recorded onto DAT machines, and it would not be practical or even cost-effective for me to make duplicate DAT copies. Now, I know you've spent some time sharing with us the operation and insights of your duplication practices in the September/October 1993 issue of ***db Magazine****, but can you tell us what choice of duplication is recommended for my mailing purposes — whether it is cassettes or CDs, and why you would choose one method over the other?*

Said Jim, "That's a good point, Larry. There are several considerations one must examine when preparing to blitz the market with a new product. The factor that usually seems to play a key role during the decision-making process, is the budget. I usually recommend that an unsigned artist (that is, a person or persons who are not presently signed to a recording contract or publishing agreement) not go to the expense of making CDs. CDs can be quite costly, and depending on the artwork and packaging involved (unless the graphic layout and artwork is done at Ariel Music Design, because of the new technique we developed to output four-color laser negatives I spoke of earlier), may not always be necessary to prove to the record companies that someone is serious about their music. Indeed, smart business moves and cost-effective, yet professional-looking packaging can certainly be respected by a prospective record company that is looking to sign acts. Remember that the major and the larger independent record labels are looking to invest typically from one-hundred thousand to perhaps up to two-hundred-fifty thousand dollars on a new artist.

"So, with those kinds of numbers at stake, they would like to know that the people they are potentially investing in are level-headed and business-minded. My point is that the hot sounding and smart-looking audio cassettes recorded at Ariel Music Design are usually more than impressive to turn a few corporate heads. However, some enterprising individuals may want to duplicate their master tape directly onto CDs, so that each CD may be sold as a mastered, finished product, with completed graphic layout and stunning artwork. These are services that I provide, and at a price point that is very attractive."

Well, Jim, won't you please tell us about this new way of outputting laser negatives for the color artwork that accompanies your cassettes and CDs that will ultimately save people money?

Said Jim, "I'm glad you asked! Well, Larry, as you know, the human eye perceives color according to the wavelength of the light that reaches it. The entire spectrum of light is perceived as white light, and no light at all is perceived as black. Most colors of the spectrum that occur in nature can be represented by various combinations or mixtures of the three primary colors red, green, and blue. This is an additive process. The colors on TV sets and computer monitors are dis-



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Circle 14 on Reader Service Card

played using combinations of red, green, and blue. Now, when color is shown on printed paper, its appearance is a result of color being absorbed or subtracted by the ink on the paper. This subtractive process uses combinations of four colors known as subtractive primaries to represent all other colors because of the way light hits them. Some portion of the light spectrum is absorbed by these translucent inks when it hits the paper, and still another portion of the spectrum is reflected back to the eye. The four subtractive primary colors are cyan, magenta, yellow, and black. If you recall, I mentioned that the computer monitor shows colors as RGB colors and not CMYK. When color-scanning is performed, the colors are initially scanned as combinations of red, green, and blue. It therefore becomes necessary to convert the colors from the native RGB mode to their CMYK equivalents. This conversion process is a standard practice for desktop publishers and service bureaus because printers need the color images separated into these four "plates" so that they may fill each printing plate with the appropriate cyan, magenta, yellow, and black inks.

"Our new process of separating these colors and generating the laser negatives creates an eventual composite image that looks like a stunning digital representation of the original. It's very much like making a DAT copy of a CD or record. Well, without letting the cat completely out of the bag, a picture is still worth a thousand songs, and seeing is believing."

Thanks, Jim, for sharing these insights with us. db

Equipment List

KEYBOARDS

Aeolian 5-foot baby grand piano
E-mu Systems Emax HD SE sampling synthesizer
Kurzweil K1200-PLUS digital synthesizer
Roland D-50 digital synthesizer
Roland D-5 digital synthesizer
Roland MKS-50 digital synthesizer
Roland MT-32 digital synthesizer
Korg DSS-1 sampling synthesizer
Korg EX-8000 digital waveform synthesizer
Korg 707 digital FM synthesizer
Digital Keyboards Inc. Synergy digital synthesizer with Kay Pro II computer
Ensoniq ESQ-M digital waveform synthesizer
Kawai K1r digital waveform synthesizer
Yamaha TX-81Z digital FM synthesizer
Yamaha CS-80 digital/analog hybrid synthesizer
Yamaha CP-80 electric grand piano
Yamaha SY-2 analog synthesizer
Oberheim Matrix 1000 digital synthesizer
Oberheim "Strummer" MIDI keyboard-to-guitar chord converter
Challenging Technology Bit-One synthesizer
Challenging Technology EX-99 synthesizer
Siel DK-80 synthesizer
Siel EX-600 synthesizer
Custom console Fender Rhodes electric piano
Crumar Toccata organ
Custom Moog, Arp, Electro-Comp synthesizer with Moog ribbon controller

MIDI SEQUENCERS

C-Lab Notator software sequencing and music notation program for the Atari Mega 2 ST computer
Korg SQD-1 digital MIDI sequencer
Roland MSQ-100 digital MIDI sequencer

DIGITAL SIGNAL PROCESSORS

Alesis Quadraverb digital multi-effects processor
3 Yamaha SPX-90 digital multi-effect processors
ART Multiverb LT digital effects processor
Yamaha R-100 digital multi-effect processor
Lexicon Prime Time digital delay
Roland SDE-1000 digital delay
Roland RSD-10 digital delay
Boss DE-200 digital delay
T.C. Electronics stereo chorus plus flanger and pitch modulator
Digitech Vocalist Model VHM-5 vocal harmonizer
Aphex aural exciter Type III model 250
Aphex Type C aural exciter
BBE Model 422A 2-channel sonic maximizer
Korg A-3 digital guitar effects processor
Zoom 9030 digital guitar effects processor
Tech21 Sans-Amp digital guitar overdrive processor
2 Alesis Model 3630 RMS/Peak dual channel compressor/limiter with gate

3 Alesis M-EQ230 dual channel 30-band graphic equalizers
4 Rane Model SM26 splitter/mixer distribution amplifiers
BSR EQ14/14XR dual-channel 14 band equalizer/spectrum analyzer w/ remote

ANALOG SIGNAL PROCESSORS

Roland DC-10 digital delay
Roland SVC-350 vocoder
LT Sound-Thompson vocal eliminator Model VE-1
Mutron "Bi-Phaser" 2 channel
Roland analog delay Model DC-1
Multivox Fullrotor phase shifter
Electro-Harmonix flanger
Electro-Harmonix frequency analyzer

DRUM MACHINES

Roland R-8 digital drum machine
Alesis Model SR-16 digital drum machine
Casio RZ-1 PCM digital drum machine
Korg KPR-77 analog drum machine

TAPE RECORDING GEAR

Fostex R-8 eight-track recorder
Fostex A20 reel-to-reel two-track mastering recorder with center-channel control track for sync
C-Lab *Unitor* SMPTE/EBU synchronization generator/reader
Panasonic SV 3500 Digital Audio Tape deck
Panasonic SV 3200 Digital Audio Tape deck w/ remote
Sony DTC-700 Digital Audio Tape deck w/ remote
Teac X-300R 2-track reel-to-reel recorder
Nakamichi MR-1 three-head cassette deck w/ remote
50 modified Teac V-370 cassette tape decks with unified remote system
Teac W-410 double cassette deck
Akai GXC-38D cassette deck
Pioneer double cassette deck, Sanyo, Sharp, Fisher and Ultrx additional cassette decks
J.L. Cooper PPS-1 tape-to-MIDI synchronizer
Tascam Porta One four-track recorder
Fisher AD-833 CD player

RECORDING AND SOUND REINFORCEMENT GEAR

Mackie Designs Model CR1604 mixing console
Mackie Designs Micro Series 1202 mic/line mixer
Tascam M216 mixing console
Fostex model 450 mixing console
Biamp model 1682 mixing console
Tascam Model 10 12-channel mixing console
Tascam Model 10 8-channel mixing console
Tapco 6000 6-channel mixer/pre-amp
Delta-Lab single channel pre-amplifier
2 T.C. Electronics Model TC1140 4-band parametric equalizers
Symetrix 528 compressor/limiter/expander/de-esser/3-band parametric equalizer voice processor with microphone preamp
dbx 166 2 channel compressor/limiter/noise gate
BOSS NF-1 and MXR noise gates
dbx 150X 2 channel Type 1 noise reduction
AKG C414B-ULS studio condenser microphone
2 Audio Technica AT-813 condenser microphones
Beyer M500 ribbon microphones
Shure SM57 and SM58 microphones
Rocktron Hush IICX single-ended noise reduction system
2 Rocktron HUSH IIC single-ended noise reduction system
dbx 119, NX-40, and 163X dual-channel compressors
UREI 565 notch/peak filter set
Dynaco 410 stereo power amp
JVC Model VN-5101 stereo monitor amplifier with 5-band graphic equalizer
Pioneer SA-1040 stereo monitor amplifier
Pioneer CK-W50 stereo monitor amplifier
Sylvania RS-5741 stereo monitor amplifier
York stereo monitor amplifier
Roland Cube 60 keyboard amplifier
2 Tannoy Model PBM-8 near field speaker monitors
2 Yamaha NS-A635A near-field speaker monitors
2 Pioneer CK-W50 near-field speaker monitors
2 Electro-Voice EV-FM12-3 3-way room speaker monitors
2 Pioneer HPM-300 3-way room speaker monitors
2 dbx Model db-SW15 15-in. sub-woofer cabinets
2 Pyramid Phase III 3-way bass-reflex near-field speaker monitors
2 custom-built Hollywood 2-way near-field speaker monitors
Princess Electronics DiscMix DJ mixer
Technics FG Servo SL-BD22 turntable
Sanyo turntable with monitor amplifier
Realistic dual-channel 5-band graphic equalizer
4 DAK CD4000 stereo headphones
Koss 9465 stereo headphones
3 Realistic Nova 55 stereo headphones
Realistic Nova 45 stereo headphones
Assorted Atlas boom and microphone stands

continued ➤

PATCH BAYS

Digital Music Corp. MX-8 MIDI patch-bay
Digital Music Corp. MX-28S MIDI patch-bay
Symetrix 32-point audio patch-bay
Russound/FMP Inc. Model QT-1 audio patch bay
assorted switch boxes for further signal routing

VIDEO GEAR

SONY Model VO-6800 3/4-in. U-Matic video recorder
2 SONY Trinitron Model DXC-1800 video cameras
Olympus Model VC-106 Hi-Fi Audio HD VHS video recorder w/ remote editor, 19-in. JVC color monitor and switch boxes
Panasonic Model PV-4451 Hi-Fi Audio VHS video recorder w/remote and 19-in. Magnavox color monitor

COMPUTERS

Custom assembled 486 DX2-66 VESA local bus IBM clone, with 20 meg. RAM, BSR CD-ROM, Syquest removable hard drive, and BSR SC-428VS 14-in. 0.28mm dot pitch Super VGA color monitor
BSR 386 SX with 4 meg. RAM and Panasonic PanaSync C1395 14-in. 0.28mm dot pitch Super VGA color monitor
Atari Mega2 ST with 2 meg. RAM using an Atari SM124 hi-res monochrome monitor
Kay Pro II with CPM-based operating system for use with the Synergy Digital Keyboard

SCANNERS/IMAGING

Envisions ENV24Pro 2400 dpi 16.7 million color hi-resolution flatbed scanner
GSCAN 256 800 dpi 256 level grayscale hand-held scanner
Marstek M-105 400 dpi hand-held scanner
Canon PC-6RE copier with enlargement/reduction
Fluorescent back-lit light table for viewing transparency and negative images
American Business Concepts SCAN-ALIGN track guide for hand-held scanners

PRINTERS

Hewlett-Packard LaserJet 4 upgraded to 1200 dpi Postscript using WinJet technology by LaserMaster and 10 meg. RAM
Toshiba 420 ExpressWriter 24-pin dot matrix printer
IBM Proprinter dot matrix printer
Electronics Corp. of America-Brother Industries, Ltd. Model M- 1109 9-pin dot matrix printer

MISC

SCORE II perforating and scoring machine
Boston Model 2612 paper cutting machine
Assorted spiked and circuit breaker-protected power controllers and strips
Panasonic KX-F250 FAX machine with answering system-FAX# 516-595-1247
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Aiming for Zero Downtime at KSL Radio

Ron Brittain

In the radio broadcast industry every second counts. When broadcasting equipment fails for even a few seconds, the interruption in service can annoy thousands of listeners and can cost a radio station lost advertising. For radio station engineers, keeping a station on the air means working near radio transmitters that emit kilowatts of RF energy—energy that can wreak havoc with electronic test equipment.

