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March/April 1992 Vol. 26, No. 2

db MAGAZINE

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THE RECORDING ENGINEER

THE SOUND CONTRACTING ENGINEER

AUDIO FOR THE CHURCH

THE ELECTRONIC COTTAGE

About the Cover

● Two pictures are on our cover. The studio shot is of SounDesign Studio in New York City. More of their equipment as well as what is in the photo is detailed in John Barilla's article beginning on page 14.

In the other picture, two students at the Peabody Institute are working with a new sound reinforcement tool. That article is on page 30

DEPARTMENTS

Letters

The Editor:

I would like to make a few comments about your article in the Jan/Feb 1992 *Electronic Cottage*.

I think the first point you should have made is that the mastering engineer is only supposed to transfer the *final mix* of a production to the next step in the process.

The expertise of the Mastering Engineer is in knowing, and understanding, the strong and weak points in "the next step".

If the next step is the cutting of a record master, he should be fully aware of the requirements of the acetate recording chain, from the recording electronics, the groove geometry circuitry, the cutter head, the acetate master material, the plating process, the 'Mother/Daughter' process, the effects of various record stamping processes, and the use of pure virgin vinyl versus fill.

He should even be aware of the problems likely to be encountered in the sleeving and jacketing process. It helps to also have an awareness of the complete chain of handling up to the point of final sale to the customer (you and me!!).

Of course, all of this knowledge is needed only so far as it goes to make the best possible record from the material supplied by the production team.

If the next step is tape duplication, he should equally be aware of the requirements of the 'dupe' chain. This involves awareness of the speed differential in the master reproducer and the slave recorders. High-speed duplication severely limits the amount of head-room available, usually requiring close attention to the equalization and levels on the dupe master. Real-time analog duplication has very few needs other than a faithful copy of the original final-mix tape. Digital duplication is another story that is not being covered so far in your article. But, again, it is only required to make the best possible record from the material supplied by the producer.

Keep in mind that I have no intention of minimizing the status of the mastering engineer. So many of them are an absolute necessity in this day and age. Without them, sound and music would be in a much sadder state than they presently are.

My point is that the mastering engineer is being required to act as *Recording Engineer, Producer, A&R man, Technical Director, Floor Manager, Studio Manager, Techie,* and even *Gofer*. The fact that most of them can, and do, carry out these jobs extremely well does not change the fact that other people are failing to do their jobs before coming to the mastering engineer.

Those of us who make their living as 'professional audio' people have a hard time teaching their clients/customers to do the right thing at the right time. Professional audio people can do a better job without magazine articles being printed that lead these same clients to a far different understanding of the process.

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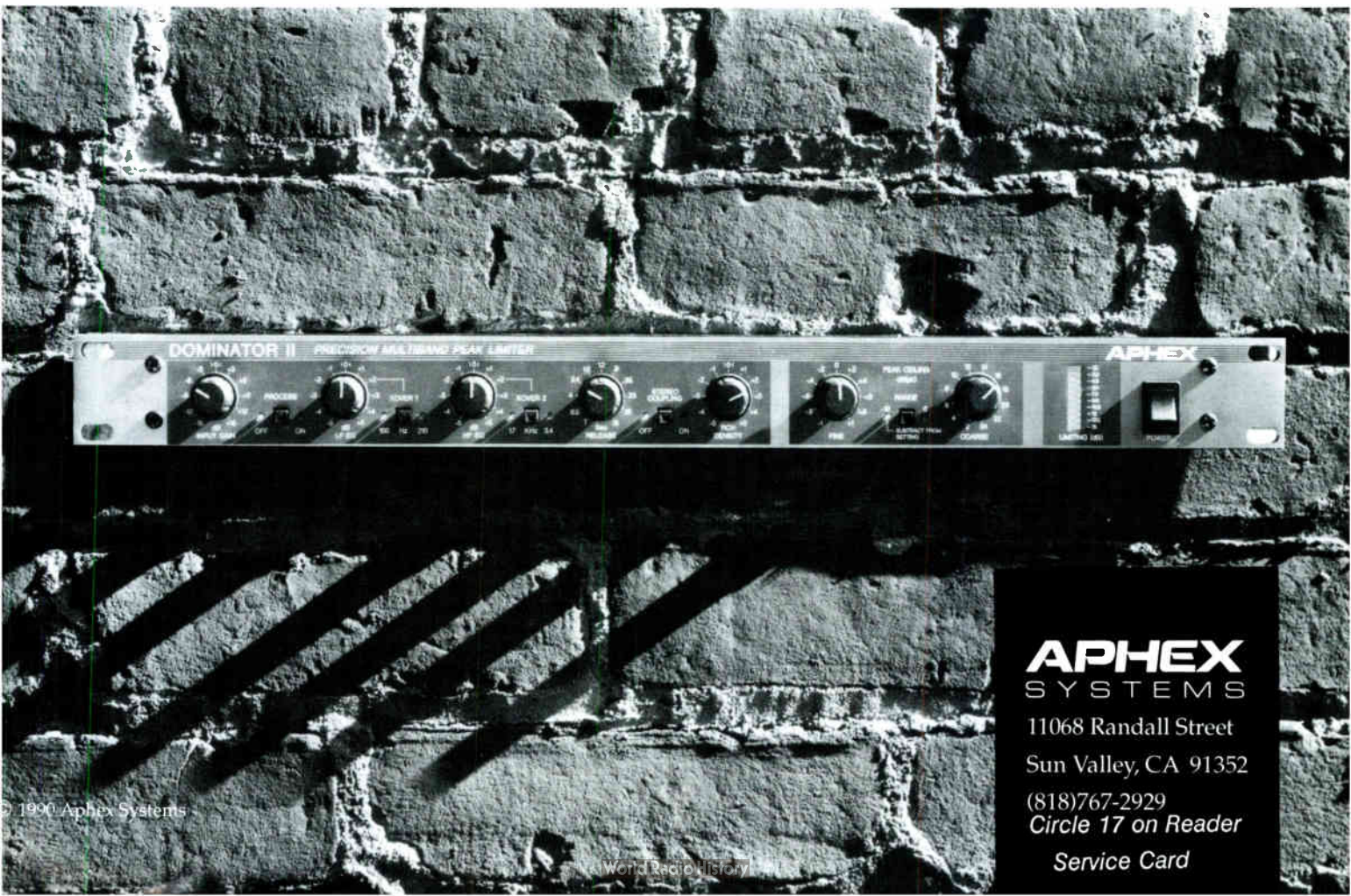

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The next point is brief. Your use of the term *exciter* should probably be *expander* or maybe *compander*. 'Exciter' is normally used in reference to equipment in the radio transmitter chain.

The next major point is regarding *The Mixer*'(page 20). I think your comments are generally valid, but I don't think the typical electronic cottage user is going to safely interpret your comments.

The design of almost all audio equipment is based on a specific set of conditions, hopefully being the *normal* operating situation. Using these normal settings will usually give the best operating point between noise and distortion. To mindlessly change the optimum setting that are suggested in the operating manual will tend to get the amateur into varied problems, most of which can not be undone by even the best mastering engineer.

As you obviously know, there are occasions when the optimum settings *should* be changed, but this is not to be done without being aware of the types of problems that can occur, and the effects of each of these problems. Only serious audio people can be expected to understand the interactions between various problems. Even professionals may find themselves unable to solve the problem presenting itself at any given time. Many years of experience and/or collective expert advice may be needed to come up with the real answer. And then the answer may only define the problem; it may not supply the solution.

I am afraid that we leave the cottage operators with the mistaken belief that *hits* are easy to make. They are continually being told that this or that new *wonder box* is the answer to time, money, and talent. This is the condition that is behind so many of our hit-maker studios going out of business. They are being used only as a last resort. All the easy recording and mixing is being done in basement operations. Only when they foul up, do they even think of any justification for the existence of the *big* studios.

In the same area of reasoning, the old-time equipment suppliers are being forced out of business. They cannot afford to supply all the technical knowledge, the demo equipment, the loaners, the endless after-sales-service, the continual phone calls, for stuff that is eventually being bought from mail-order houses, or the bargain shop, or 'we beat any price' cut-throats.

Making a decent profit has to stop being a dirty word.

Every studio, producer, mixer, engineer, supplier has a right to expect a fair return on his efforts. And every customer has a right to expect fair treatment as part of his purchase price. We all have to understand that 'you get nothing for nothing'.

Thanks for hearing me out. I wish you continued success with your magazine. I have been a subscriber since the first issue, way back when... Supporting the old-time magazines is another area I think we need to think seriously about. The new guy on the block may be okay, but the *initiators*, the *groundbreakers* deserve to be kept in business. (I bet you agree with me on that one!!)

Mel Crosby
Sequoia Electronics

Also, Recordist, Recording Engineer, Film Mixer, Audio Engineer, Sound Mixer, Master Engineer, Maintenance Engineer, Design and Installation Engineer, Radio/TV/Cable Engineer, Audio Recorder Service Engineer, *et cetera, et cetera,* and so forth!

John Barilla's Response

Thanks for taking the time to share your point of view with me. It is a valid one and I honestly understand the level of frustration you must feel as a professional audio engineer with miles of experience under your belt to be confronted by today's marketplace—where gadgetry is all too often substituted for real skill and artistry. But as you probably know, this lamentable state of human affairs is not limited to the audio business alone.

I observed a similar phenomenon happening to my father's business

during the seventies. After operating a professional lumber and building supply business for 40 years, he was greatly dismayed by the new generation of so-called lumber yards that were emerging. Dad had run a business that was based on high quality material and personal service—all at a fair price. He had served contractors and homeowners alike, giving them advice on materials, doing detailed estimates, helping to design their projects, and even custom milling materials to suit the job. But people suddenly started getting swayed by glitzy lumber supermarkets that sold inferior materials at bottom-line prices. None of the employees understood anything about the products they were selling. Consumers were actually getting ripped-off, but somehow they didn't seem to understand or care. It was a lousy payoff for a guy who had spent his whole life offering people quality. But for whatever reason, the trend did happen and there was not much he could do about it. So, after a fashion, you could say I do identify with your complaint.

Unfortunately, there always seems to be a price-tag attached to what people call progress. Look, for example, at the hideous cost to the environment and to the structure of family life that has been exacted by the single invention of the automobile. I am convinced that life would have been much more wholesome without it, but very few people would be interested in going back to the horse and buggy era. Technology seems to march on without any ethical restraint and I am as frustrated by this as you are. My hat is off to you for having the guts to sound-off about this issue. As far as I'm concerned, making a decent profit is not a dirty word! So I do appreciate your comments.

But I do have a few bones to pick with you relative to some of the things you implied in your letter. In general, it seems that you have somehow misapprehended the whole purpose of my column. In no way do I seek to put down state-of-the- art professional studios; I simply want to inform and encourage those who operate the smaller studios - those things that have been labeled "electronic cottages". At the extremes, there is a universe of difference between the pro studio and the cottage; but all is not black and white. Because of technological advance and its impact on culture and musical taste, there is a whole intermediate region of gray in which the distinctions are not at all noticeable. Fact is, Mel, many professional sounding releases are done in what you might regard as a less-than-professional studio. So how can I be faulted for inspiring people to grasp for an attainable goal of excellence - even though their equipment might be somewhat limited.

So much for my general apologia. I would now like to answer a few of your specific contentions. First of all, in my experience working with mastering engineers on my own productions and also interviewing them for the magazine, it has become clear to me that the mastering engineer does a whole lot more than you allow. True, it is part of the job description to faithfully replicate the given mix in anticipation of the final medium of distribution - be it record, cassette, CD or whatever. But the mastering engineer has come to be valued also as a sort of co-producer in the whole creative process - an important aesthetic link as well as a technical one - not only to salvage a bad mix, but also to make a good one better and more impactful. Some of the techniques that they use can be validly applied even in the realm of the home studio. And this, of course, is the purpose behind my articles. I make no pretense of writing a comprehensive guide on mastering techniques; I am not qualified to do that. My articles are only what they claim to be: "Hot Tips For The Home Studio".

Regarding the use of an "exciter", I am aware that exciters have been used in broadcast facilities for years. But recording studios and mastering facilities also use the process of harmonic excitation to enhance a mix. Since Aphex released its product on the studio market during the seventies it has been a legitimate color in the producers palette. These devices are now inexpensive and available to the home studio owner as well.