Engineers who maintain the electronic equipment at KSL Radio, a news radio station in Salt Lake City, Utah, have overcome the problems of working in a high-RF environment by adding a new instrument to their tool kit. This instrument, the ScopeMeter from Fluke Corporation (Everett, WA), combines a digital storage oscilloscope and a digital multimeter in a hand-held unit. Because the portable instrument is battery-powered, it can be operated without an A.C. power cord, and is therefore virtually immune to electrical noise.

Ron Brittain is with Fluke Corporation in Everett, Washington.

TRANSMITTER NOISE

When KSL engineers want to see a picture of analog or digital signals from circuits near a transmitter, an oscilloscope is needed at the scene. But a bench-top oscilloscope needs an A.C. power cord, and, in a high-RF environment, a cord transmits more than power to an oscilloscope.

Working near one of the station's fifty-thousand-watt AM transmitters, the engineers and their test equipment are doused with an RF field strength of 10 V-per-meter—enough energy to generate several hundred volts of RF noise in the extension cords used to power test equipment.

"If you stretch a 50-foot extension cord around the station, you can easily pick up fifty volts of RF noise," says KSL senior engineer Randy Finch. "You can't tie an A.C.-powered scope's ground to a circuit ground in the transmitter because the noise currents that would be induced at the connection might bring the transmitter down."

Using the portable, battery-powered ScopeMeter, Finch is now free to view waveforms while working in the shadow of the transmitter.

AN INTERMITTENT NIGHTMARE

Recently, Finch was called to solve a problem with a KSL transmitter located on the salt flats near the Great Salt Lake. A fault in a sensing circuit for the transmitter's three-phase power supply was causing the transmitter to shut down intermittently. Because the fault was intermittent, Finch knew that finding clues to the fault's source meant monitoring the circuit during a failure. With these signals to analyze, Finch was certain he could spot an anomaly that would lead him to the fault.

"At first, the transmitter had shut down just once in a month. But the problem quickly grew worse until shut-downs were occurring several times a day. "The transmitter would turn off for maybe ten seconds, then turn itself on again," said Finch. "When that happens in the middle

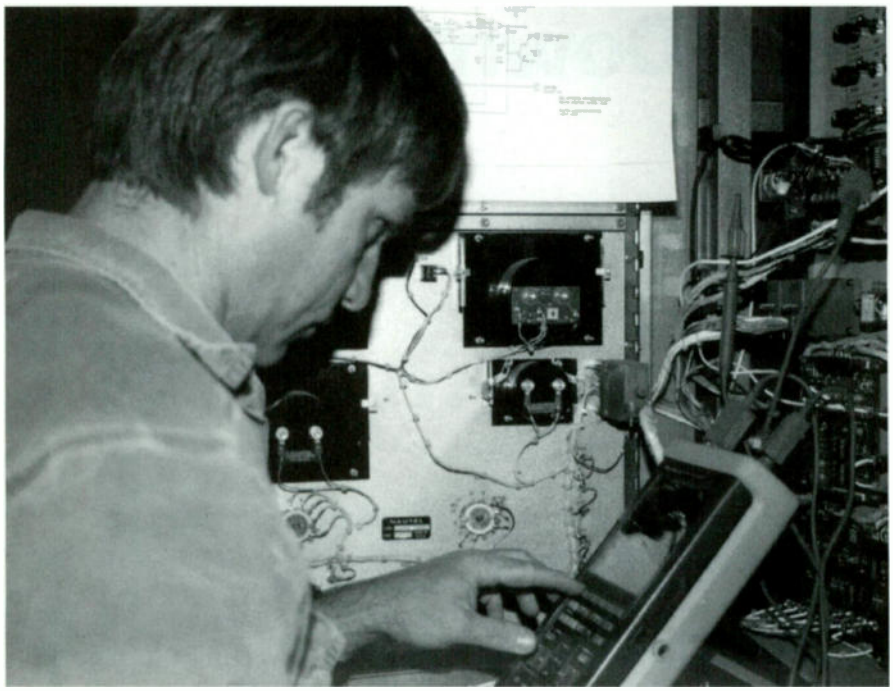


Figure 1. Using a portable, digital storage oscilloscope allows engineer Randy Finch at KSL Radio to test and troubleshoot the transmitter and other circuits on-site. Because the meter has no AC power cord, RF noise induced by the transmitter is not a problem.

of a commercial, the station has to run the commercial again, and that gets real expensive."

MONITORING THE PROBLEM WAS A PROBLEM IN ITSELF

"The fault could have had a number of sources," said Finch. "It could have been caused by a loss of audio or power, or maybe the excitor circuit was going down." To find the source of the fault, Finch knew he needed to observe signals in the transmitter circuits just before the transmitter failed. That meant capturing the signals with a storage oscilloscope—which, before obtaining a ScopeMeter, was an impossible task because his bench-top storage 'scope required an A.C. power line.

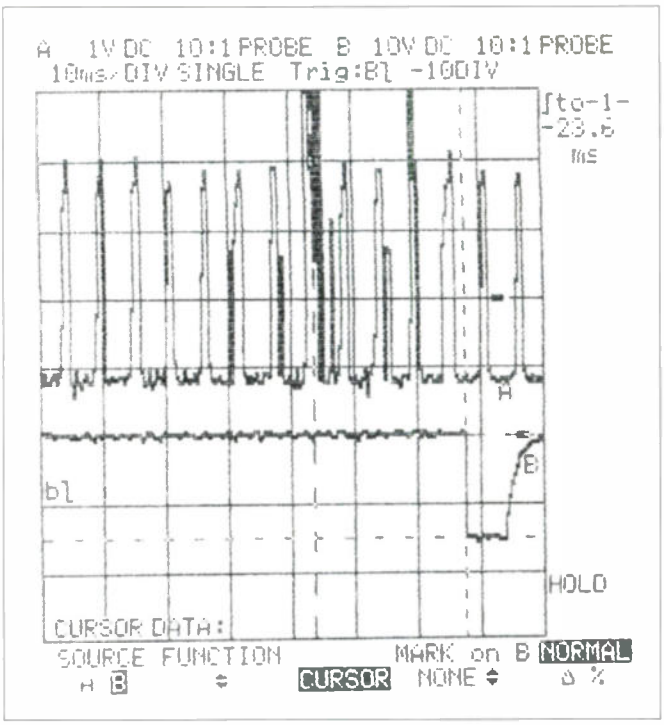
With no way to capture and store signals in the high-RF environment, Finch designed a pulse stretcher that would trigger when the transmitter failed. "I made a one-shot circuit from digital logic gates to capture a triggering condition," he explained. When he connected the circuit to various test points in the sensor circuitry, Finch could determine where sudden changes in the power-supply voltage occurred. "The one-shot circuit triggered at several test points," he said. "So, it was hard to narrow down the problem to a particular place in the circuit." And Finch still was not getting what he wanted—a picture of the signals that occurred just before the transmitter failed.

A SUDDEN SOLUTION

After several weeks of tracking the elusive problem, Finch was rewarded with relatively instant success when he armed himself with a ScopeMeter. (See *Figure 1.*) Using the meter, he could not only observe signals near the working transmitter, but he could make "floating" measurements as well, measurements where the scope's ground is not connected to a circuit ground.

"You can use a single probe to take measurements directly across components," he said. "This really cuts down on the noise you pick up because there are virtually no ground loops in your connections." With a standard bench-top oscilloscope, Finch pointed out, measuring across a component that is not connected to ground requires a ground reference, two probes, and a differential input, a configuration that creates ground loops among the connections.

Before receiving the ScopeMeter, Finch had to add transformers to existing test equipment when he needed to view waveforms on balanced audio lines. For example, when using a bench-top oscilloscope to observe signals on balanced audio lines around the station, he had to use the differential inputs on his scope to eliminate noise on the viewed signal. (See *The Need for Balance.*) "But the differential circuits were not really balanced over the entire frequency response," said Finch, "so we always ended up with some un-canceled noise on the scope signal."



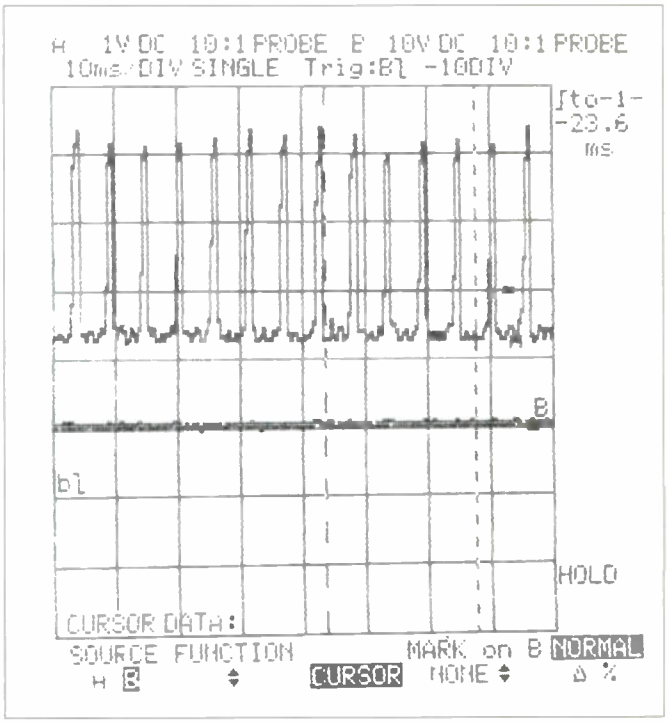


Figure 2. (Left) This fault signal, captured by the ScopeMeter, shows the voltages that occur when an intermittent connection is temporarily jarred loose by the vibrations from a cooling fan. Note that the power supply faults that tripped the fault detector circuit happened up to 40 mS before the trigger point. At the right we see a no-fault condition. The ability to view these pre-trigger events was the key factor in finding the source of the problem.

CATCHING CLUES

At the transmitter site, Finch set up the meter for single-shot mode.

"I wanted to check a signal at the input of an operational amplifier," he said. The amplifier is part of the transmitter's protection circuitry; it senses the output voltage from the power supply and shuts down the transmitter when a power-supply problem occurs. "When all is well, the amplifier's output sits at 0 V," said Finch. "If the power supply's output voltage fluctuates, the amp's output jumps to -15 V."

Finch left the meter to monitor the sensing circuit overnight. During the night, the transmitter failed, and the meter captured and stored a signal from the sensing amplifier on one of the meter's channels and from the power supply voltage on the other. Finch returned the next morning and viewed the stored waveform. As he suspected, the voltage had jumped from 0 V to -15 V. But when he used the meter's ability to view pre- and post-trigger events on stored waveforms, Finch saw something he had not suspected:

"The power supply voltage was bouncing all over the place. It would jump to 0 V for three milliseconds, then back to -15 V for 10 milliseconds, then back to 0 V. And it was ringing like crazy." (See *Figure 2.*)

The millisecond-wide duty cycles of the signal reminded Finch of switch bounce—the repeated voltage fluctuations that occur when the contacts of a mechanical switch bounce together and apart for a short time after the switch is closed. "Sometimes we get intermittent failures caused by temperature changes," said Finch. "Plus there's a certain amount of vibration in the transmitter circuits due to the power-supply cooling fans. Once I saw what the faulty signal looked like, I started looking for intermittent connections."