In defense of my somewhat unorthodox suggestions on console operation, please understand that I have never told anyone to abandon the use of a VU meter. I have simply stated that there may be more headroom available than they are using if they merely play it safe at nominal levels. In the electronic cottage every dB of signal-to-noise really counts. We don't have balanced inputs and outputs to help us out, so it follows that we have to be a little more adventurous if we want to turn out a competitive product. My advice always ends with the admonition to monitor the sound very carefully, so I don't think I am exhorting anyone to irresponsible engineering practice.

Well, I guess I've said what I need to say on this issue. I am hoping that you'll come to see that I am really not an adversary to you or anyone else who is a highly qualified recording engineer. I am simply trying to help intermediate level people grow in the knowledge of the audio craft and get the most out of whatever equipment they have in their studio. The general feedback I am getting from our readers, is that my advice is useful to them. This encourages me to keep on doing what I'm doing.

As you know, **db** has served the professional audio community for decades and we maintain our faithfulness to that important segment of the industry. But we also recognize that there is a growing segment of our readers who are getting into audio on an entirely different level, and we intend to serve their needs as well. We do appreciate your continued support of **db magazine** and your willingness to share your point of view.

John Barilla
Senior Editor

ED LEARNED

International Audio Update—The Dirty Dozen Brass Band In East Asia, 1991

Author's Note: Before I leave again (my West African tour with Pharoa Sanders runs from Jan.17-Feb. 25, 1992), I thought **db** *readers might enjoy a quick review of my recent completed tour of East Asia with the Dirty Dozen Brass Band. Unlike my previous tours of this region (see* **db** *Jan-Aug, 1991), we carried no sound equipment save microphones. Looking back on the planning, preparation, and execution of this tour gives a fascinating view of the psychology of touring audio; it's a topic that is seldom discussed, but you'd better believe it's important to your job security! The ability to gracefully handle adversity while controlling your own emotions is imperative for a touring engineer; when things go wrong, your attitude can set the tone for the whole show. The group's audio requirements, especially with respect to monitors, were not static; they evolved constantly, and this evolution often required a lot of diplomacy!*

AMERICA IS KNOWN AS THE WORLD'S ETHnic/cultural melting pot; New Orleans is certainly America's musical melting pot. Like gumbo, New Orleans music consists of many varied ingredients mixed together to form something wonderful and original; no two are alike.

Perhaps no group better personifies this than the Dirty Dozen Brass Band. The tradition of brass bands runs deep in New Orleans; Dirty Dozen embraces this tradition while at the same time remaining delightfully un-traditional. The musical palate of the individual members covers the full range of musical idioms; as band spokes-person Gregory Davis is fond of saying "no one can pigeonhole us, because there aren't enough pigeonholes to go around."

NO PIGEONHOLES

A typical Dirty Dozen performance might feature jazz, blues, R & B, reggae, and second line compositions, to name but a few. 1991 was a transitional year for this talented group. The winter months were spent recording "Open up (Watcha gonna do for the rest of your life?)", scheduled for an early 1992 US release. This CBS/Sony recording showcased a new maturity and confidence: for the first time, most of the compositions were penned by the group. The band maintained its usual rigorous touring schedule, which included an appearance at the prestigious New Orleans Jazz & Heritage Festival as well as several tours of Europe.

In the early fall of 1991, Dirty Dozen underwent a critical metamorphosis. I realized something was up when I visited the guys during their September visit to Detroit. There was no sousaphone, for years the bass signature of the group—an electric bassist filled in. I discovered that longtime members Kirk (sousaphone) and Charles (trombone) Josepf had left the band; they were eventually replaced by Keith Anderson (sousaphone) from the Rebirth Brass Band and Revert Andrews (trombone) from the Treme Brass Band. Change is one thing you can count on in the entertainment business; inevitably, a change in personnel also dictates a change in audio needs.

Initially, USIA planned to send the group on their East Asian tour not only without sound equipment, but without a sound man. Surprisingly for a group of their stature, the Dirty Dozen does not employ a regular sound engineer; tenor saxophonist Kevin Harris handles the role of tech director for the band. The group's technical rider contained a basic description of sound gear and a stage layout; at gigs Kevin would "direct" the sound techs and mixing engineer to (hopefully) obtain the stage setup and sound desired.

ONGOING PROBLEMS

This procedure worked moderately well for them, but Kevin confided that even in the most developed countries there were still problems. Let's face it, a band comprised of horns and drums exclusively is not something that the average engineer, steeped in Western-style pop music, can easily relate to. Certainly, one might expect the exposure level of East Asian audio engineers to this type of music to be even more limited. USIA tour co-ordinate Beverly Gerstein wisely realized this, so I was brought in as sound engineer for the tour.

Our itinerary included concerts in Papua New Guinea, Thailand, Indonesia, Malaysia, Singapore, Philippines, and Taiwan crammed into a five-week tour. Since we were going to be totally dependent on locally contracted sound equipment, I began immediately to construct a new tech rider for the group with the assistance of Kevin. We had to anticipate the changes in audio needs dictated by the addition of new

personalities, factoring that against what equipment would realistically be available in East Asia.

My experience with the Asian pro audio market revealed a readily available supply of quality equipment in most major cities; the drop-off in quality outside these areas was substantial, but I felt we could still find adequate equipment.

The trick was to ensure that we had the best equipment available in each location. One of the ways I tried to accomplish this was to be brand-specific when describing house and monitor speaker system requirements; yes, there are Meyer, Turbosound, Electro-Voice, Apogee, Yamaha, and JBL sound systems available in Asia. I also used my usual watts-per-audience-member formula to ensure that suppliers could accurately tailor system size to room size.

In terms of presentation, Dirty Dozen was louder than a traditional jazz group, softer than a pop group. I requested that Thailand, Singapore and the Philippines re-hire the sound companies used for the Wayne Toups tour of 1990; I knew what gear they had, and felt it would handle the needs of the Dirty Dozen. I also requested that each location forward a detailed list of the equipment procured for our use; unfortunately, this was not done. I would have to make my final assessment of equipment on-site, when it would be too late to do anything about it. I resigned myself to the fact that there would be those nights when our sound might be compromised.

CONSISTENCY

I've always believed that consistency in stage sound from concert to concert is the most important factor in maintaining a group's comfort zone over the course of a prolonged tour. I didn't have the option of carrying our own monitor system; it was a given that stage sound would be at the mercy of local equipment. I did, however, have a 50 lb. excess baggage allowance I could use for any specialized sound gear that Dirty Dozen might need. I decided, and Kevin quickly concurred, to bring along specific microphones; at least the same mics would be in the same place every night. Kevin had some very specific ideas about the mics he wanted in certain applications, and it was clear that the only way we could insure brand preference was to bring them with us. It was a good thing we did; the Dirty Dozen gave 20 performances on our tour, and only once were all the required mics available.

A well-balanced ensemble sound is absolutely essential to a horn-oriented group like the Dirty Dozen, but this implies more than just comparative levels: individual and complimentary tone quality are equally important. The word Kevin used most frequently to describe the sound he wanted was "warmth". A quick listen to any Dirty Dozen recording will reveal what he meant. Close-mic'd brass and reed instruments, bright by nature, can become overly harsh with the wrong mic selection. The rigors of international touring made dynamics an obvious choice for practical reasons; we both agreed that large diaphragm mics would help preserve the warmth the group craved.

MIC'ING

Kevin requested Sennheiser 421s for the tenor and baritone sax, tuba, and bass drum. I suggested the EV RE-20 for both trumpets; my experience with Don Cherry (**db** Mar/April 1989) proved this mic a great trumpet-warmer. The Dozen's occasional trumpet plunger effects were another consideration. When plungers are used, there is not only a drop in volume, but a drop in high frequencies. When the plunger is removed, both level and highs return. Mics with enhanced high-frequency response can exaggerate this; drastic tonal differences are often the result. I wanted to reproduce, not exaggerate; the RE-20s smooth response and tolerance to rapid level changes meant that I could. The trombone was another area of concern to Kevin; he definitely didn't want an edgy sound on it. I recalled my first experience working with the Dirty Dozen: Kevin asked me to roll most of the highs off the trombone mic. The frequent use of trombone to reinforce the low end of ensemble playing again dictated a large diaphragm;

I suggested an AKG D-12E. Many engineers use this mic for bass drum, but I'd use it before for trombone with excellent results. It has a very large diaphragm with great bass response; it doesn't have the greatest high frequency response. This was exactly the sound Kevin was looking for, so the mic's coloration would work to our advantage. The D-12E also could tolerate high spl, something I came to appreciate: Revert Andrews was a very *strong* soloist. The vocal mics were EV ND-457As with blast filters; I chose the ND series

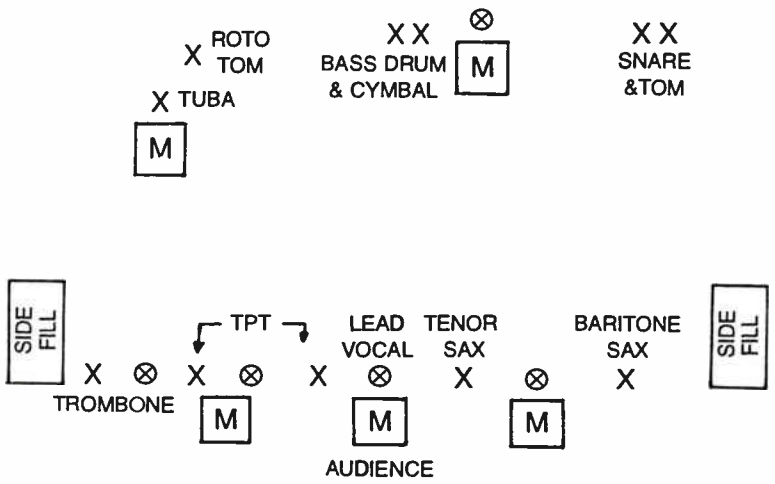


Figure 1. The stage layout forwarded by the Rosebud agency. Note that the coding is the same as in Figure 2.

microphones for their gain-before-feedback and their high output. I always wanted the vocals to be heard; with such high-output mic, I was assured of the hottest possible signal from the source. That's important if you cannot count on quality input pre-amps. The ND series also features excellent "reach"; I never had to worry about dignitaries who suffered from "fear-of-microphone" when making important announcements or introductions. Several group members would occasionally play small percussion instruments along the front line, and these mics certainly did the trick for area percussion pickup.

OTHER EQUIPMENT

This tour, more than any other I've done, involved interesting combinations of equipment improvisation and crisis management! The band's monitor mix situation was by far the most problematical for me.

As the tour progressed, the band's perception of what was necessary kept changing. No doubt this was because the equipment kept changing, but I also believe the inevitable growing pains of new members contributed. My presence contributed too: the band never had their own soundman for an entire tour, so there was that natural tendency to "build on the last gig" because of continuity.

I'm pleased that I could help everyone figure what might work best for them, and for the band as a whole, with respect to monitors. Compare and contrast the stage layouts pre and post tour. *Figure 1* represents the stage layout forwarded to USIA by the Rosebud agency (the group's booking agent). *Figure 2* illustrates what Kevin and I worked out before the tour commenced; it is what we forwarded to the individual countries in advance of our departure.

Figure 3 represents the rider I wrote for the band at the end of our tour, reflecting the knowledge gained about individual musician's needs; hindsight being 20:20, the group now has a rider which accurately reflects their stage sound needs. Unfortunately, we often didn't even get the three mixes we'd ask for, How we dealt with that, and how the monitor requirements evolved, was an object lesson in audio diplomacy.

THIALAND

Thailand was a representative stop: it featured both ends of the sonic spectrum. In Bangkok, our two performances featured systems provided by Yamaha/Bangkok. I mixed on a 32 channel PM-1200, with an array of outboard effects. The stage featured a separate Yamaha 2408 monitor console, controlling six Yamaha S2115HII stage monitors on four mixes. These were assigned as brass, reed, tuba, and Jenell mixes.

Chiang Mai was much more difficult: the venue was the same horrible concrete echo chamber I'd played

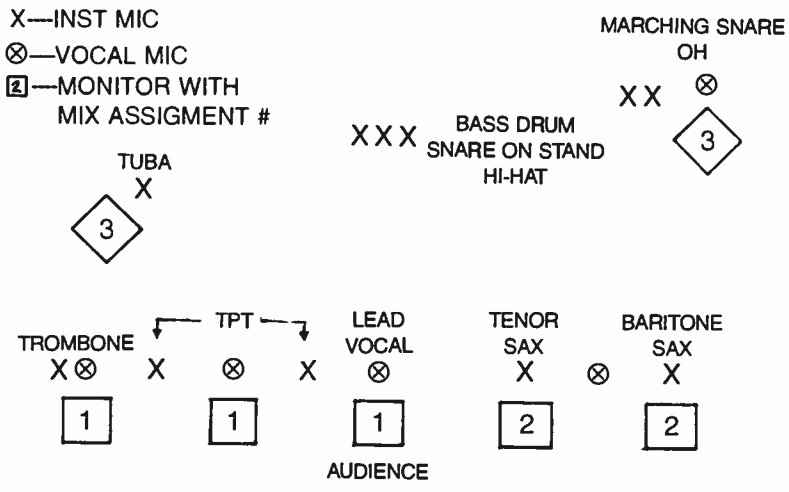


Figure 2. This is what Kevin and Ed worked out before the tour commenced.

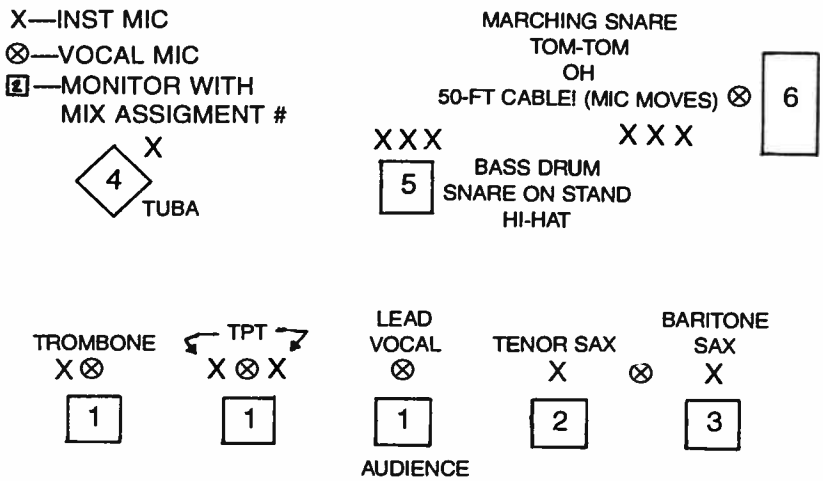


Figure 3. This was created by Ed at the end of the tour and shows what was really needed.

with Toups in 1990. We used the same PA, but the real problem was the monitors: only two mixes, and the six monitor cabinets were small, self-powered boxes, each with their own six-band graphic. That was all we had; not only were these monitors noisy, but they began to break up with any kind of real hot level or low-frequency input. Baritone saxophonist Roger Lewis in particular had trouble hearing himself; we could never get it loud enough for him, even after moving and elevating a wedge to point directly at him.

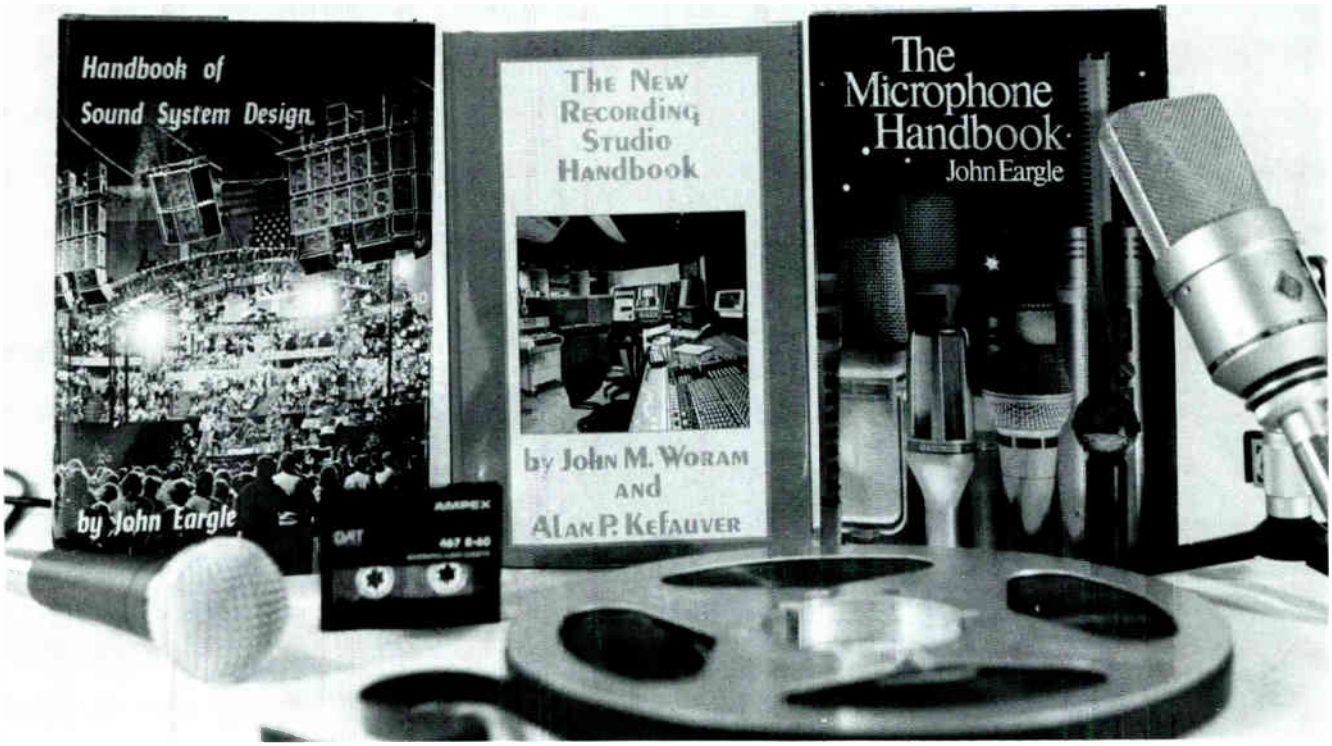
To make matters worse, the front line wedges were on a single mix, so increasing sax level only served to wash out the other musicians, pleasing no one. With the low-end problem, I couldn't get enough tuba anywhere on stage for even marginal satisfaction; drummer Lionel Batiste complained that he couldn't hear his bass drum. My only recourse was practical: I asked everyone to move closer to each other, hoping this would enable them to "hear" each other acoustically. In this concrete sandwich that was not easy; it was a difficult night for everybody.

There were eight wedges and a drum monitor, configured as eight mixes. Kevin and I went over early in the day to pre-set the monitors and mics.

Things did *not* get any better: the Songkhla performance was outdoors, on a temporary stage about 75 yards from the Gulf of Thailand. It was a beautiful setting for a concert, but the sound equipment was far from beautiful. There were no real "sound companies" to speak of in the Hatyai-Songkhla area. Our sponsors managed to find three different guys who each owned some sound gear; they pooled their equipment to form our PA. The house console was a 24 channel Peavey Mark IV. The house speaker system was a mad custom made monitor board with three mixes, and three pairs of different wedges. House amplifiers included some Peavey CS-800s, but the monitor amps looked to be built from kits.

With a lot of work, I was actually able to get a fairly decent sound with this stuff—that is, until the band hit the stage for sound check. Less than five minutes into the check, we lost four of the six monitors. At five minutes 'till "showtime" our crew only had four out of six working; at that point we could wait no longer, so we went with what we had. I did a fast five minute house and monitor check, which included totally reworking out two remaining mixes. The band coped admirably with these less-than-ideal circumstances, and responded by playing their best shows to date.

The ELAR Audio Library



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● *The New Recording Studio Handbook* by John Woram and Alan P. Kefauver is for everyone involved in recording. It is already established as the "bible" for learning all the basics of the recording studio operation. This includes the latest in the many kinds of noise reduction, analog recording, digital recording from multi-track to R-DAT, what they are and how you use SMPTE and MIDI time codes, signal-processing equipment, microphones and loudspeakers (monitors), and all about the new automated consoles.

● If you are a professional in audio and use microphones in any aspect of your work, you need John Eargle's definitive *The Microphone Handbook*. Among the topics covered are: Using patterns effectively, directional characteristics, remote powering of condenser microphones, sensitivity ratings and what they mean, proximity and distance effects, multi-microphone interference problems, stereo microphone techniques, speech and music reinforcement, studio microphone techniques, and so much more.

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Signature (required for chargecards)_____

JAKARTA

Our festival performance at the Jakarta (Indonesia) International Jazz Festival marked major progress in the group's monitor evolution. Even that was not without problems. There were eight wedges and a drum monitor, configured as eight mixes. Kevin and I went over early in the day to pre-set the monitors and mics. I stayed behind an extra hour and "sat in", mixing the Martin Speake Quartet at their soundcheck; this was a sax-guitar-bass-drum quartet led by alto saxophonist Speake. This gave me a chance to get comfortable with the house PA system (Turbosound TMS-3 and subwoofers); I noticed a radical difference between the left and right stacks. It had gone un-noticed to this point; steps were taken to correct the anomaly.

We certainly were getting smarter with each show: while we couldn't always get a dedicated mix, we made sure that Lionel at least had his own wedge.

Unfortunately, the stage crew neglected to properly chart their patching between bands, so when the Dozen returned for sound check I was greeted by a mis-patched mess. The monitors had not been properly restored either: mixes were coming up in the wrong place, and it took a good half hour to sort out. This did not improve everyone's attitude: I had to placate the band while trying to maintain an aura of patience and cooperation with the sound crew whom the band was ready to kill!

Eventually, we managed to sort everything out, and discovered the expanded mix situation offered some good solutions to prior stage problems. Roger had his own mix for baritone: now I could satisfy him with blowing everybody else away. Lionel had his own floor monitor and mix; he liked the added bass drum I could give him, but still complained about the lack of "feel", something I attributed to a small-woofer wedge in an outdoor situation.

I still had the patching problem to deal with. When the group returned to the hotel, I stayed and had a little talk with the stage and sound crew. There would be two groups opening for us, and I made it clear I did *not* want an encore mis-patch,

I showed the crew how to track their patching and monitor mix placement, marking every stand and wedge with tape numbers that matched complimentary floor markings. The sound crew appreciated my assistance and patience; they were trying hard, but lacked the experience to handle rapid consecutive set changes of dissimilar groups in a festival situation. My time was well spent: every other group on that stage had problems with patching except for the Dirty Dozen; our stage change came off without a hitch. The band played great, and for the most part they were happy with the stage sound.

Conditions throughout the rest of Indonesia varied: our Bandung performance found us limited to two mixes and six small wedges. After eight mixes at the festival, it was hard to change gears: the group's tolerance level was definitely frayed. I had to apply all my diplomatic skills at this show: I listened to everyone, tried not to take sides, and proposed options. When I felt things getting out of control, I tried to project an aura of calm assessment; whatever solutions I did propose were carried out *quickly and with projected confidence.* We actually managed to devise a single front line mix that everyone could live with by judicious monitor placement. The problem I could never solve here was Lionel's bass drum: he constantly complained about "no feel", and was quite angry with me after the show. I was feeling pretty frustrated, but Kevin, bless his heart, told me to hang in there.

Our next performance, in Yogyakarta, gave me the chance for redemption. We were back to eight mixes, which included two giant side fills, place upstage from the front line. I really didn't need these fills downstage at all (I had four wedges on four mixes available for the front line), so I moved them even further upstage for rear fill, with heavy bass drum. Lionel was like a kid with a new toy: he called me over and told me "this is what I've been looking for—I can finally feel the drum". My redemption did have a price, however: after the show, I got complaints from everyone else in the band about the bass drum being too loud! Kevin winked (I got the feeling that he'd dealt with this situation more than a few times), and told the

guys to direct their complaints to Lionel: he pointed out that I'd only been trying to satisfy him.