Finch moved the meter's probe to a test point farther back in the protection circuitry and set up the meter for another single-shot trigger. Not much later, the transmitter

THE NEED FOR BALANCE

In the communication industry, balanced lines are often used for signal and power transmission because the balanced configuration helps eliminate noise from the transmitted signal. When it is necessary to use electronic test instruments to view signals on balanced lines, the instruments must also be balanced. Using unbalanced instruments to monitor balanced lines can result in serious problems with electrical noise: the noise picked up by unbalanced instruments may corrupt the observed signal and introduce noise to the circuit under test.

Figure 3 shows the basic configuration of a balanced transmission line. The line is said to be balanced because the electrical impedance from like points on either line to ground is equal. The signals carried by the two lines are equal in magnitude but opposite in polarity. Most electrical interference is induced equally in both wires, producing signals that cancel in the load at the output.

Introducing an unbalanced test instrument to a balanced transmission system upsets the impedance in the system. As a result, noise is not developed equally on both lines and will not cancel itself out entirely. This noise can show up on the instrument's display, making the display difficult to interpret. The introduced noise can also cause failures in the circuit under test.

A balanced test instrument has characteristics similar to balanced transmission lines: the inputs of a balanced instrument have equal impedances in reference to the common point between the inputs. Such an instrument can be used in a balanced transmission system because the instrument does not upset the system's balance of impedance.

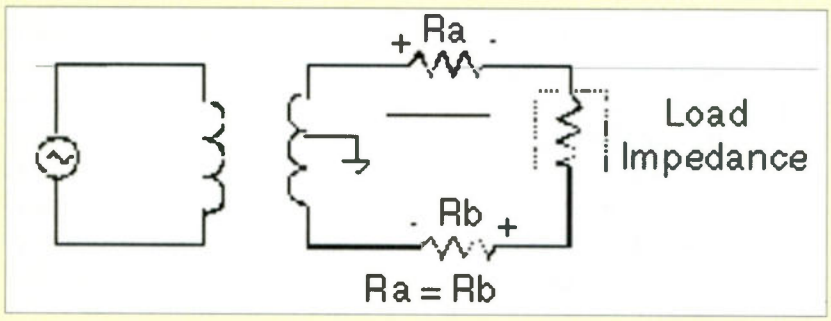


Figure 3. The balanced transmission line has equal impedance on each side and carries signals having equal magnitudes, but opposite polarities.

failed again and Finch had another stored waveform to analyze. After repeating this process several times, he traced the fault to a corroded connection in the sensing circuit.

"The vibration from the power-supply fans was causing the connection to open up now and then," said Finch. "This would cause the protection circuit to think that the transmitter had lost part of its power supply circuit, so it would shut down the power supply."

SAVING SIGNALS, SAVING TIME

Finch's work at KSL Radio frequently involves tracking intermittent problems in electronic circuits—a job best aided by a storage oscilloscope. Radio broadcasting equipment, with its need for constant, high-power and critically timed communication circuits, is especially prone to failures caused by intermittent glitches. Using the portable storage oscilloscope, Finch has stored waveforms that have helped him find faults both internal and external to the station.

"We've had problems with transients on power lines," he said. "The power company claims these don't exist, but when we put the scope on the 480 V input line and trigger on voltages above a certain point, we see all kinds of things."

In an industry where every second counts, the ability to view, capture, and store waveforms is crucial.

"Being able to make balanced measurements with a scope has saved us hours," said Finch. "And we save hours using the storage feature for catching glitches. We once had to come up with time-consuming schemes in order to hook up our scopes. Now we can measure lines immediately."

Though success in radio and TV is most often measured by the size of the listening audience, saving seconds in lost air time and hours in troubleshooting time can help keep a radio station on the air by improving its bottom line. db

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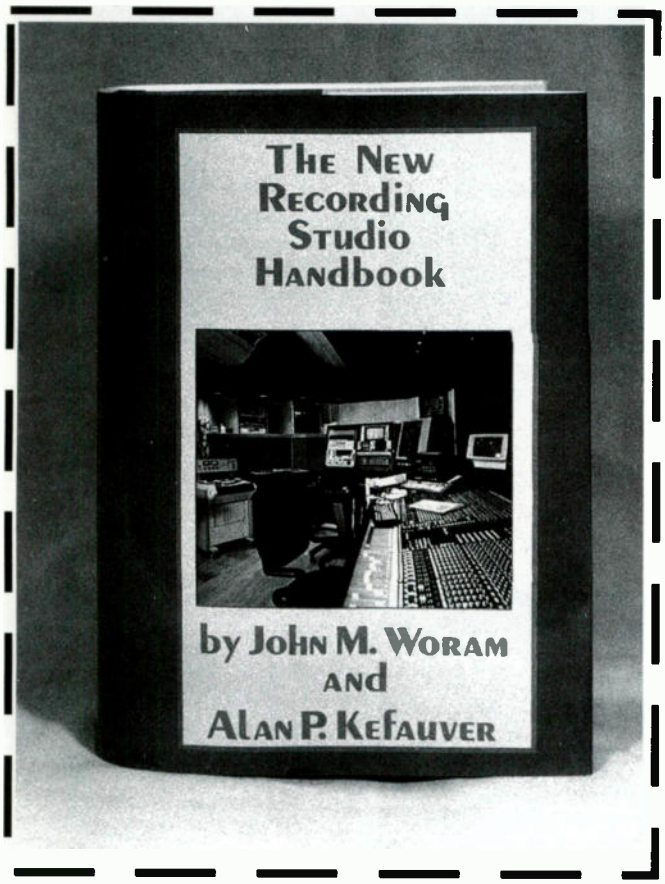

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A Multi-Media Future

D. Joseph Doyle

Last October's AES at New York's Javits Center was a milestone in the rapidly growing fields of "multi-media," but January's meeting of *MILIA* in Cannes, France, was the measure of just how fast things can develop. For one thing, compact disc storage using Philip's CDI (Compact Disc/Interactive) was shown with a new full-motion video capability. Philips also owns the underlying patents for audio CDs. It is obvious that in the very near future, popular musical artists who use MTV or similar broadcast venues to market their recordings and touring careers will be including these videos on their CDs. In addition, a whole new boost will be given to location recordings of live concerts. This latter will also provide material for classical, jazz, folk and other kinds of music.

But, as always, there is a good deal of controversy over other candidates to fill this niche, other than CDI. One leading one, the Japanese entry 3D-O, is backed by a consortium of the heavy-hitter corporations who are approaching this from more of an expanded video-game point of view. Like Beta versus VHS a generation ago, there is likely to be only one survivor.

On the other hand. there may be a third possibility. The attraction of both CDI and 3D-O is in its ease of use by the consumer and the power of each of the developers to market the players to the public. From a pro-audio point of view, it would be disastrous to purchase all the equipment for one format only to find another the dominant player. Yet both are really just flavors of CD-ROMs with consumer-friendly overlays to allow people to play back audio CDs on the equipment or to use a conventional television screen (PAL, SECAM and NTSC compatible and interchangeable) as a monitor.

Since these technologies were

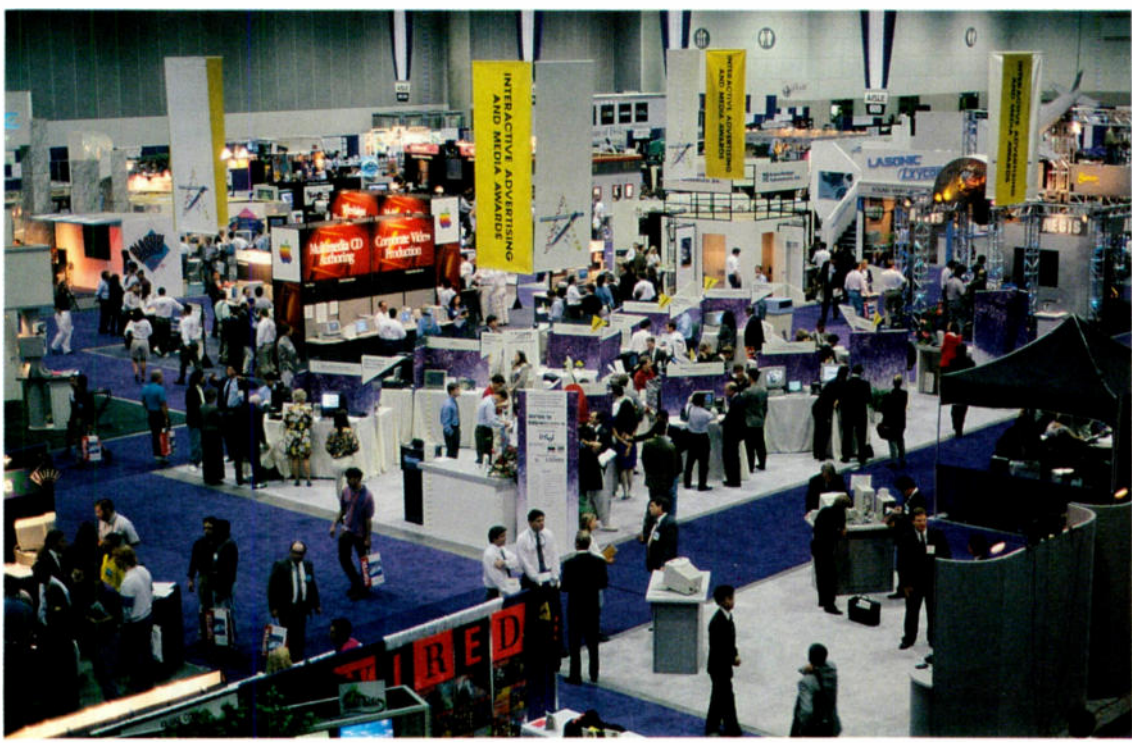

Figure 1. One view around the MILIA convention.

Figure 2. Another view of the convention.

first developed, the cost of computers has continued to drop. When cost is compared to memory and speed, the cost of a CD-ROM system is in free fall. According to the Link Resources Group, over eight million CD-ROM computer units will have been purchased by American households. Perhaps in five years, the increase in computer power and the decline of costs in absolute and real terms, will set the market in that direction.

These questions stalked all the participants at MILIA. Companies were staking their futures on their judgment. My personal view is that the CDI will probably be adopted on a consumer level and that CD-ROM will also succeed for the higher-end user. For this to become true, the cost of the consumer CDI units with full-motion video cards has to come down considerably. This will require a commitment from Philips to support the technology.

Figure 3. At MIDEM, Ted Cohen of Philips hosted a well-attended session.

As if this conflict was not enough, large computer firms, such as Apple and Microsoft, are also prowling through this market and were quite prominent at MILIA. Also present in greater or lesser capacities were broadcast cable and telephone companies such as France Telecom, Turner Broadcasting, Disney, the BBC and AT&T. Each, of course, had its own angle and target niche.

Some of the producers of programming have plunged ahead and are establishing their catalogues even before the hardware market is settled. Among the leaders was Voyager of California with a nice line of interesting software, *Penthouse Magazine*'s interactive pornographic *Photo Sessions* brilliantly done by Jerry Ehrlich, and an Italian presenter called *Opera* who has a multimedia project coordinated by Umberto Eco about the Seventeenth Century, combining narration, still image, text and CD quality music.