COMPROMISE

After Yogyakarta, I noticed a new spirit of compromise within the group. I think the band began to understand the consequences of individual monitor versus the common good. We certainly were getting smarter with each show: while we couldn't always get a dedicated mix, we made sure that Lionel at least had his own wedge. I always chose the largest available monitor (at least a 15-in. woofer) for him to preserve the "feel" he craved. When we were limited to less than three mixes, I noticed that backline players Keith Anderson, Jenell Marshall, and Lionel were increasingly sensitive to each other's needs. Jenell and Keith would tolerate a little more bass drum, Lionel a little more sousaphone. When the frontline shared a mix, Roger was able to adapt his needs to the general good of the front line.

PHILIPPINES

We did one show in the Philippines, at the Thomas Jefferson Cultural Center, with no monitors and only two vocal mics. The PA system here was mounted in the wall behind the stage, and the room seated only 150, so essentially it was an acoustic show.

The band just played, and as trumpeter/vocalist Efrem Towns later remarked, "it was good to just listen- sometimes I think we get too dependent on monitors doing it all for us." While the caliber and reliability of our sound equipment continued to vary, the quality of the music did not...it was fantastic! Audiences throughout East Asia were astounded, with rave reviews—the standard everywhere we went. Many people were surprised that we could achieve such a full sound with only horns and drums.

The new Dirty Dozen has a bright future: Keith and Revert, the newest (and youngest) members, bring new musical influences with them. Keith's background as a trombonist leads him to approach sousaphone in a completely different manner than his predecessor, opening new avenues in arrangement and composition for the band to explore.

And the engineers out there who are lucky enough to work with this great group will profit from our experiences.

I believe the group learned a great deal about their own audio needs and the best way to get what they want. The new rider we composed through hard experience will ensure that in the upcoming years...or until the next change occurs! db

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1992 Editorial Calendar

JAN/FEB The Sophisticated Electronic Cottage.

Winter NAMM Show issue.

• **GUIDE: Speakers: Performance & Monitor.**

MAR/APR Broadcasting—Audio Production for Radio and TV

NAB show issue.

• **GUIDE: Consoles and Mixers.**

MAY/JUNE Audio in Houses of Worship/Fixed Venue Sound Reinforcement

NSCA show issue.

• **GUIDE: Power Amplifiers.**

JULY/AUG Live Sound—Touring and Stadiums.

• **GUIDE: Tape, Tape Recorders and Accessories, Microphones.**

SEPT/OCT The Recording Studio—Digital and Analog, Big and Small.

AES in San Francisco Show issue.

• **GUIDE: Signal Processing Equipment, Part I, (delays, reverbs, crossovers, equalizers.)**

NOV/DEC **db Magazine's 25th Year Anniversary Issue!**

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JOHN BARILLA

Fox And Perla: Creative Problem Solvers For The 1990's

Bernard Fox and Gene Perla have a gaping hole in their vocabulary. They can't seem to understand the meaning of the word, ***impossible.***

THESE MEN—WHO ARE TWO OF America's most innovative audio design consultants—exude the raw energy of young boys with their hearts set on becoming astronauts. For them, life is an ever expanding vista with new challenges on every horizon as far as their eyes can see. Impossible? They just can't grasp the meaning of that word.

How did Fox and Perla manage to carry this audacious point of view forward without faltering? Their claim to be able to do anything in the world of audio—from theatrical sound design to computer systems development to forensic audio to new product development—is well documented from their track record. To handle such a diversity of design problems would require a richly variegated background in a number of disciplines, and both Fox and Perla bring this to the equation. But it is not mere technical bravura which provides the engine for their productivity; it is rather, the unique chemistry between two people with a great deal of mutual respect, uniquely complimentary backgrounds, and a shared vision for the future.

The story of Fox and Perla—their formative experiences, their projects and products—will make edifying reading for anyone interested in finding their niche in the audio industry—or, for that matter, any other field. Their story proves the old axiom, "the whole is greater than the sum of its parts". It also shows how unseen forces are constantly at work shaping careers decades before a serendipitous meeting of the minds brings everything into focus.

SEE FOX RUN

Bernie Fox is a 43-year old Jewish kid from the Bronx who exudes the hard won confidence that comes from years of diverse experience. His education comes primarily from the Seat-Of-The-Pants School Of Audio Engineering which has as its curriculum thousands upon thousands of hours doing things which no one has ever done before. Actually, Fox did get his initial start-in from academia. During the mid '60's, he studied music-for-film under veteran RKO film mixer, Bill Blatchley. His performance in that course got him his first job in the dubbing room at RKO Pictures, and a few years later, he and a co-worker made a deal with RKO to rent one of their rooms on a lease/purchase basis. This was a film room, mind you, replete with 3 or 4 track mag film machines, but ironically Fox hooked into the Latin music business doing numerous records for the well known Latin label, Fania Records. How did that fare on mag recorders? Very well indeed. While the industry standard for multitrack recording was still 4-track, Fox was doing 36-track recording by interlocking a chain of mag recorders. This somewhat unorthodox approach—his initial experience in record making—proved to be a sort of paradigm for Fox's career. He was an interdisciplinary person right from the start, but didn't realize it yet since he was simply trying to make a business work with equipment on hand.

Fox recalls: "I thought everybody was doing this. It took me years to discover that people weren't doing this stuff anywhere else. I grew up there and learned from all these very diverse guys; guys who were in the film business, but were also doing music. People were doing 4-track and we were doing 36-track with automation."

"The way we were doing automated mixdown was to lock up a mag recorder—an early Magnatech pickup recorder—with the playback machines. We'd mix a few bars. If there was a mistake in the mix, we'd back up the whole thing, roll forward, punch-in and keep going. We'd mix to 3-track: a left, a center, and a right. That way, we could punch the vocals in on the center track, even after the mix was done."

After 4 years, he and his partner finally took over the RKO facility and re-named it *Good Vibrations Sound Studios*. Around 1972, Fox and his partner did a feature film called *Salsa* which started a nationwide craze for salsa music. Fox was in position to cash-in on this phenomenon by recording many more Latin albums. Not satisfied with the status-quo, Fox decided to also take advantage of the concert craze which had been recently fueled by Woodstock, so he ventured out to do live sound and remote multi-track recordings synchro-

Figure 1. Bernard Fox posing for the author's camera.

Figure 2. Gene Perla does the same.

nized to picture for the numerous outdoor festivals which were blossoming all over the country.

It was here that Fox was introduced to time-code synchronization—an area in which he has developed a much deserved reputation as an expert. But this was the early '70's and SMPTE time-code, as we now know it was then used strictly for labeling video frames; it had no audio sync applications until the early '80's. Typically, Fox took what technology was available and pushed it to its limits.

"A guy named Lou Lindauer from API invents a thing called Mini-Mag/Mag-Link. It was one of the first time-code formats. In some ways, it was actually better than SMPTE. SMPTE being square wave pulses, doesn't transfer well. It has to be refreshed or regenerated. Lou's system, as I remember, was three or four simultaneous sine-waves beating against each other, and you could copy it; it would pass over phone lines—it had a lot of things going for it.

"In the summer of '73, my partner and I took the prototype time-code unit to Africa to do the Ali-Forman fight, and used it to synchronize 12 cameras and a multi-track recorder. Unfortunately, the industry never heard of this trail-blazing venture, because the film fell into litigation and was never released."

As can be seen, Fox developed simultaneously in the film business, music business and remote business. In 1976, he branched out again, joining a studio owned by Eventide Clockworks during the heyday of developing the new digital technology. Here Fox whetted his appetite for product design and applications of new technology and in 1977 he opened up another studio on his own, with an eye towards "evolving upward" from current technology to the futuristic technology he envisioned. Trouble was, with limited funds, he could only afford a limited amount of equipment, but with this in hand he again forged an extremely successful business doing "recovery" of old masters for re-release as compilation records. Again, as fortune would have it, this experience provided him with skills that would later be applied in forensic audio—providing expert opinions and evidence for court cases.

During these years of hands-on experience, Fox acquired lots of diverse skills—audio for film, video, remotes, mastering, synchronization, product development—skills which now serve him well. But as he would confess, he really didn't hit his stride until he met up with Gene Perla at The Center For The Media Arts, where both were teaching during the early '80's. Since then, his career has taken on a new dimension of focus and organization which allows him to use his diverse skills with greater efficiency. He summarizes it like this: "You draw on all your experience all of the time. And that's primarily what we as a company do".

THE PARADOX OF PERLA

Ever hear of a hyper-organized bass player? Ask any musician; they don't really exist, except of course in the case of Gene Perla. Perla who is best known for his credits as a jazz musician (having played with many of the greats including Miles Davis, Elvin Jones, Dizzy Gillespie, Sarah Vaughn and many others), went through a long and tortuous route to find his niche in the audio industry. He is constitutionally something of a late bloomer, and even today at 52 years old, he has the enthusiasm and demeanor of a teenager.

Perla, obviously, has a strong background in the arts. He started studying classical piano at age 5 and did so for 10 years, later switching to slide trombone in high school. This background seems to work as a good counterpoint to Fox's strengths in technology. But unlike Fox who knew he wanted to be an acoustical engineer in the second grade, Perla never quite knew what he wanted until much later in life. Perla remembers his early years:

"I was always a screw-up kind of a guy, 'cause I liked to chase girls and work on cars and I didn't pay attention in class. So when it came time to go to college, I didn't know anything and I didn't know what I wanted to do. My marks were so bad I had to go to New York Military Academy to do post-graduate work".

But Perla gained something from this somewhat punitive experience. He learned principles which enable him today to be the organizational force behind Fox and Perla. He goes on to say:

"I have to tell you something. It was probably the most eye-opening experience that I've had in my life!

The military school in a year's time really gave me a lot of discipline, which I feel is the key to any success".

Still, Perla did not know what he wanted to do in life. So pretty much by default, he enrolled in a college program of civil engineering, but he actually "majored in pool sharking". Still unsure of his goals, he spent several years going from major to major—collecting over 300 hours of credits, but narrowly falling short of the requirements for a degree. At this point, music was fundamentally on the back burner, but during his last year in college Perla discovered the world of professional music. He went to see a band one night and was smitten with the idea of becoming a professional musician. He thought, "I've finally found myself," and decided to go to music school, but there were still many turns in the road ahead.

At 23, Perla enrolled at Berklee College of Music (in Boston) as a piano major and proceeded to practice 6 or 7 hours a day for months on end. He had admired jazz pianist Bill Evans for the fluidity of his style and wanted to get that level of mastery and inspiration, but he ran into a roadblock along the way.

"I practiced like mad," confesses Perla, " but I just wasn't getting it. It wasn't coming to me; not the Bill Evans I wanted—the smoothness, the understanding of chord inversions."

"One night, I listened to an Ornette Coleman record and I hear this bass player who's playing out of tune, his time was funny and the notes were questionable, but it was the most fantastic thing I ever heard—Charlie Hayden. The next day I went to Berklee and changed my major. I started to play the bass when I was 24 years old and broke my neck for a few years playing and practicing."

Finally confident that he had found "his own thing", Perla headed for New York looking for a gig, and finally it all began to come together. Doors began to open wide and he realized many of his goals to play with the giants of the jazz world. But Perla still didn't feel like he had all his bases covered. So, in the early '70's Perla (unlike many creative types), decided to get a piece of the music business for himself, starting his own publishing and record company, PM Records, Inc. The record company, while not a major money maker for Perla, is nevertheless a self-supporting venture and carries with it a large catalogue of jazz records which are internationally distributed. Again, Perla did not exactly find his niche, but garnered instead, a wealth of organizational experience from which he draws daily.

"When I started the record company, I realized that if I was going to produce records, I really should know something about the technical operations of recording equipment, so I went to school at night at the Institute of Audio Research." But Perla was not content with technical training in the absence of artistic application, and a fortuitous meeting with Moogy Klingman in a pub near the Institute landed him a job at Secret Sound—a studio that was co-owned by production wizard, Todd Rundgren. It was here that Perla sojourned (starting in 1974), rose to chief engineer and "learned the concept of having a creative free-thinking head in the technical area—as Todd Rundgren had—but in a way that I could relate to from my perspective as a jazz musician." During these years, and the ones to follow (when he operated a jointly owned studio with keyboardist Jan Hammer), Perla learned a similar perspective to Bernard Fox's: taking existing technology, creatively applying it, and pushing it to its limits—sometimes beyond the realm of normal application.

In the early '80's Perla joined the staff of Center For The Media Arts as an audio instructor and simultaneously continued his education in the realm of multi-media, video, and computer technology—taking full advantage of the interdisciplinary program at CMA. It is here where Fox and Perla first met and began to see how their skills complimented each other in a truly synergistic way. And it is here that our story truly begins.