From an audio-recording point of view, all of these projects involve choice. The expense of trying to combine previously incompatible equipment will be a growth industry. "Open systems" has become a buzz-word in the computer industry and should be a watch-word for all those contemplating spending the sums necessary. Microsoft announced at MILIA some new alliances, including some involving 3D-O, which seem to be working in that direction. Microsoft, with its proprietary involvement in MS/DOS and Windows, has the advantage of already having a large and diverse client base. It has the disadvantage of being everyone else's competitor.

In short, the first annual MILIA was a measure of the state-of-maturity of multi-media. Next year's MILIA promises to be that much more involved since it reflects the

state of the industry. As it is operated by the Reed Organization and headed by Xavier Roy, who is also responsible for the well-known MIDEM show, a seriousness-of-perspective is assured.

MIDEM itself followed MILIA only two weeks later. MIDEM has been staged in its Cannes location for the last twenty-eight years. It is the largest international marketplace for music publishing, licensing, and distribution, particularly for independents. It too had a large multi-media component. For example, Peter Pan, a children's music company from New Jersey, announced its first interactive titles while seminars were conducted, to introduce multi-media to longtime music professionals. Ted Cohen of Philips Interactive gave a well-attended panel on CDI.

By the end of MIDEM, a sort of consensus among recording company people emerged. Roughly it went like this: CDI has the edge in Europe; Philips is European and has strong distribution-wholesale-retail consumer connections. 3D-O will be stronger in Asia; it's a Japanese product and has come out of a development process that reflects the video-game origins of its developers. The most important battleground is North America, where the war will be won or lost, and is still undecided.

Finally, pro-audio people getting involved in joint ventures in multi-media should track the controversy surrounding the U.S. Patent Office's decision in the Compton's patent case. It was the subject of an extraordinary series of public hearings in San Jose, California, and Washington.

In a nutshell, if a patent can be issued for this kind of software design, there will be very serious legal hurdles for anyone trying to market new products in the field.

I will update **db**'s readers on this and other multi-media issues following the National Association of Broadcasters Convention in Las Vegas and the New Media Expo, operated by Comdex Organization's Interface Group in Los Angeles next April. The Patent Office is expected to make a final ruling by that point.

Stay tuned! db

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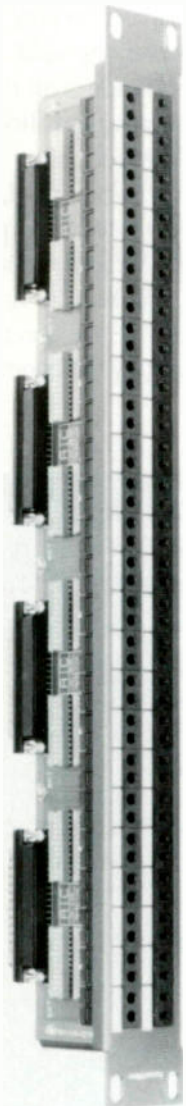

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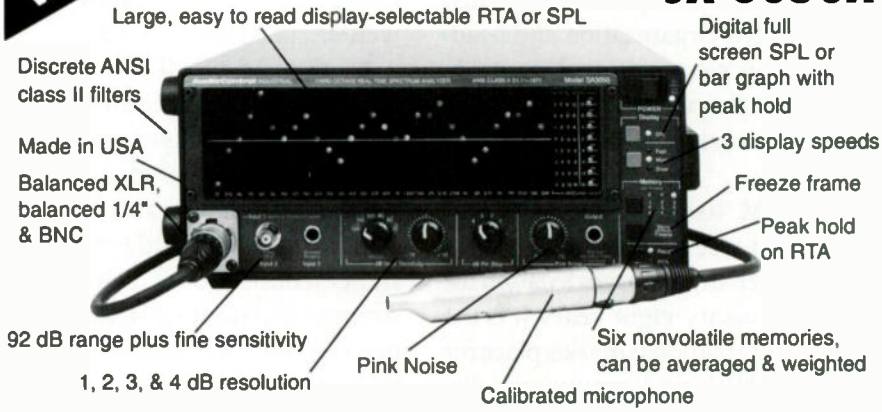

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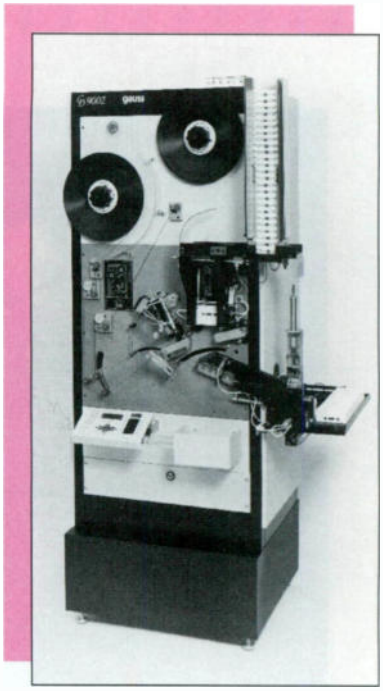

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Multi-Media at the NAB Convention

The National Association of Broadcasters' Conference is a large and well-run conference of over 250 sessions and exhibits covering sixteen football fields. It is the largest forum of radio and television management, engineering, broadcast law and regulation, and high-definition television.

Matt Dougherty

The NAB '94 (March 20-24, Las Vegas) introduced multi-media as an adjunct conference, with the Interactive Multimedia Association (Annapolis, MD) as its co-sponsor. Three subjects caught my attention: compressed digital audio, compressed digital video, and multi-media production.

One of the greatest areas of contention I noted was at the session on digital audio workstations concerning compression algorithms. There are two types of digital compres-

Matt Dougherty is based in Houston, Texas.

Figure 1. A typical view at the NAB. Photo by Atwood Convention Photography, Overland Park, Kansas.

sion, *lossy* and *lossless*. Lossless is able to faithfully reconstruct the original. Lossy compression, inherently, is unable to exactly reproduce the original. Lossless can obtain 4:1 compression and lossy can obtain 80:1 or more. The Adaptive Delta Pulse Code Modulation (ADPCM) is the most common audio compression and the Motion Pictures Expert Group (MPEG-1) is soon to be the most common video compression, which incorporates ADPCM.

The crux of contention concerns the psycho-acoustic model and how significant the loss of audio quality is using ADPCM. The mathematics, the physiology and the physics are complex, but ultimately it comes down to a consensus of subjective analysis—does it sound right? There was agreement that you should use ADPCM as a final step in production, not at the front end.

There is no substitute for direct personal review: I have heard it. I have average ears and I find it acceptable. What can be said about it is that ADPCM is being positioned and will probably be around for some time.

Video compression working within the framework of the 150kb/s compact disc is a done deal. Incorporated in the Philips white and green book specifications and defined in the International Standards Organization specification 11172, known as MPEG-1, it is a lossy compression both on the video and audio side. I have seen excellent and horrible MPEG-1 compression, variability due to original material and compression decisions made. Unlike ADPCM, MPEG-1 has a wide variety of parameters that can be adjusted dynamically at the time of compression by a technician. Average and excellent compression is usually ranked in the VHS and SVHS range. MPEG-1 audio quality is referred to as "compact-disc like," operating at 44.1 kHz stereo. Philips'

There is no substitute for direct personal review: I have heard it. I have average ears and I find it acceptable.

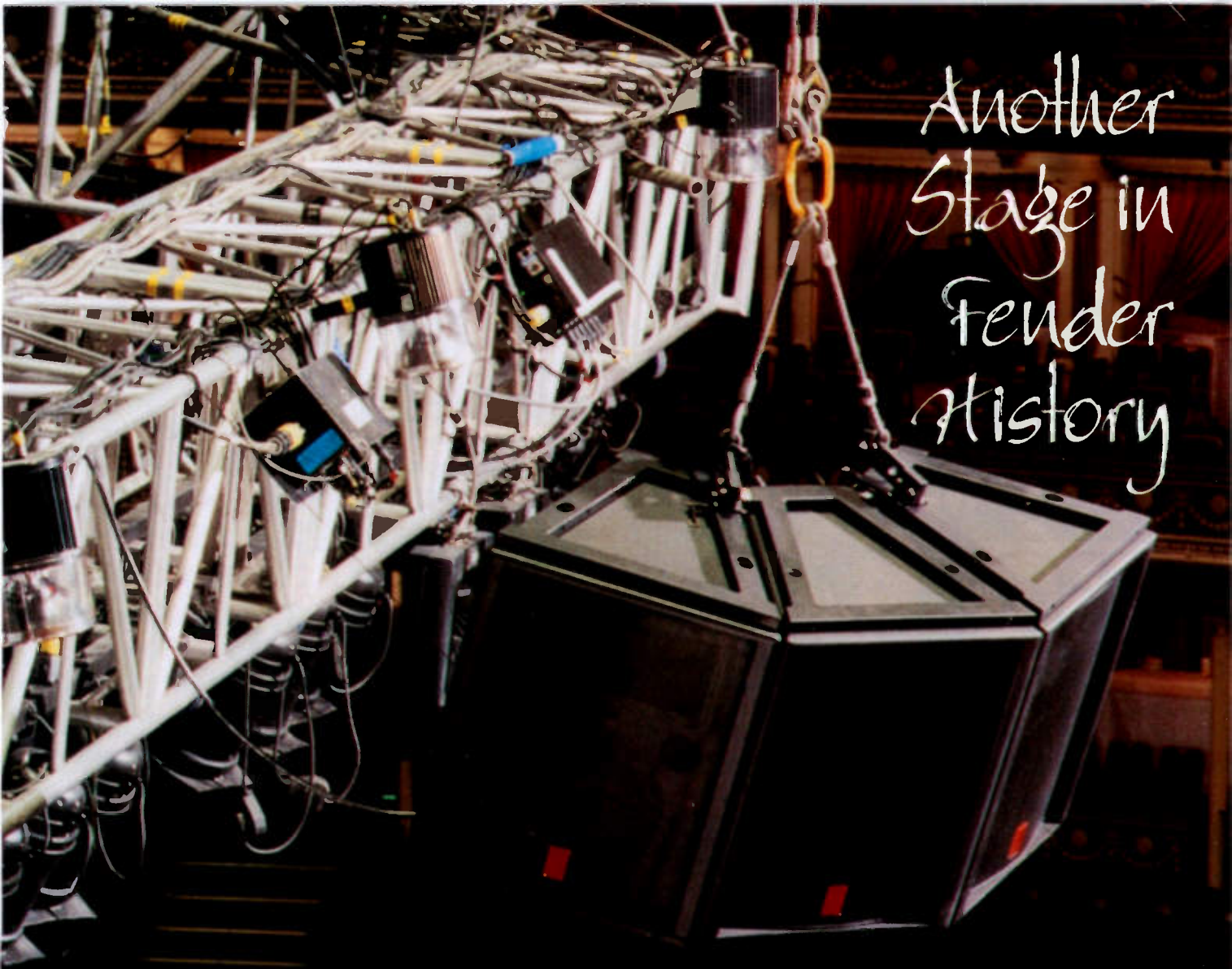
CDI format is capable of 32 simultaneous audio channel, which could be useful for multi-lingual production. MPEG-1 is also capable of four simultaneous video streams, allowing a user to select which camera to view. The next step, MPEG-2, is being positioned for the mechanism of HDTV using higher bandwidth and will be backward compatibility to MPEG-1. On the commercial side, the HDTV "Grand Alliance" was announced. It is consisting of a consortium of Dolby Labs, ATT, Philips, Zenith, et al.

NAB Multimedia World was held at the Hilton, next door to the convention center. Avid Technology (Tewksbury, MA), major players in video production, demonstrated the Open Media Framework at various booths around NAB. With two hundred corporate supporters, OMF is intended to standardize the production world so that audio producers can work independently of other producers using the standard to digitally link up the edit decision lists, audio, video, etc., avoiding digital babel and increasing reliable multimedia production.

The home video games market is about $5B per year. The panelists noted that in the past audio played a minimal role, but with the tough games market, top quality audio is seen as a decisive element in a product that is successful. Because of the CD-ROM capacity there is no technical excuse not to use it; hence an expanding opportunity for pro-audio.

During the session on Multimedia Markets, a venture capitalist on the panel slammed Philips' CDI platform for a good five minutes, and repeated himself during the Q&A. I went to the session on CDI to see what deserved such banishment. Panelist Craig Rispin of Big Hand Productions (Dallas, TX) rebutted by saying "...everybody says CDI stinks, but we are very successful because of it." (Note: The company started three years ago with two college guys and currently employs a 20+ full-time staff.)

There are a lot of critics who would like to write this off. I don't think so. Considering the issues—money, position and power—it is highly unlikely that Philips would drop this nine-year project development during the year they expect to reach a million installed units. At the same time, CDI is grandfathered into the CD-Bridge standards and the players are integrated into CD-DA, Photo-CD, and CD-V. db



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The Return of the Harwell System

The Harwell System, spoken of in awe by live-sound engineers of the early eighties, has reappeared. For years these legendary loudspeaker systems toured the world with such stars as The Police, Supertramp, David Lee Roth, Whitesnake, Poison, Def Leppard, Judas Priest, Motley Crue, The Who and many others.

Shelley Herman

Designed by Roger Harvey and Tom Boswell, the Harwell systems were used primarily by TASCO, one of the premier British sound-touring companies. When TASCO opened their American division they imported several large Harwell systems for operations in 'The Colonies'. A few years ago TASCO decided to get out of the American market, and sold their U.S.A. operations and equipment to A-1 Audio of Hollywood, CA.

WHAT A-1 AUDIO RECEIVED

Along with the usual cases of microphones, amplifiers, cables, mixing desks, and a crew that speaks strangely and drives on the wrong side of the road, A-1 Audio became the owner of 60 stacks (180 cabinets) of Harwells. Over the years, some of the Harwell systems had been allowed to fall into a state of disrepair—blown speakers and drivers, broken cabinets, missing cables and other ailments. The A-1 Audio staff looked at the great pile of cabinets as somewhere between sound equipment and lumber.

But the legend remained and Al Siniscal, A-1's president, decided to invest the equivalent of a couple of major FOH consoles in refurbishing the system. Under the supervision of Arthur Kemish, Greg Price, Laurie Quigley, and Mike Sprague, the A-1 Crew restored the entire system to better than its original condition, not only replacing, repairing, and re-coning, but bringing all drivers into the 1990s with the latest cones and diaphragms. Each "stack" of four-way Harwells consists of three cabinets: A low-frequency front and rear loaded horn containing two 15-in. JBL 2226H drivers, with five feet of the horn in front of the speaker and nine feet at the rear, for a total horn length of fourteen feet. The quality of the "Z Horn" construction becomes very apparent when one of these 400-pound cabinets is moved. (See *Figure 1.*) The low/mid cabinet, with two Electro-Voice 12-in. speakers uniquely coupled to a proprietary horn that is foam mounted into the cabinet, weighs only about 275 pounds. The

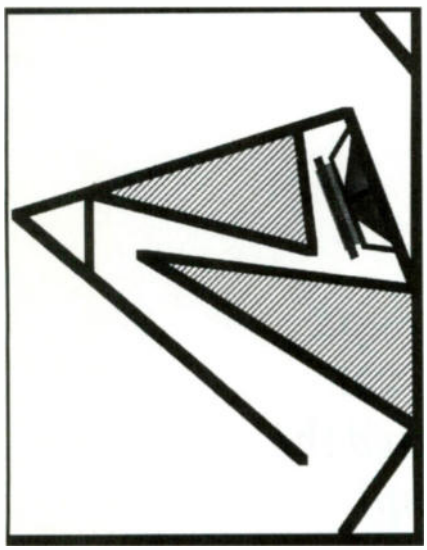

Figure 1. The low/sub, side view.

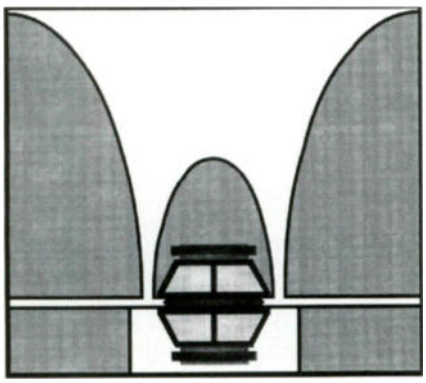

Figure 2. The lo-mid, top view.

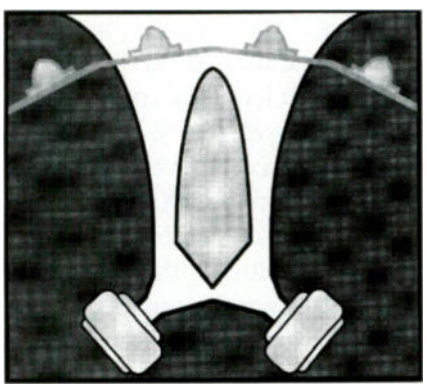

Figure 3. The high/mid, top view.

two 12-in. speakers are face-to-face, in phase, with a small tunnel connecting the resulting output to the horn (see *Figure 2*).

The high-frequency cabinet, weighing in at 300 pounds, contains two JBL 2445 drivers Y coupled to a specially-designed Harwell HF horn, and four JBL 2402/5 bullet tweeters, (see *Figure 3*). The hi-mid and lo-mid cabinets are the same size (24-in.H X 40-in.W X 36-in.D), and the low/sub cabinet is twice as tall (48-in.H X 40-in.W X 36-in..D), allowing extreme versatility in stacking and hanging. The special hanging hardware shown in the pictures adds to this versatility, allowing "checker-boarding" of cabinets for optimal coverage and superior sound quality.

CONNECTIONS

Speaker connections are by XL3, and all units are capable of flying with built-in and accessory hardware. However, it would be advisable to take a good look at the building structure before very many of the bass cabinets are raised. Each amplifier rack, which powers two stacks of Harwells, is 21-in. tall and holds three power amplifiers, usually Crown PSA2s but some have BGW 750Bs. The amplifiers are only loaded to four ohms, instead of two ohms, as is usually the practice. This results in less stress on the amplifiers, more power with less heat generated, and reduced cable losses.

Traveling carts for the amplifier racks hold three racks each, and have speaker distribution and an AC distribution system built in. These self-contained units easily roll into the trucks and stack for transport. *Figure 4* shows two of these traveling carts.

As crossover technology has pro-

Figure 4. Traveling carts for the amplifier racks

gressed hyperbolically since the 1980s, the decision was made to use modern crossovers, therefore Yamaha D2040 crossovers were selected for the refurbished system. Along with accurate crossover curves, this digital memory system provides position/time correction not previously available for the Harwell system. The entire system is protected from audio idiots and accidents by dbx limiter/compressors.

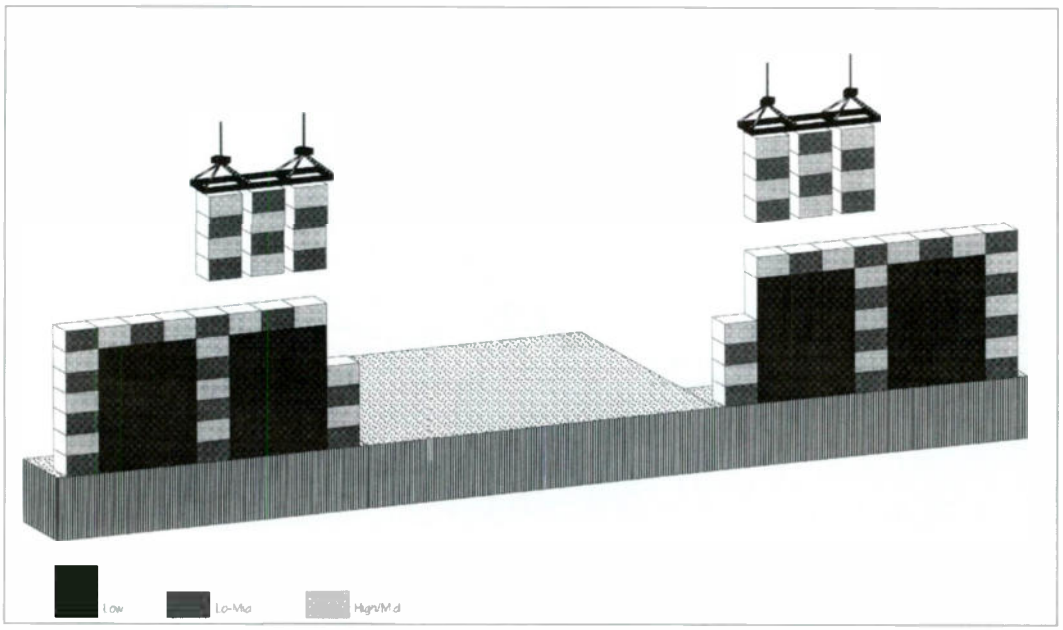

Figure 5. The Harwell G2 System as configured for FANFEST 1994.

Updating the components and crossovers to modernize the system, especially with time/position correction and modern crossovers, led the staff at A-1 Audio to dub the refurbished systems as Generation 2, and they are now designated Harwell G2.

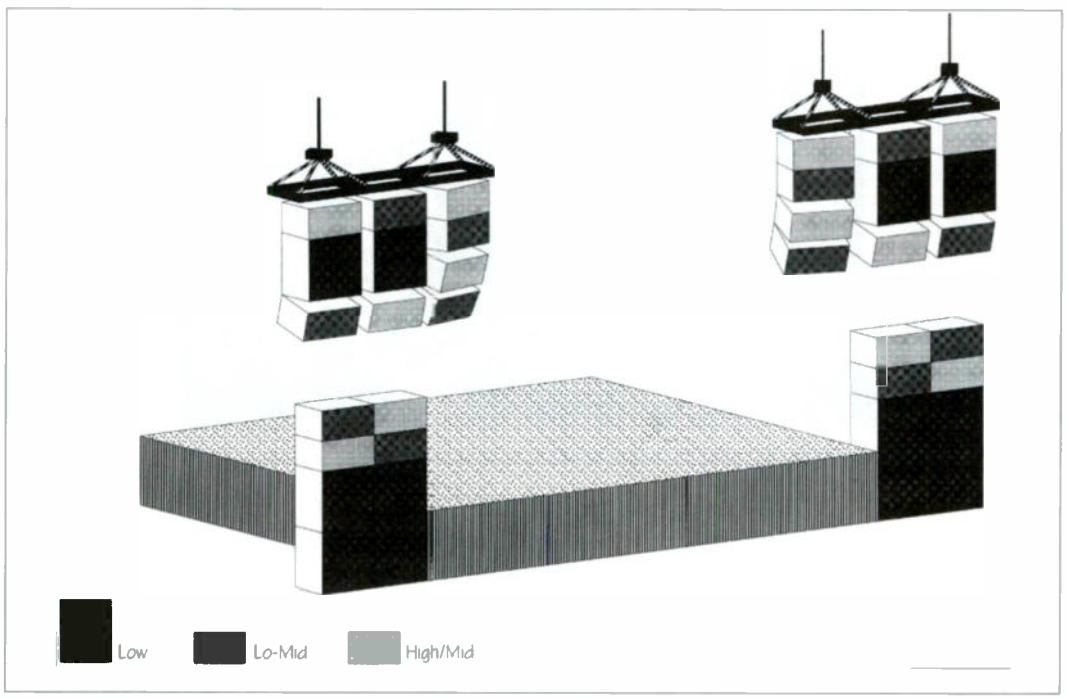

Figure 6. This is the Harwell G2 System at the Hollywood Palace installation.