TWO HEADS ARE BETTER THAN ONE

Fox and Perla realized that between the two of them virtually all the bases in audio were covered. For years Fox had hoped to fully exploit his technical skills, but a lack of organization hindered him. Perla fixed that. And for years Perla had hoped to exploit his mastery of aesthetics through the opportunities that technology presented. Fox fixed that. So in 1989, they started doing design consulting on various mixed media projects. The seminal event that really brought their backgrounds into the foreground was when they were called in by Richard Fitzgerald—a world renowned theatrical sound designer—who approached them with some knotty technical problems. Fitzgerald was working on a re-make of *Sweeney Todd* at Circle In The Square and was trying to transcend the limits of traditional theatrical sound. It should be noted that theater—and film as well—are areas where tradition is so deeply entrenched, that new technology is always looked upon with a great deal of reservation. For example, it took some salesmanship for them to accept MIDI samplers as superior replacements for the time-tested cart machines. Like primitive tribesmen confronted by a radio, they couldn't seem to grasp how the technology was a superior mode of communication to smoke signals.

They were entrenched in their ways, and Fox and Perla would either make lots of friends or lots of enemies—depending on the outcome. Fortunately, their combined experience and interdisciplinary approach made them instant heroes, and they subsequently worked with Peter Fitzgerald (Richard Fitzgerald's brother and business partner) on the next project, the complete sound design for a new Broadway play, *City Of Angels*.

CITY OF ANGELS

One example of Fox and Perla's simple but elegant solutions occurred during two sequences of the play that featured rear screen movie projection. The problem was complex in that the movie had to be synchronized with a live orchestra, singers, actors and dancers—all requiring split-second cues to sync their parts with on-screen events. Because they would be busy performing, the various performers had no idea what was on the

screen, so an elaborate set of cues would have to be given in advance throughout the lengthy sequence. The conductor would also have to be notified of the exact start time of the film so that he could direct the orchestra to start playing on the first frame of the film. In this case, the use of SMPTE driven projectors was prohibitive because of high cost and scarcity of these specially modified units. So for this creative dilemma, Fox and Perla fell back on an older technology for an elegantly simple solution. Fox recalls:

"I recorded on multi-track tape all the cues for the band to start playing, for the people to start walking, all the musical and theatrical cues—the forward count-off, the backward count-off, a click track and cue information for the performers so they would know when to walk across the stage so that it's all synced up to the picture. And then I simply transferred all this information as a mono mix to the optical track of the projector. My film experience helped out a lot here, because it takes some specialized skills just to mix all that stuff so that it holds up through an optical transfer, and plays back on headphones and also on a crappy speaker on the side of the stage. It worked incredibly well! When the stage manager called for the film, the projector gave all the cues for the next six minutes. Another interesting problem was that the count-off had to be audible before the picture appeared on the screen. In order for that to happen we had to get the projector to run black before the film actually comes in. So you see, this one little problem required a discipline of film mixing, film sound, synchronization, musical notation, remote sound and stage direction; but that's the kind of stuff Fox and Perla specialize in."

RYE PLAYLAND

Ready for another knotty problem? Fox recounts the story:

"In 1989 Richard Fitzgerald gets a contract to design sound for a large ride at Rye Playland called "The Old Mill" . The catch is, unlike contemporary rides that are chain driven or in some way timed on a definite course, this is a 63 year old boat ride driven solely by water pressure. If four heavy guys get in the boat, the ride takes 8 minutes; if two children get in the boat, the ride takes 6 minutes. So we had to come up with a way for the sounds to be synchronous with the boats, even though each individual boat travels at a different rate.

In most rides, sounds are stored on cart machines that play when a certain amount of time has elapsed, but in this case, that was impossible. So we designed it so that when the boat goes through the ride it breaks a beam of infrared; there is a closure, the closure is converted to a specific MIDI note by a box we built, and the MIDI note plays a sound that is stored in a sampler. So, there are no tapes to wear out, no mechanical contacts, and digital quality audio for 24 sound effects. And to prevent memory loss, we tied the power to the auxiliary power of the burglar alarm system; so the samplers are always under power—even if there should be a power failure".

PRODUCT DEVELOPMENT

Fox and Perla do not always spend their creativity on other people's projects. They are also actively involved in the development of new products designed to address the specific requirements of their clients and anyone else who wants to purchase them. Typically, the products take their inspiration from a perceived need that is not being met by current configurations of technology. Much like Japanese engineers do, Fox and Perla generally take disparate technologies and reconfigure them in systems that didn't exist before. Unlike the Japanese though, Fox and Perla design their systems from the standpoint of the user, making them virtually idiot proof and easy to learn. The following is a sampling of their products and how their development makes them unique in their field.

PERFORMANCE AUTOMATION

Having worked extensively in theatrical sound design, Fox and Perla were stricken with the relative lack of theatrical applications of computer technology—especially in comparison to the modern recording studio. Why have some of these things—like console automation—never been popularly applied to Broadway shows? The answer of course, is that studio craft is linked to tape—which means that events like fader moves are easily synchronized with SMPTE

Figure 3. City of Angels.

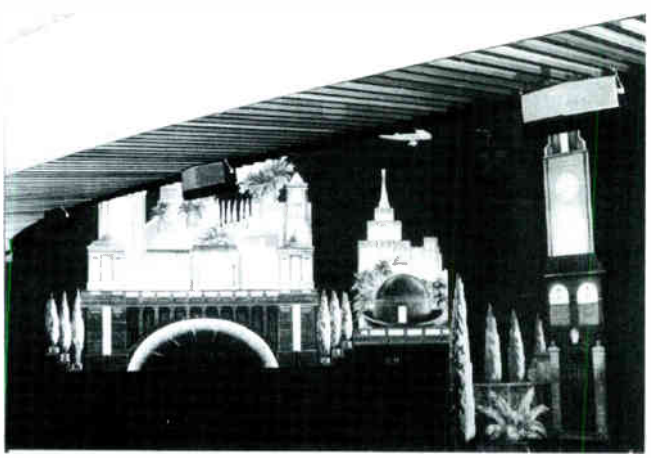
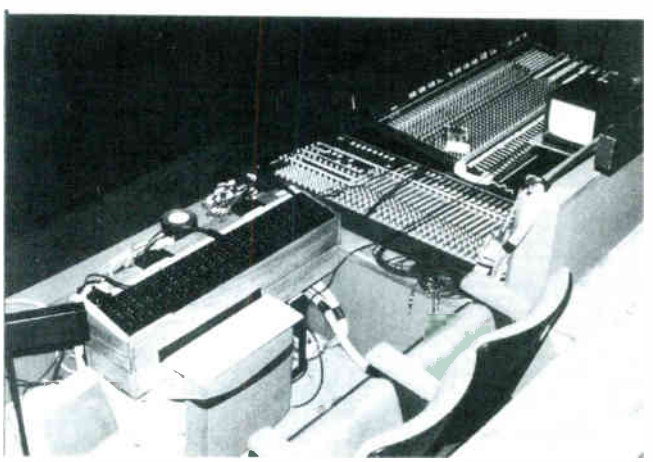


Figure 5. The City of Angles main control board layout.



time code. It was a forgone conclusion that since there was a predominance of live music in the theater, that such technology was inapplicable. But Fox and Perla thought otherwise. Their reasoning went as follows: while it is true that fader cues linked to a free running time-code will eventually go out of sync over long passages of live music, it will, in fact, stay in sync quite well over short periods of time. If the clock is initialized for each meaningful passage (introduction, verse, chorus, instrumental solo, crescendo, diminuendo, tag, interlude, etc.), then one could expect the fader moves to stay in sync with the dynamics of the show. This would insure that standards of perfection are repeatable from night to night, without the typical 6 hands on the mixing board and minimizing the error of human beings spacing-out and missing a cue. It would allow a single operator who could follow the score to re-initialize faders with a single keystroke according to the downbeat of a musical passage or any other meaningful cue. In this way, all unused faders could also be shut down when not in use—something which is truly an octopussian chore, even for several operators.

Well, this is precisely what Performance Automation is designed to do (see photo and diagrams). The system is the result of an international collaboration with Audiomation Systems, Ltd. of the U.K. and with Uptown Automation of Boulder,Colorado and features a custom designed PC-based software that directs Audiomation's moving faders. The system has already been implemented on several Broadway shows and has received rave reviews. The moving faders use non-VCA technology, so they add no noise to the mix, and can be retrofitted to any existing console and operated remotely from the main mixing console by a single operator. What is also unusual and necessary for live applications is that the operator can easily override any pre-programmed fader move simply by grabbing the fader. Once commanded, the fader will not return to the program but remain where the operator positioned it—even if he removes his hand from the fader.

Another currently available option is the use of multiple VDTs for an entire orchestra, taking the place of sheet music.

The heart of the system however, is the 386 computer, loaded with 16 Meg of RAM, and of course, specially-designed software. This allows the user to pre-program an unlimited number of discrete musical passages called "scenes" with both static and dynamic fader moves and recall them instantaneously, according to a pre-determined cue.

Performance Automation seems destined to change the traditional face of theater sound and will undoubtedly have many other applications for concert sound as well.

PERFECT SCORE

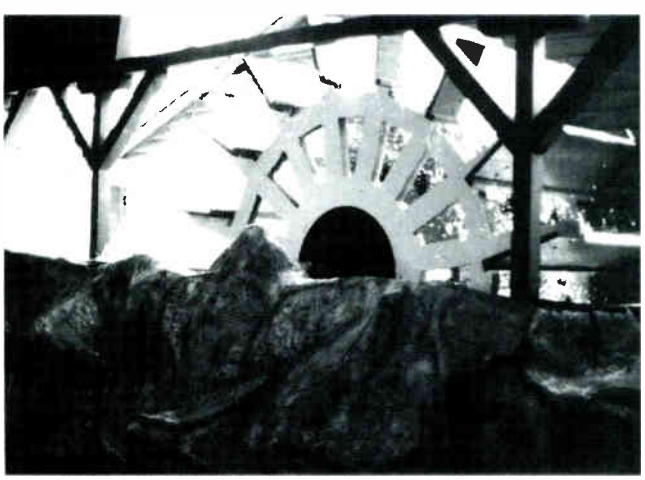


Figure 6. A view at Rye Playland.

This flexibly configured system design is one which drew heavily on Gene Perla's extensive musical training as well as Bernard Fox's passion for technology. Designed for futuristic applications in theater and concert orchestras as well as music education, Perfect Score is another PC-based system which allows composers to realize their compositions quickly and easily. While there are several systems currently in use that allow composers to sequence a score and print it out, Perfect Score takes the concept to some new heights. A turnkey operation that includes not only computer, software and printer, Perfect Score is a complete system also containing modules for sound generation, mixing and effects processing. Music can be entered and edited quite easily in a number of ways: a composer can play it on a MIDI device, sing it in, type it in, mouse it, and move and edit it with a wireless pen. Various orchestration options can be tried quickly and easily with its extensive sound generating capabilities, and of course publishing quality scores can be generated with its laser printer.

But beyond its obvious purpose as a user-friendly compositional tool, Perfect Score is designed to interface easily with a variety of remote media such as multiple VDTs and large screen video projectors. The applications for this are awesome. One example currently in use at several music colleges is for the students to have individual workstations with the professor having some global control over sounds, a light activated pointer and a large screen on which each student's musical scores can be seen. When the professor highlighting a particular passage decides to demonstrate what a string line might sound like doubled an octave higher by piccolo, he simply reassigns a piccolo sound to play along with the strings. Voila, instant actualization of ideas!

Another currently available option is the use of multiple VDTs for an entire orchestra, taking the place of sheet music. The individual parts, derived from the master score, simply scroll downward as the music progresses, thereby eliminating the need for page turn-

Figure 7.Gene Perla testing a ride at Rye Playland.

Figure 8.Bernard Fox and friend at Rye Playland.

ing. While this concept has received some initial resistance from traditional musicians, it is undoubtedly the wave of the future.