THE SYSTEMS ARE TESTED

A-1 Audio has 180 cabinets (sixty stacks) of Harwell G2 speakers, and the decision was made to "bring them out" at FANFEST, a Country Music Jubilee held May 4-7, 1994 at the Los Angeles County Fairgrounds in Pomona, an hour-long drive from Hollywood. After careful consideration it was determined that the entire sixty stacks weren't necessary for this application, so only thirty-six were sent. See the drawing of *Figure 5*. In

Figure 7. Layout of main FANFEST stage, taken from the stage.

Figure 8. View of the main FANFEST stage, as viewed from the speaker tower.

ing of *Figure 5*. In the interest of consistency, all the systems sent to FANFEST have JBL LF speakers and PSA2 amplifiers. Another twelve systems have been installed in the famous Hollywood Palace Theatre. Those twelve have Gauss drivers in the LF cabinets and are driven with BGW 750B amplifiers.

The remaining twelve systems are awaiting assignment. They will be powered with Yamaha PC4002M amplifiers. The Hollywood Palace installation is shown in the drawing of *Figure 6*.

The main FANFEST stage was at the west end of the racetrack, aimed down the middle of the track infield, slightly toward the grandstand. The usual grandstand seating wasn't used because a rodeo, held in conjunction with the concert, blocked the area that would normally be used for the stage. The layout can be seen in *Figure 7*, viewed from the stage.

When we arrived at the fairgrounds, the festival was under way. We entered the racetrack area from the end opposite the stage and stopped for a moment in the grandstand, almost half a mile from the speakers.

As we entered, there was no activity on the stage, but soon an announcer, and then a band, started to use the system. The sound was *awesome*. At that distance, the SPL was well into the 80s, with full bandwidth. We sat there openmouthed, amazed at the level and quality of sound we were hearing from so far away. Our first reaction was to check some fill speaker systems that were placed closer for the rodeo, but we learned that they were off. We proceeded to the con-

Figure 9. Main stage speakers are located behind the scrim.

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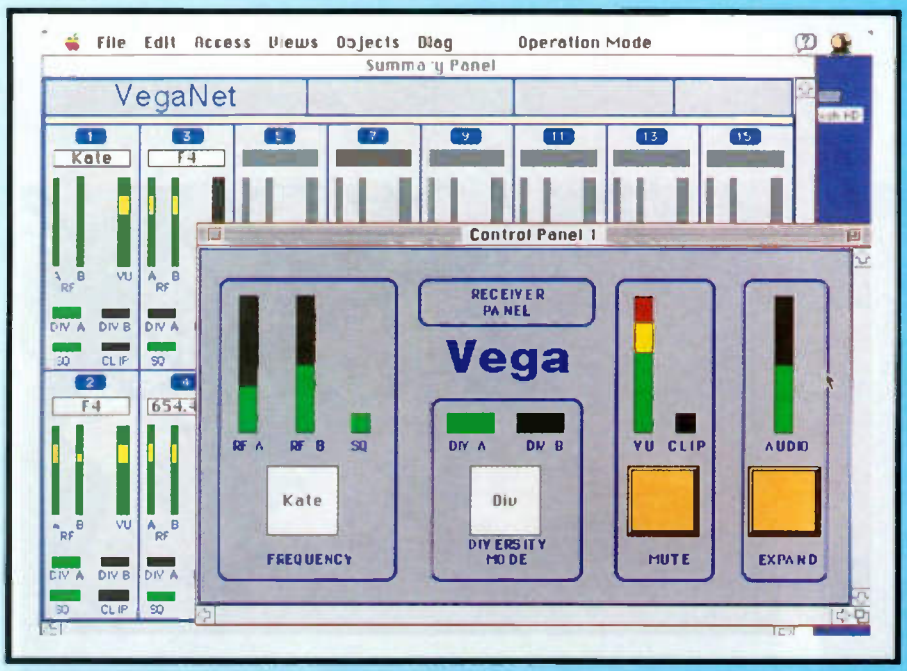

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Gain complete control of your wireless-microphone system. Remotely control and monitor all of your compatible Vega wireless-microphone equipment via VegaNet™. Using either Macintosh or IBM-compatible personal computers, VegaNet™ hardware and software provides a previously unavailable degree of control over medium to larger wireless installations.

With Vega's modular interface unit, you can expand from as few as two wireless systems to literally dozens easily and simply. Vega's NE-8 enclosure holds up to eight NE-2 interface modules, each of which provides control and monitoring interfaces for two receivers. If your needs grow beyond 16 systems, additional NE-8 enclosures can be added easily.

The control computer can be located hundreds of feet away from the receivers. Multiple display and control locations are easily accommodated. Even off-site control and monitoring can be implemented simply via standard data modems.

VegaNet™ software is available for Macintosh computers running System 7 or PCs operating under Windows 3.1 or higher. In addition to VegaNet™ hardware and software, a complete system requires Lone Wolf's VNOS™ operating-system software, a network interface bridge (both available separately), and a Mac or PC with the appropriate system software.

With this system you can generate customized display and control screens without programming, using almost any paint program. The "drag and drop" feature of Lone Wolf's VNOS™ operating system then allows active control and monitor elements to be "pasted" to the display. These custom panels are not limited to wireless equipment; they can integrate any of the other network equipment such as power amplifiers, EQs, delays, etc.

The system supports multiple active display panels, one windowed over the other or tiled on the screen. At your touch, hidden active screens can be brought forward for instant use. VegaNet™ is fully Lone Wolf MediaLink™ compatible and conforms to the AES draft standard for audio networking.

Get the whole story on this exciting new technology, whose applications are limited only by your imagination.

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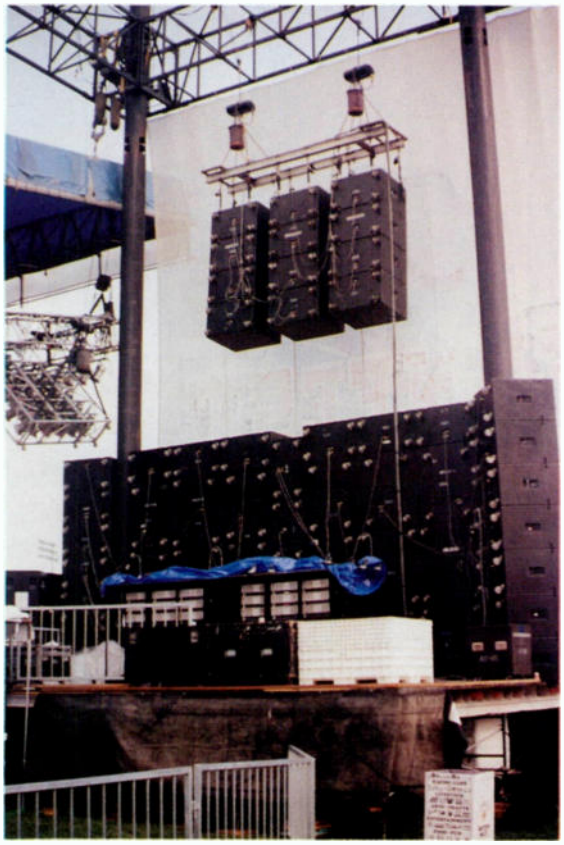

Figure 10. The entire layout that was on stage right.

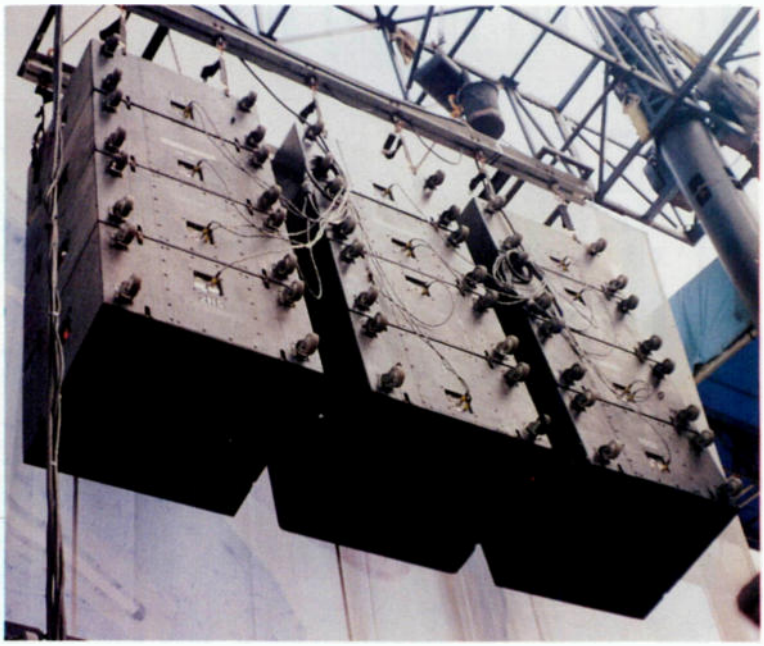

Figure 11. The stage-left flying speakers.

The concert was held during the day, when temperatures are warmer and drier and sound doesn't travel as well as at night when it's cooler and damper.

cert area and discovered that it sounded even better up close.

At the sound/light tower the level was about 100-105 dB SPL and Laurie Quigley, the operator, said "I've barely got it cracked open." Laurie said that he started out at rock and roll levels but the cowboys didn't like it that loud. At the end of the evening, just for our benefit, he turned up the system for a few minutes and one of those portable lavatories behind the tower almost exploded, with me in it! The system stayed clean (beyond the ability of my ears to do so.) Although this was C and W, there did not seem to be any need for sub woofers as those big wood horns were coupling the 15-in. drivers almost down to DC. *Figure 8* shows the stage from the tower, the Harwell G2 systems are behind the scrims.

Figure 9 shows the location of the speakers behind the scrim, and *Figure 10* shows the entire layout on stage right, including flying cabinets "checker-boarded" stacks, and amplifier racks. *Figure 11* is a close-up of the stage-left flying speakers.

THE NEXT TEST

After FANFEST the system was checked out at A-1's Santa Monica warehouse, then transported to Las Vegas for the JuneFest featuring REO Speedwagon, Greg Lake, Bachman Turner Overdrive, Blue Oyster Cult, and starring The Doobie Brothers.

JuneFest was held in Silver Bowl

Park, a soccer field, with over 30,000 people in attendance. The concert was held during the day, when temperatures are warmer and drier and sound doesn't travel as well as at night when it's cooler and damper. Because of the size of the venue, it was determined that only twenty-four stacks of Harwell were required. The sound was everything the promoters wanted—good clean coverage throughout the entire wide frequency range.