RACK 'n ROLL

Build a better mousetrap? Well, that's exactly what Bernard Fox has done with Rack 'n Roll (see picture), his new modular equipment mounting system. Fox was ruminating one day on the space taken up in storage by conventional racks, when not in use. A sound design company like Peter and Richard Fitzgerald's Sound Associates, has some 900 racks hanging out in a warehouse, virtually none of which have interchangeable parts. In storage, they take up lots of space equal to the volume of the rack, and few of them can be connected with others to make larger systems without a lot of jerry-rigging. A rack is a rather simple device involving less technology than a mouse trap. Was there any reason why racks could not be standardized so that they could be ganged together in flexible formations? So Fox decided to build a better mousetrap. He started with square tubular steel—the strongest and lightest thing around—and proceeded to make a standard rack formation that could be stored in two-inch thick packages when not in use, and easily put together in a series of modules when ready for use.

The response to this system has been overwhelming. The uses range from studio to remote applications, as well as simple portable racks for gigging guitarists (the units come with wheels).

"The bulk of the original sound effects for Broadway are done here. That's a given.

Since the initial development, Fox has since become more cosmetically conscious offering the system in various colors, with coordinated side panels and covers. Another offshoot is something he calls Rack 'n Rotate, which is a simplistic machine-mounting system that allows tape recorders and other non-rack size units to be easily mountable at any desired angle, all on a roll-around rack size base.

While Rack 'n Roll is hardly a triumph of technology, it is nonetheless a tribute to Fox's user oriented design philosophy, and it is gaining a wide base of support, especially from retail music stores—where floor space is certainly at a premium.

SOUND DESIGNERS STUDIO

Let's leave off products and projects for now and see what goes on in Fox and Perla's proprietary studio facility—Sound Designers Studio (see cover photo). There are actually two rooms here, both well equipped for various aspects of digital audio. Highlights from the equipment list include the Akai DD-1000 magneto-optical recorder, various PRO-DAT machines, Neve consoles, video lock-up, and the WaveFrame AudioFrame digital audio work-

station. So who uses Sound Designers Studio? Perla replies:

"The bulk of the original sound effects for Broadway are done here. That's a given. But anyone who wants to do specialized sound effects in the video domain find this a really comfortable facility. We also do lots of forensic work."

The WaveFrame has proven extremely valuable for forensic work. With its sampling and large sound storage capacity, digital console, 8-channel hard-disk recording, and most impressively, wave shape editing which can be achieved down to 1/100 of a millisecond, the WaveFrame has provided scientific evidence in many a court case. Perla cites a recent case:

"I mentioned to you that we do forensic work, for example, like examining two pieces of music to determine whether there has been some copyright infringement. What we do when somebody comes to us on a case is first to sit down and listen to what they're talking about; to see if in our opinion, they really have a case. So it gets down to two passages of music: here's the original and here's the allegedly plagiarized copy. If we believe there is actually a copyright infringement, we basically take a sample of each one, do a wave analysis, and then juxtapose them side by side—or really on top of one another—so you can graphically see the similarities between them.

"One of the projects we did was that somebody had taken a sample off somebody else's record, and played it back in another key while recording their own record; so it put the passage in a different pitch. But we just brought it back to the original pitch, and when you superimposed the wave shapes they were of course, exactly the same".

VOICE RESTORATION

A stellar example of Fox and Perla's innovative use of their studio equipment came during a fund raising performance at the New National Theater. The one night only event included a host of famous actors and actresses from Hollywood and Broadway. Unfortunately, one of the main stars had recently been operated on for throat cancer and he was unable to speak in a normal voice. His unique voice—a trademark of his acting career—was only a remnant of what it had been before, and audience recognition and intelligibility of speech would be seriously reduced because of his condition. Fox was called into the job to come up with a creative solution and did something which to his knowledge had never before been done in a professional production. Fox tells of the process:

The enthusiasm these two men have for all their projects is indicative of a certainty about where they are and who they are at this point in time.

"I went to the old television show (featuring the famous star) and did a digital recording of his voice off-the-air, and then loaded it into the WaveFrame. I made a sample of a 15 second line, and then went to the theater and asked the actor to say the same words over his wireless microphone. At that point, I had the same words in the same pattern, as they were said 10 years ago on TV. So I had the old voice starting on the first word and the new voice starting on the first word. Now with units of the spoken word on hand, I put them into a spectrum analyzer that has a time window set up, so that you could set it not for real-time, but very slow time. Essentially, what it does is sample the energy spectrum for a short phrase. I looked at the energy content of each voice and saw that the old voice had all kinds of resonances at 400 hertz and so on, that no longer existed. And I also found that the new voice had all kinds of resonances at say 900 Hz, that didn't exist before. With that data in hand I took his new voice and ran it through the WaveFrame's digital equalizer, which is super powerful (+18 to –60 dB with no noise). And the frequency select is so discrete—you can type-in any number you want. It's really a super-parametric equalizer. And, of course, I can gang them together if I need more boost or cut.

"So here's what I did. I took the out of one equalizer and put it into another until I had sufficient control to get the same energy pattern in the new voice that was present in the old. Then I took the WaveFrame to the theater and ran his live microphone through the WaveFrame console. While the results weren't perfect, because I couldn't subtract his new voice from the room, it was still a vast improvement. You could hear him, understand him and recognize who he was solely from the sound of his voice. I even ran a monitor mix of the processed voice that was sent back to the stage, so that he could hear himself the way he used to sound, and it appeared to give him a sense of confidence. People really appreciated it, most especially his wife."

THE PHILOSOPHY OF FOX AND PERLA

The enthusiasm these two men have for all their projects is indicative of a certainty about where they are and who they are at this point in time. They are fortunate in having found their niche in an increasingly competitive world. Fox sums it up:

"Gene and I have substantial backgrounds in the arts—whether it be art from a sensitivity point of view or a performance point of view or mixing or product innovation—whatever. We know what art means. We also know what the purpose of technology is: to help people understand the joy of creativity."

"Creatively, Gene and I are both kids. We both have a tremendous desire for life. In my case, I know what it comes from. I was almost dead when I was 17. I had spinal meningitis which seriously re-arranged my brains. I was real close to death. They thought I had four hours to live, but I survived. Yeah, life is a good thing. You got to grab it and have fun with it. We enjoy taking art, technology and a desire for life and mixing it all together. And we go forward and say: 'Lets be there!' I wanna be on the bridge of the Enterprise—not watch it on television." db

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HANDBOOK OF SOUND SYSTEM DESIGN *by John Eargle*

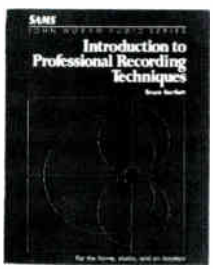
In one complete up-to-date book here are all the practical as well as theoretical aspects of sound reinforcement. The detailed chapters include information on electrical fundamentals, acoustical fundamentals and psycho- acoustical aspects; high-, low-, and mid-frequency systems; microphones in sound reinforcement and system architecture; central loudspeaker arrays, distributed systems, speech reinforcement and paging systems; system intelligibility; high-level sound reproduction, a theater sound overview, and sections on live music reinforcement, line arrays and sound columns.

347pp. Hardcover

$37.50 #12-991

INTRODUCTION TO PROFESSIONAL RECORDING TECHNIQUES *by Bruce Bartlett*

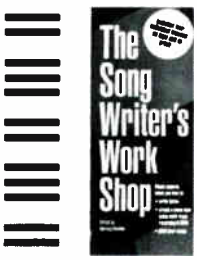
Geared primarily for the aspiring professional, this book provides a comprehesive discussion of recording, engineering and production techniques. Special coverage of microphones, microphone techniques, sampling, sequencing, and MIDI is also included.



416pp. Paper

$29.95 #8-991

THE SONGWRITER'S WORKSHOP *edited by Harvey Rachlin*



This book and cassette meets the songwriter on the level that he practices his craft—through sound. Beginning with an idea for a song, it travels through inspiration and creativity, writing lyrics, making a demo, understanding MIDI and how to pitch songs to the industry. Each lesson is to be learned through reading and also hearing the lesson, and is taught by experts such as John Barilla.

96pp. and 2 cassettes, Paper

$24.95 #9-991

THE SOUND REINFORCEMENT HANDBOOK *by Gary Davis and Ralph Jones*

This second edition of a very popular book has an additional 40 pages and covers all basic aspects of sound reinforcement. The new topics include MIDI, synchronication, and an Appendix on Logarithms.

417pp.

Paper

$34.95 #17-791

SOUND REINFORCEMENT FOR CHURCHES *by Curt Taipale*

Tapes recorded during an actual seminar, you will hear Curt present on these tapes not only the basics of microphones, but how to get the most out of your console both in a live setting and in the studio; how to deal with feedback, how to recognize phase cancellations caused by poor speaker placement and much, much more. Helpful diagrams are enclosed where appropriate. This is your chance to learn from Curt's mistakes and his triumphs. His accomplishments and his failures are freely shared in an encouraging manner.

Four cassette tapes, nearly five hours!

$35.00 #14-991

THE NEW RECORDING STUDIO HANDBOOK *by John M. Woram and Alan P. Kefauver*

This new edition has been accepted as the long-awaited replacement to the original book published in 1976. The new edition is not "old wine in a new bottle." The revision has been done by Professor Kefauver. He is the Coordinator of the Recording Arts and Sciences Department and Director of Recording at the prestigious Peabody Conservatory of Music. The book is used by most of the recording schools and universities here and abroad. This book contains all the basics for the recording studio engineer, as well as more advanced information covering MIDI, Automated Consoles, SMPTE Time Code and Digital Audio. This book has been and remains the "bible" of the audio industry.

525pp. Hardcover

$45.95 #13-991

LIVE SOUND! *by David Scheirman*

This excellent video is targeted at first-time users and musicians new to the field of sound reinforcement. However, the video contains insider tips and sophisticated approaches to using the equipment.

The video covers:

- Equipment selection
- Loudspeaker placement and setup
- Mic selection and placement
- Monitor systems
- Mixer Position
- Processing/effects
- Crossovers/Equalization
- How to Soundcheck
- System Assembly & Cables
- Power Amps
- Running the Mixer

This is a *must have* video!

75 minutes

$39.95 #16-791

SOUND SYSTEM ENGINEERING, SECOND EDITION *by Don and Carolyn Davis*

Like the first edition, this comprehensive text provides readers with useful information for the day-to-day work of designing sound systems. This updated version contains in-depth coverage that carefully examines acoustic gain, clarity of sound, and required electrical power.

688pp. Hardcover

$49.94 #2-991

CONCERT SOUND AND LIGHTING SYSTEMS *by John Vasey*

This book shows how to set up, maintain, and operate sound and lighting equipment for the performance of amplified music or any kind of touring production. An excellent reference and/or guide to procedure, the book provides descriptions of all the components that make up a system, explanations of how they all work together, and photographs and illustrations that show specific equipment and proper stage setup.

178pp. Hardcover

$27.95 #4-991

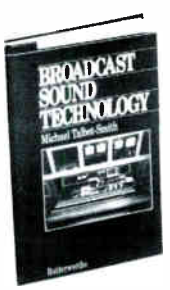
HANDBOOK FOR SOUND ENGINEERS: THE NEW AUDIO CYCLOPEDIA *by Glen Ballou*

This brand-new second edition has been updated to include the latest in MIDI, cinema sound, tranformers and compact discs. Readers learn the new developments in audio electronics, circuits, and equipment. There is also an in-depth examination of disc, magnetic, and digital recording and playback.

1,400pp. Hardcover

$99.95 #5-991

BROADCAST SOUND TECHNOLOGY *by Michael Talbot-Smith*

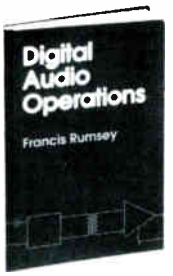


This is an introduction to the technical aspects of sound in radio and television. It examines in detail the main items in the broadcast chain: studio acoustics, microphones, loudspeakers, mixing consoles, recording and replay (analog and digital), and the principles of stereo. It offers a easy technical treatment of audio principles and broadcast hardare.

224pp. Hardcover

$42.95 #7-991

DIGITAL AUDIO OPERATIONS *by Francis Rumsey*

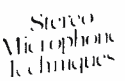


Leaving the higher levels of theory to other digital audio texts, this handbook emphasizes principles for the studio and those aspects of digital audio appropriate for day-to-day sound engineering operations. It describes the sampling process, error correction, editing systems and different recording options. This book is written to help producers and engineers in the studio get the best possible results from the high quality standard equipment in use today.