...much thought was given to loading the units in and out of semi-trailers

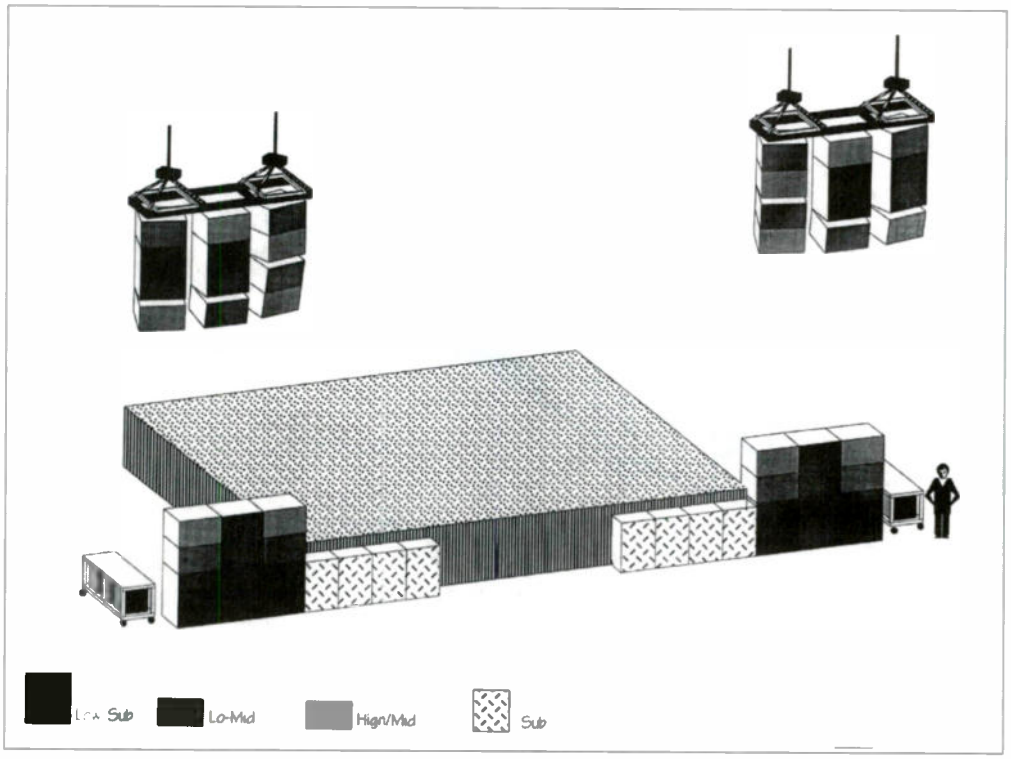

Figure 12. Harwell G2 System in a small arena or shed configuration.

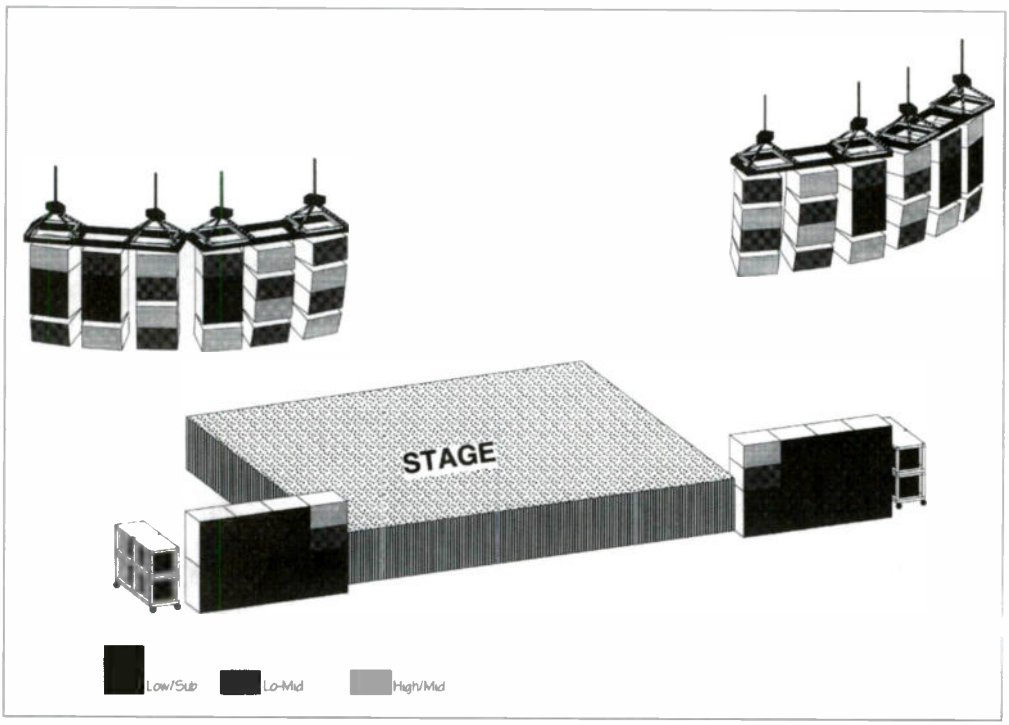

Figure 13. Harwell G2 System in a larger arena or shed configuration.

HARWELL CONFIGURATIONS

The Harwell G2 system can be configured for large or small venues in almost any type of building. *Figure 12* and *Figure 13* show typical configurations for the Harwell G2 systems, and it's important to note that should it be necessary, long throw horns or sub woofers can be added. As the Harwell System was designed by and for a touring sound company, much thought was given to loading the units in and out of

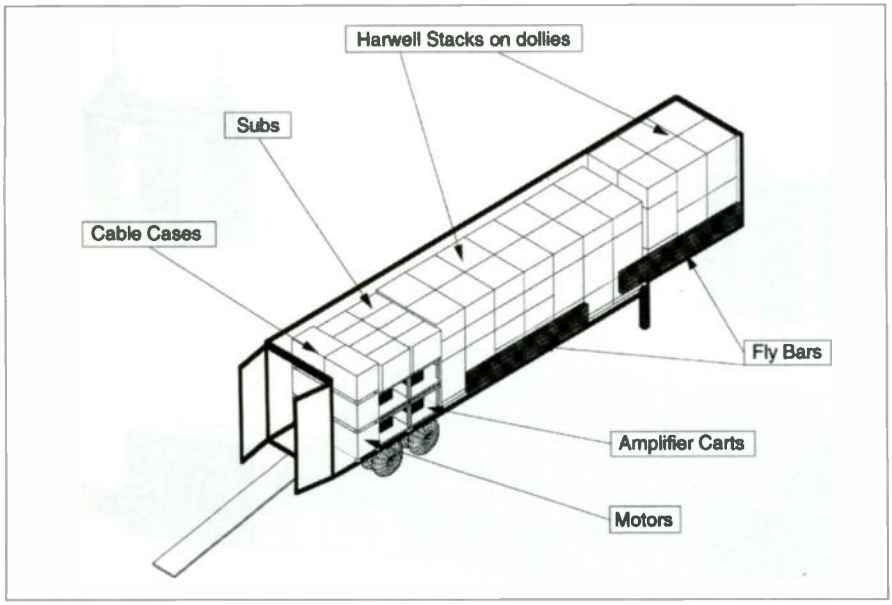

Figure 14. A sixty-eight cabinet Harwell G2 System truck-trailer pack.

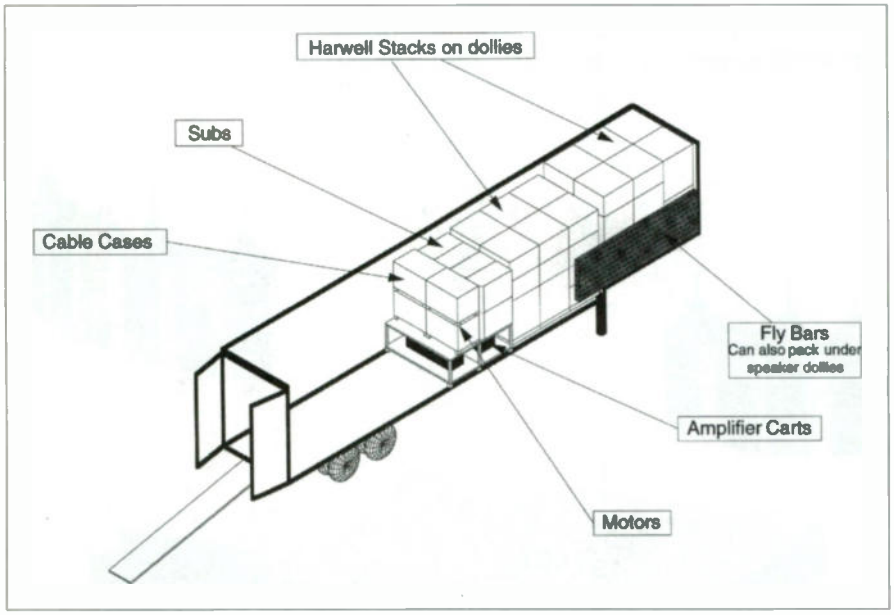

Figure 15. The forty-four cabinet Harwell G2 System truck-trailer pack.

semi-trailers, packing density, and moving the equipment with minimum damage to the systems and personnel, all in the least amount of time. The amplifier carts permit rapid setup and breakdown.

Because all of the loudspeakers have the same footprint and are multiples in height, dense packing of the trailers is possible, preventing shifting of the units. As all cabinets and racks are provided with heavy- duty casters, moving the systems can be done with a relatively small crew. The drawings of *Figure 14* and *Figure 15* show how the above systems fit into semi-trailers. Notice that even the custom-designed flying hardware fits into the trailer.

Roger Gibbons, who was part of the TASCO staff when the Harwell System was introduced, said that originally four stacks were built for Elton John. On their first outing they proved such a hit that TASCO literally locked Jeff Easterby (the chief carpenter), Martin Hopton, and the TASCO staff into the factory for the time it took to build enough units for the next tour. In all about 130 stacks were originally built, research has uncovered the fact that at least 20 stacks have been disassembled and no longer exist. Other systems have been sold to various people, leaving A-1 Audio as the owner of the largest quantity of Harwell Systems.

Because the Harwell systems have earned their keep over the years, A-1 Audio is able to make it more affordable than the latest and hottest brand new systems, a feature that promoters will appreciate. As the mixers and musicians hear the Harwell G2 in action, they will be beating down the doors at A-1 Audio to get the systems reserved for their concerts. The Harwell has had a great past with the superstars of the 1980s, and thanks to Al Siniscal's incredible foresight, it certainly looks like the G2's future can be even greater. db

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NEW PRODUCTS

PORTABLE MIXER

● This new M367 is a six-input, portable microphone mixer designed for professional applications in many situations. It features up to six microphones or line-level feeds and can be used with any balanced low-impedance dynamic or condenser mic. Note that this is an improved version of the best-selling M267, which continues in the line. The M367's low-noise circuit makes it 25 dB quieter than its predecessor and now makes the new unit applicable for use with DAT, recordable CD and additional digital formats. Other improvements include user-friendly LEDs and peak lights as well as 12- and 48-volt phantom power. The M367 retains all the features of the M267 plus input clipping LEDs, detachable power cord, two XLR outputs and a headphones monitor circuit. Frequency response is 20 Hz-20 kHz and the dynamic range is greater than 100 dB. It operates at 100-120 Vac and can be switched to operate at 220-240 Vac. Two nine-volt batteries provide up to eight hours of continuous operation, under typical conditions.

Mfr: Shure Brothers, Inc.
Price $795.00
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CROSSOVERS

● Three new models have been introduced. XR-Series II units all feature 24 dB per octave filters, and infinitely variable selection of crossover points, and well as both ¼-inch TRS phone jacks and XLR connectors on all inputs and outputs. The user can select the best filter performance for a particular need—Butterworth, Linkwitz-Riley, etc. A peak overload circuit monitors all critical points in the circuit to ensure low-distortion operation. A recessed switch on the front panel allows for either *normal* or *divide-by-ten* frequency selection, while adjacent status lights indicate the chosen mode of operation. XR-1001 is a stereo two-way or mono three-way crossover. XR-2001 offers stereo three-way, mono four or five, or even in a four-channel two-way configuration for bi-amplifying on-stage monitor systems. Four-way stereo needs are filled by the XR-4001 model.

Mfr: Ashly Audio, Inc.
Price: to be announced
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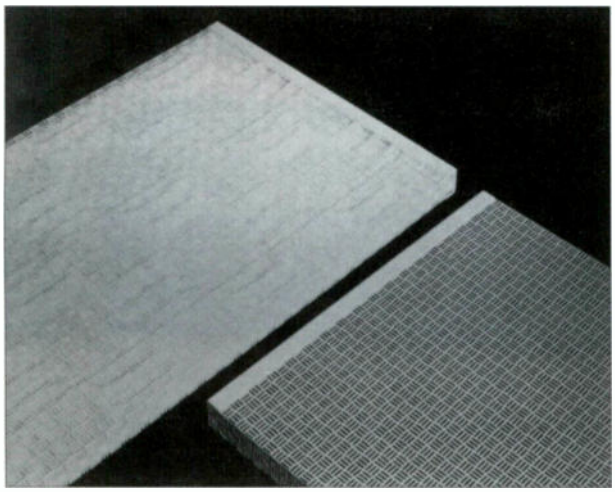

METAL NOISE ABSORPTION

● metalSONEX is made of lightweight galvanized steel, and provides for maximum absorption via a 50 percent perforation pattern with the use of fiber-free SONEX foam liners. The shell is designed to withstand the harshest industrial installations. The steel shell comes backed by 2-inches SONEX acoustic foam, or 2-inch SONEX-1, a fire-resistant melamine foam that meets Class 1 building codes. For damp conditions, the product may be treated with a PVC sealed acoustic element.
Mfr: Illbruck, Inc.
Price: dependent on quantity
Circle 52 on Reader Service Card

SMALL MONITORS

● The PBM 5 Mark II near-field monitor is nine pounds in weight and less than a foot in height. The box has a hard-wired crossover with hand-selected poly capacitors and air-core inductors. The drivers include an injection-molded polyolefin low-frequency driver and a soft-dome high-frequency element. There is rear porting, gold-plated five-way binding posts, and a removable grill. Specs include a 63 Hz-20 kHZ ± 3 dB.
Mfr: Tannoy/TGI North America
Price: $350.00 pair.
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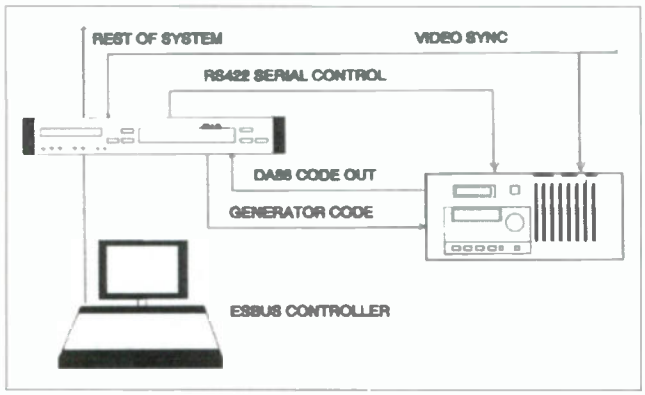

SDA 88 SYNCHRONIZER

● ES.LOCK software permits comprehensive control of Tascam DA 88s, permitting genuine multi-machine audio editing, effecting full integration of the machines and thus avoiding the problems associated with time-code chasing. The software allows rapid location and accurate synchronization with fully adjustable time-code offsets. Remote track selection can be effected across all eight audio tracks, subject to the installed controller software levers of each unit. Full control is achieved via the 9-pin RS422 control port, fitted to the optional Tascam SY 88 interface card. This accepts Sony P2 protocol commands, allowing the DA 88 to emulate a typical VCR. In essence, the ES.Lock module treats the DA 88 as any other serially controlled machine, using the RS422 connection to provide all transport commands.
Mfr: Audio Kinetics
Circle 54 on Reader Service Card

INTERFACE

● This new Audio World Interface combines a two-way recorder interface with switch selectable operation as a line amplifier or mono mix amplifier. There is balanced instrumentation amplifier inputs for high common-mode rejection, and electronic transformer-balanced outputs. The half-wide rack-mountable chassis includes LEDs to indicate mode switch position, signal presence, the onset of peak overload and power presence. The power supply is fully regulated.
Mfr: Benchmark Media Systems
Price: $225.00—optional rack mount is $35.00
Circle 55 on Reader Service Card

PRO-DAT

● SV-4100 offers several new features. These include: An instant start mode, external sync capacity, software-enhanced digital interface, optical plus AES/IEC digital I/Os, accurate PNO/Cue assignment, five programmable cue locations, programmable output level control, and enhanced system diagnostics. A remote controller, which plugs into the unit's parallel control port, allows the operator to select a target PNO and have the unit automatically cue to that location—ready for instant playback. Analog and digital output levels can be continuously adjusted between 0 dB and -14 dB, or select among four preset values (0, -2, -4, -6 dB).
Mfr: Ramsa/Panasonic Pro Audio
Price: $2,695.00
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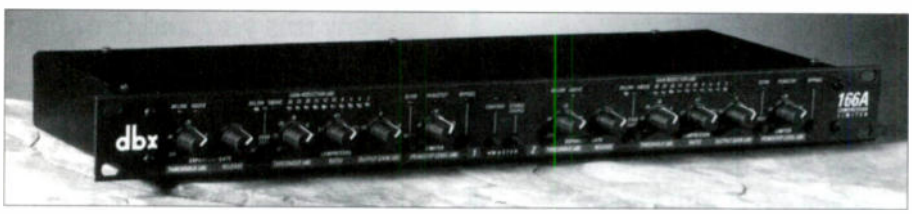

GATED COMPRESSOR/ LIMITER

● The166A Compressor/ Limiter/Expander Gate is a radical update of the classic 166. This new model is a two-channel stereo-linkable unit. There's a choice of the classic Over Easy- or hard-knee compression, two sets of program dependent attack and release time constants, a switchable low-frequency shelf in the detector circuit and Peak Stop limiting. New features include electronically balanced XLR and ¼-in. inputs and outputs, an all-new expander/gate design with continuously variable release time and 75 dB threshold range (maximum threshold +15 dB) and the mode switch selects from two sets of program dependent attack and release times to tailor response time for individual instruments or mixes.
Mfr: dbx Professional Products
Price: $549.00
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CALENDAR

- **Multimedia is busting out all over.**
- **Frost & Sullivan** has announced its First Annual **Multimedia Strategic Conference**. It will be held in Lake Buena Vista, Florida, on October 3 and 4, 1994. For more details about the conference write to **26524 Golden Valley Road, Suite 401, Santa Clarita, CA 91350, or call 800 256-1076; (fax) 805 298-3268.**
- The **NAB Radio Show** is about radio management trends, radio sales, radio programming and emerging radio technologies. October 12-15, 1994, are the dates. New this year, and running concurrently, will be the **World Media Expo** from October 13-15. This is expected to be a showcase for equipment, products and services. **Where?** Los Angeles, California. Contact the NAB **directly at 1771 N Street N.W., Washington, DC 20036-2891 or call 202 429-5350.**

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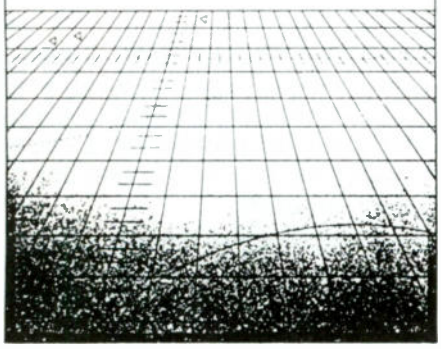

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PEOPLE, PLACES & HAPPENINGS

● **Doug Wood** has joined the sales and marketing department of **Otari Corporation** as its new Product Manager. He will oversee product development for both digital workstations and consoles. He previously held a similar position at Waveframe. In other changes, **Robert La Violette** is the new Sales Manager for Industrial Products. This includes high-speed audio and video duplicating systems and loaders. In still other news from Otari, the company announces its agreement with **Creation Technologies** of Vancouver BC for exclusive rights to market and distribute the **RADAR** (random access digital audio recorder) and associated products.

● **AudioTechnica** has new personnel: **Marc Lee Shannon** joins the professional products division filling one of three regional sales manager positions. Joining him in this position are **Tony O'Keefe** and **Kal Mullens.**

● **DOD** announces the promotion of **Wayne Morris** to executive vice president, sales and marketing. Formerly, Wayne held the position of vice president, international. He will now oversee all aspects of sales and marketing for the domestic United States market. He joined the company in 1984.

● At **XTA Electronics** exclusive U. S. distributor **Group I, Lloyd Kincade** has been appointed as national sales manager for XTA. He comes to Group I from several years with **Ringling Bros** audio department for the traveling circuses.

● A newsletter that recently arrived announced the ten year anniversary of **RPG Diffusor Systems Inc.**

● Perhaps not to be outdone, **Wireworks Corporation** is celebrating a year-long twentieth anniversary.

We wish them both a happy anniversary.

● **Synclavier** announces that they have signed on as a **Digidesign Development Partners Group**. The new generation of user interfaces will be compatible with Digidesign's Sound Tools II, Pro Tools, AudioMedia and Session 8., along with Synclavier's PostPro and Synclavier workstations.

● **Roland Corporation** has three new appointments in their professional audio division. In an announcement by **Bob Todrank,** division general manager, **Tom Stephenson** has been promoted to national sales manager from his previously held position as Eastern manager, **Laura Tyson** joins the company as Northeastern regional manager and **Grendal Hanks** is the new Western regional manager.

● **Kris Jackson** has been appointed as product manager of the new DAW-80 and Mediasound DAW, at Timeline Vista, Inc. He comes to Timeline from eight years as technical manager at **Trident Audio USA.**

Our Digital Audio Workstation Is Now Performing With The Following Groups

Soundstorm, Burbank

Gordon Ecker's busy facility (sound for "Black Beauty" and "The Fugitive") has a Foundation 2000 which controls and chases a JVC S-VHS video deck "beautifully".

Here's the fastest and easiest to use digital workstation available today. Dedicated editing buttons let you work at lightning speed, intuitively. Define a splice, cut it and play it back instantly. And Foundation's Removable Project Environment lets multiple editors work on a single machine.

Merrill Lynch, New York

Scott Kersey is the audio engineer who recommended Foundation 2000 for one of the largest private television networks in the U.S.

A low cost plug-and-play solution for in-house productions, Foundation 2000 integrates into an existing production set-up without any ancillary equipment. Need to bring in a free-lance engineer to work on a hot project? You can teach him how to operate this system in fifteen minutes.

Foundation 2000LS

Designed specifically for broadcast production, this random access recorder/editor features the speed, the ease of use, and uncompromising audio quality of Foundation 2000—for less than $15,000! It's the same dedicated user interface with touch screen display, real time operation, event based editing, wave form display, and expandability to a full Foundation 2000 at any time—the only workstation of its kind to offer this important feature. Test drive the high performance Foundation 2000LS in your studio. Call 1-800-7-FOSTEX or 212-529-2069 today to schedule a demo.

FOSTEX

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Our M267 Mixer is more than the best selling mixer of the last ten years. It's the most versatile, the most durable, and the best performing. You trust it in your rack – you trust it on the road. And while production environments have changed, your mixer remained the same. Until now.

The New Standard.

Our new M367 Portable Mixer gives you all the reliability and durability of the M267, plus a list of new features and improvements. We made it over 25 dB quieter with a low noise circuit — ideal for digital formats. We added two more mic line inputs, bringing the total to six. We added peak LEDs. And we gave it 12 and 48-volt phantom power for your condenser mics.

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Without increasing the size, we were able to pack in dozens of new features and improvements. The M367 has all the features of the M267, plus:

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- Headphone monitor circuit
- Output peak/limiter LED
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