256pp. Hardcover

$39.95 #6-991

STEREO MICROPHONE TECHNIQUES *by Bruce Bartlett*

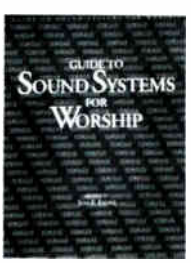


This book is extremely timely for sound engineers and video or audio producers. Also, as Digital Audio Tape (DAT) production becomes less costly to use in the field, all electronic media will be trying to achieve the highest level sound production possible. This book tells how to position the correct microphones in the proper locations in order to record optimal quality stereo sound. The many illustrations and clear organization easily explain the theory behind stereo mic'ing methods, and describe specific techniques, including comparative evaluations. In addition, it offers suggestions on session procedures and stereo troubleshooting as well as recent developments in binaural and transaural stereo and stereo boundary arrays.

192pp. Paper

$24.95 #3-991

GUIDE TO SOUND SYSTEMS FOR WORSHIP *by Jon F. Eiche*



This book is written to assist in the design, purchase, and operation of a sound system. It provides the basic information on sound systems that is most needed by ministers, members of Boards of Trustees and worship and music committees, interested members of congregations, and even employees of musical instrument dealers that sell sound systems. To be of greatest value to all, it is written to be both nondenominational and "non-brand-name."

183pp. Paper

$24.95 #1-991

LIVE SOUND MIXING

by Duncan R. Fry

Live Sound Mixing is the first book that shows you how to pull a great sound from a PA system. Author Duncan Fry is a survivor of many years on the live sound trail. People used to say "Ah, you can't learn how to mix from a book!" With this book, you can! This is an easy-to-read and understand "hands on" book that every live-sound engineer should have. From the basic principles of how a system works, through troubleshooting when it doesn't, the book is packed with useful information, many clear diagrams, helpful hints and detailed explanations. There are examples of every type of equipment you're likely to come across.

164pp. Paper

$26.95 #11-392

THE RECORDING SERIES BASIC MULTITRACK RECORDING TIPS *with Rick Shaw*

Using a "hands on" approach, this video gives you an overview of the basics in setting up a personal studio. Among items covered are: hooking up instruments, connecting equipment, setting levels, working with the console, doing a recording, overdubs and mixdown. This is a very important video for all persons planning on setting up a studio.

Approximately one hour long

$34.95 #18-791

THE STUDIO BUSINESS HANDBOOK: A GUIDE TO PROFESSIONAL RECORDING STUDIO BUSINESS AND MANAGEMENT

by Jim Mandell

Here is a comprehensive survey on the state of recording studio business and management in the nineties that includes startup and equipment cost comparisons from low budget to world class operations; equipment purchasing strategies; rate-setting factors; actual examples of pre-session contracts; how different studios handle billing, credit applications, payment guarantees, conflicts and collections; how to write publicity releases that will get into print; what to avoid in advertising;

336pp. Paper

$29.95 #10-991

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SHELLEY HERMAN

The Empress of Audio

Who is Antonia Barnes Boyle (Toni after about two minutes) who calls herself 'The Empress of Audio'? She's from Detroit, the city the recording industry officially changed to Motown.

HER PARENTS PROBABLY DIDn't notice the name change as they were both classical musicians. Toni was the last radio major out of Northwestern University where she served an apprenticeship at the campus radio station WNUR. She went on to Wayne State University where she did her graduate work in international communications.

After stints at WDTM and WABX in Detroit, like anyone who sets as their goal the media business, and sooner or later move to New York, so did Toni, where she was involved in radio and TV production at some of the top advertising agencies. Five years later, Toni married and moved to Chicago where she worked at several radio stations and finally to station WFMT in Chicago where she was a classical music announcer. Her stay there was cut short when she became pregnant, and station management thought that a pregnant radio announcer might offend their listeners. Another example of the great intelligence of radio station management.

In 1985, Ms. Boyle became an Executive Producer with Nightingale-Conant Corporation, one of the major publishers of spoken word motivational tapes. She worked closely with Earl Nightingale, the world's foremost motivational speaker (and for you old radio buffs, the voice of Sky King). Her credits as a producer read like a "Who's Who" of motivational speakers: Leo Buscaglia; Lee Iacocca; Norman Cousins; David Horowitz; Wally "Famous" Amos; Gen. Chuck Yeager; and many others.

"This industry is more than just a toy, there are thousands of motivational and educational tapes being made every year, most of them badly done because so many of the people involved just don't understand what to do."

In 1990 Toni finally was convinced to move to Southern California where *Cassette Productions Unlimited*, a very successful cassette and video tape production organization decided she should start their "CPU Creative" division. CPU Creative is a full-service audio production facility offering total service from product concept through scripting, recording, packaging, and fulfillment.

In March 1992 Toni is going to make one more giant step in her career. She will be opening the door of her own production service in Pasadena, CA., *A.B.&C.* (Antonia Boyle & Company), Inc.

Toni told me: "I respect the folks at Cassette Productions Unlimited and I am grateful for the opportunities they have given me to grow in my craft, but it's time to take the plunge and work under my own flag. I have a lot of marketing, packaging, and distribution ideas that I want to implement. I am very concerned that we must begin to reach the majority of Americans who do not read, are not concerned about books and best seller lists, and who need good information, in

short formats, at inexpensive prices."

I had the opportunity to spend a couple of hours in Pasadena California's famous Rose City Diner interviewing Toni, and traded horror stories about the recording industry. Here are some excerpts from that interview, which will give you an insight into what makes Toni Boyle work.

My first question was: How did you get the title *Empress of Audio?*

She answered, "At Nightingale-Conant, I wore many hats. Not only did I run the audio production department and supervise a staff of eleven people, I was also a full time producer and did a great deal of writing and speaking. One day an "Image Consultant" from the West Coast was in to record and the producer brought her into my office and said: Toni is our executive producer, manager, public relations person....well, she does everything. We call her our 'Empress of Audio'."

The image consultant thought it was very funny and asked if she could quote the story. Within a matter of months, everyone in the industry was referring to me by that title, and as a joke, I had it put on my business card. When I left N-C, the title was waiting for me in California. It's what the marketing people call "positioning"—on a grand scale."

I then asked Toni about her first CPU Creative project: "Taping Yourself Seriously" (See the "Tools Of The Trade column in this issue), "What motivated you to do this project?"

"This industry is more than just a toy, there are thousands of motivational and educational tapes being made every year, most of them badly done because so many of the people involved just don't understand what to do."

"What about the workbook that comes with the tapes?" I asked.

"It was originally used to accompany a speech. The main points are: Do your research; prepare and rehearse everything in advance; be ready to change, rearrange, add, or delete; use a producer; and leave your ego at home," she answered.

"I didn't understand what you meant about 80% of the speakers tell 20% of the stories—or 'God in Her Heaven'."

Toni replied, "If God was a woman this would have been planned better."

"What technology are you using to edit now?" I asked.

"CPU is now setting up "Soundtools" but the information will end up on a DAT. Soundtools is not designed for spoken word, which is a shame. We keep calling the company for more information and different applications. It turns out we're doing things that they don't know how to do," she answered.

"What about using subliminal techniques?"

Toni answered, "I came up with something called an 'Optiliminal.' I said to Nightingale-Conant management one day: "People resist a cassette marked subliminal, so what about one you could turn the subliminal on or off. Can we do that?" and I said: "Oh Sure." I talked to my friend Ron Steele at Midi Lab in Chicago, one of the founders of Streeterville studios, and an old RCA engineer. We sat and worked at it for a couple of days and came up with a system, based on the balance control on your amplifier. But it doesn't just short out one side or the other, it literally dials one track under the other track and makes it a subliminal.

"I can't name names, but just look at some of these motivational, real estate, and self-help speakers who are suddenly making millions, they came from nothing, ..."

We applied for a patent, and Nightingale-Conant put them out but left Ron's and my name off the credits. Finally the subliminal thing began to cave in. But it's something that could still be worked on."

She told me about some of the stars she has worked with,

"Joan Crawford was my first exposure as a professional, and I thought she was wonderful. I was working at a little classical music FM station and had a chance to interview a big movie star. While I was there, a lady who was with the NBC outlet called and said that she was going to be late, would Miss Crawford wait? This was 1962 when women didn't swear. Joan Crawford, in a mink with her hair tinted to match the mink and a big diamond pin, was all in black because her husband had recently died, said: "If Joan Crawford was late it would make headlines in the papers, tell her 'F—k You'." and went right back to what she was doing. And my twenty-two year old mouth dropped to the floor. It was wonderful, I've grown up with people that are famous, some are good friends, some are jerks."

"Who are your favorite speakers?" I continued.

"Denis Waitley and Leo Buscaglia, not because they are necessarily the greatest in the world, or not because they're friends of mine, but because they're honest. They are who they say they are. I don't so much care who you are, as long as you are honest about it."

"What about some of your least favorite speakers, Toni?"

"I can't name names, but just look at some of these motivational, real estate, and self-help speakers who are suddenly making millions, they came from nothing, they talk about it all the time, then they act like they always had this kind of money. They couldn't think of doing anything that didn't involve limousines, and you just have to laugh at their pretentiousness."

Toni is one of the many people in our industry who keeps her eye on the goal of perfection and tries not to cave in to those who say that mediocre is good enough.

Let us all try for those goals. db

SHELLEY HERMAN

Tools Of The Trade

From time to time, as the items present themselves, this column will feature books, tapes, CD's, tools, or other products that will make the working recordist's life a little easier.

Taping Yourself Seriously

Antonia Barnes Boyle
Empress of Audio
Booklet and two cassettes.
Published by: ***Cassette Productions Unlimited***
CPU Creative Division
5796 Martin Road,
Irwindale, CA 91706-6299
(800) 345-0145

● This package is primarily aimed at the person who is a motivational speaker, or speaks on technical subjects. *Taping Yourself Seriously* tells them how to go about transferring their public appearances to tape for sale. The entire process is explained, from original concept to idea consolidation, to script, to production, to marketing, and even determining the market. Suggestions are given about script writing, pacing, organization, preparation, including many production tips, and, most valuable to the novice, a chart indicating who does what.

The main point that Ms. Boyle makes is reliance on a producer to listen to the speaker and to keep them on track. She feels so strongly about this, that although she is a top notch producer, she even hired a producer when she made this tape.

There is not much technical information as far as microphone technique, which microphones to use, equalization, or tape editing, because any good recording engineer already knows that information! In my opinion, the salient point for readers of this magazine is that in most small recording studios, the recording engineer, more often than not, functions as a producer for most sessions, particularly for spoken word.

By reading the booklet and listening to the tapes, a good recording engineer will have a fine lesson in being a producer for spoken word sessions. Then, when a client comes to a small studio and asks about spoken word recording, the recording engineer can ask all the right questions and offer the proper suggestions. They're hooked then, and the client will use the studio, and maybe even pay just a little more for the extra services. In reviewing the material, I had very few differences of opinion until I came to the glossary page. This page attempted to explain technical concepts to civilians and confused more than it enlightened. In spite of what is printed, digital is not the opposite of analog, and is still recorded on a magnetic medium.

Also, the people who operate consoles, tape recorders, signal processing equipment, etc., are not necessarily recording *engineers*, they are *recordists*, unless they are German then they are *Tonemeisters*. An *engineer* is a person that operates an engine, or in audio, one who is instrumental in the design and construction of systems or components. That person may also be a recordist, or they may be deaf!

For a relatively low price, *Taping Yourself Seriously* is a good investment for the studio that has, or would like spoken word clients. db

A Guest Editorial

The Rise and Fall of Technocracy

The Techno Era started circa 1982 and has officially ended.

CAN YOU IMAGINE A TEN YEAR old being considered "old school?" The mind verily boggles. At the ripe old age of 34, with Shelton Leigh Palmer & Co. turning ten this April, I am considered an industry veteran. (God knows what they think about the guys that I consider old.) Anyway, seniority being what it is, I am often asked to pontificate about the generally poor condition of the commercial music production industry as it is perceived by the "new school." Often as I am asked, and believe me I am asked often, it is difficult to generalize about the current business climate, without trivializing some of the most important engines driving it.

I can happily report that for us, the music business has truly never been better and the future is seemingly unlimited. Notwithstanding my personal good fortune, I do have some historical anecdotes that may interest the casual industry observer ...

IN THE BEFORE TIME

High technology was a two-faced friend anyway. Even if you were the first kid on your block to have the latest, greatest techno-gizmo, the real benefits were extremely short lived. Technology was the worst kind of addiction: the more you had ... the more you needed, the more you got ... the more you wanted. Never enough, there was always something newer, better, faster, hipper ... the technology vortex spiraled down into a lifeless black hole with an infinite gravitational appetite for money.

We all lived it. The Technocratic 80's. Buy, buy, buy. If they made it ... you bought it. Everyone wanted to be first; and a small group of us was first. Everyone who had the funding fueled the fire. The funding often came with serious lease payments and even more serious corporate and personal guarantees. High-tech pioneering is an expensive, risk-intensive business. Ever undaunted, we experienced the rise of Technocracy.

Those were interesting times, the 80's. A privileged few with the super high-tech gear of the day (now likened to stone axes and bear skins), and the specialized knowledge to put it to commercial use, controlled the techno-universe. No one could touch us. We all had licenses to print money. MIDI?

Forget it! Kid's stuff. SMPTE? We own it. You peasants will never be in our techno-league. Digital sampling? Ours alone! We were all living in our high-tech towers,

Shelton Leigh Palmer (Shelly to many friends and associates) is president of Shelton Leigh Palmer & Co. of New York City—a major commercial/post production complex.

paying precious little attention to the technological or financial winds of change.

Then, with all the grace of a cinderblock through a plate glass window, it happened.

The personal computer, the Proteus, SPIII, Sound Tools, Pro Tools, a zillion utility programs, Roland and Korg creating a line of outstanding, affordable musical instruments. For the first time in history, poor, starving musicians could afford "real" high-technology. But what of the high-tech pioneers with the big dreams and the big lease payments? There is some strange, mind-altering ego engine that comes into play whenever anyone gets a new piece of high-tech gear, no matter how inexpensive it might be. When you hear a new sound or see a new special effect, you are temporarily brainwashed into believing that you are the only one in the world who can use this new technology in this particular way. The fall of Technocracy.

MEANWHILE BACK IN 1992

For the music business, this is the most dazzling period of change since Johann Sebastian Bach had his part copyist indicate specific orchestrations. We're talking radical change. Change, that in the long run, will be good for everyone.

In 1880 more than 80% of the population was involved in agribusiness. By 1920 more than 80% of the population was involved in industry. Can you imagine the chaos caused by this technological transition. How many farm hands, feed salesmen, livestock handlers lost their jobs? How many became assembly line workers? How many ways of life were forever changed?

In 1980 more than 80% of the population was involved in Industry. By 2020 some people predict that more than 80% of the population will be involved in Information and Service Businesses. Can a trumpet player from 1980 be expected to learn to play digital audio workstation by 2020?

Our industry is not immune. Imagine the professional synthesizer programmers of 1980's. Their stock in trade was the sounds they created from scratch: Proprietary sounds from which they earned their living.

Enter primitive computer-programmable analog synthesizers. (Prophet 5's & OBX's for those too young to remember.) Now the programmers were on semi-equal footing with orchestrators and arrangers that bought these keyboards.

Then came the age of the DX-7 (circa 1984-86). That was the most confused time and, quite possibly, the saddest. In the same conversation, an acoustic session player would complain about how synthesizers were putting him out of work and then offer to trade you his favorite RAM cartridge for your best piano sound. I really felt for those guys. They just didn't know what they were up against.

ENTER THE AGE OF MIDI.

Technology, amoral in its purpose, slowly and deliberately destroys the livelihood of those who empower it. Keyboard players and programmers alike will continue to loose jobs to the technological ability afforded the arrangers and orchestrators by sequencers and cheap sampling keyboards. Synthesizers putting synthesists out of work. Some will call it divine retribution. Others, with a taste for the bizarre, will smirk at the irony.

Regardless of how this cold blast of reality makes you feel, in 1992, everyone who wants to own a full-fledged, broadcast-quality, audio recording studio can afford one. With the recession in full force, the limits of the average consumer playback systems (car radios, clock radios, home FM Stereos, 3" television speakers and even personal stereos) won't even equal a low-end R-DAT recorder until well into the next century. Audio at an astounding 15k bandwidth and video a sharp, crisp 270 lines. One might argue that the audience has a wee bit of catching up to do. I hear that sometime this year, they're going to offer a Synclavier 9600 free with your subscription to Time Weekly News Magazine. Or maybe that was an AMS Audiofile? I forget which!

THE GREAT EQ

Now that everyone is on a level playing field, something wonderful is starting to happen. Technology and performance skills are no longer at issue. Price, as always, is set by the market. So, for the first time ever in modern music production history, competition is being based on a combination of creativity, experience, presentation and business acumen - not technological superiority. This is truly remarkable.

Since everyone has the same great set of sounds, no one is sufficiently technologically superior to impact ultimate competitiveness. It's a lot like it was in the last century. What made Beethoven standout from his contemporaries? His instrument was the orchestra. Every composer of the day had the same orchestra available, so why was he better?

(I know that the long-hair contingent will argue about how derivative Beethoven's works are, etc. Meanwhile, he's still in the Top 40 on the classical charts.)

TEN YEARS AFTER

Talent alone is not enough. Be it ever thus. It is a combination of attributes that breeds success. And this is where our story begins.

After ten years of constant technological change, it is refreshing to reach this transitory plateau. We, as SLP&CO., see the 90's as a golden age. We did more sessions in 1991 than any other year in our history. We had a higher adjusted gross revenue and a better grade of clientele. All this, in spite of the technological terror we created. And, we are already 185% over plan for 1992. There's more work out there than ever before, you just need to know how to look for it.

There is more to learn now. There are more stop-gap black boxes, more insignificant tangent technologies. The learning curve for most instruments is extreme. It is harder than ever to predict which instruments and devices will survive into the next generation. Where do you invest your valuable time? That, Sherman ... is another story.

It is my sincere hope that all musicians (old or new school) take stock of their own talent and adapt to the tools of the future. The new ways are not worse, they are only different. And, sometimes, different is only a state of mind. db

GREGORY A. DETOGNE

The Recording Arts And Sciences Curriculum At Peabody Institute

HOME OF THE ONLY FIVE-YEAR degree program in recording arts and sciences in the U.S., the Peabody Institute of The Johns Hopkins University in Baltimore, MD recently took delivery of a TEF 20 acoustic analyzer for use in three of its courses. According to Alan Kefauver, the institute's Director of Recording Arts and Sciences, the DSP-powered TEF 20 has already proven to be a great teaching tool.

"It's always helpful in any academic situation to be able to visually and demonstrably reinforce what you discuss in lectures," he believes. "And in an audio environment, the TEF 20 provides an excellent platform to do both."

Emphasizing a hands-on approach to learning, the three classes currently using the TEF 20 are in Musical Acoustics, Advanced Recording, and Sound Reinforcement. "In the musical acoustics class, the TEF 20 supplements the aural experience with a visual one."

Kefauver explains, "The goal of the class is to provide an overview of the dynamic acoustical forces which produce and effect music. With the TEF 20, students are able to actually look at reflective patterns, frequency response, and time response, and apply what these things mean in terms of musical fundamentals, overtones, and attack times. In simpler terms, if we're discussing how a clarinet works, the TEF 20 shows us exactly what a vibrating reed on the end of a tube does in an acoustical sense."

In Peabody's Advanced Recording 1 class, the TEF 20 is utilized during a section on architectural acoustics. The class is broken down into three groups. Then, each group is asked to make various measurements in three different halls where they also make recordings. Following TEF analysis, students report why each hall sounds like it does, and determine how different microphone placements can eliminate flutter echoes and other acoustical problems.

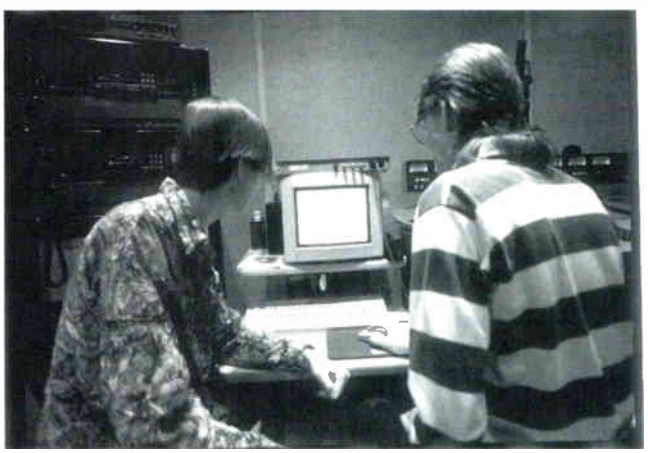


Figure 1. Two Peabody students do a TEF analysis.

Using other basic TEF 20 powers, Peabody's sound reinforcement class covers topics such as loudspeaker placement, coverage patterns, and output capabilities.

(Ed. Note:: Peabody is also adding a course on Audio Test and Measurement. This should include Audio Precision test equipment and DRA Labs' MMLLSA FFT Analyser, made available to the school through Polk Audio of Maryland.)

Students completing the five-year program leave Peabody with a bachelor of music degree in recording arts and sciences. "Students in the program earn over 210 credits during their five years of enrollment."

Kefauver adds, "Once they've completed their stay here, essentially they have gone through the same four years of education that a music major does, *plus* they have completed course work in electrical engineering and recording. I developed this type of educational format purposely because I felt that it was a lot easier to take an accomplished musician and teach them engineering than vice versa."

Powerful, portable, and easy to use, the TEF System 20 represents the latest innovation in the evolution of TEF sound analyzers. Driven by proprietary Sound Lab software available for either Macintosh or PC-compatible computers, it is smaller in size and less expensive than its predecessors. db

BRENT HARSBARGER

AUDIO FOR THE CHURCH

● *Digital the Mini-Series* continues, but first a short recap of our last episode. We talked about number systems, decimal (10) base, binary (2) base, hexadecimal (16) base, and octal (8) number systems. Numbers that use a place value type system are called weighted numbers. Digital systems are based on the binary number system, and use 0 or 1.

A single digital is called a bit, four bits equal a nibble, eight bits equal a byte, 16 bits equal a word, and 32 bits equal a long word. Converting decimal numbers in binary is referred to as coding. There are three types of coding we discussed already: Pure Binary Code, Binary Code Decimal (BCD), and Gray Code. Now that I'm out of breath let's get started with this episode, ASCII and logic circuits.

ASCII is short for *American Standard Code for Information Interchange* which is a special form of BCD code that is widely used in digital computers and data communication systems. It is a 7-bit binary code that is used in transferring data between computers and their external peripheral devices.

The ASCII code represents the numbers, and upper and lower case letters on your computer keyboard, as well as other special characters. The 7-bit ASCII code for each number, letter or control function is made up of a 3-bit group followed by a 4-bit group.

The first 3-bits tell you the column and the 4-bit group tells you the row of that character (see *Figure 1*). There are both 6 and 8-bit special versions of the ASCII code as well, but they are not as widely used.

DIGITAL CHARACTERISTICS

Now we are going to cover the characteristics of digital circuitry. As we mentioned last time, digital is either on (1) or off (0), no in-between. We refer to these differences as *logic levels*. In most textbook learning of digital technology we are taught that bit 1 or digital high is represented by 5 volts, and low or 0 is 0 volts or ground. This is great for learning but is not the case in the real world. There are many types of digital circuits and the actual voltage for high and low vary from type to type, due to the losses of the components used in the various circuits. The 5 volt (high) 1 reference is used because it is the most common supply voltage for digital circuitry; therefore, explaining the on/off operation is simplified using this reference.

Logic levels are also either positive or negative. The explanation

Figure 1. ASCII code.

DECIMAL	GRAY	PURE BINARY
0	0000	0000
1	0001	0001
2	0011	0010
3	0010	0011
4	0110	0100
5	0111	0101
6	0101	0110
7	0100	0111
8	1100	1000
9	1101	1001
10	1111	1010
11	1110	1011
12	1010	1100
13	1011	1101
14	1001	1110
15	1000	1111

DECIMAL	BCD
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

used above—with 5 volts being high and 0 volts being low—is referred to as positive logic. In negative logic the 0 volt would be 1 or logic high, and the 5 volts would be 0 or logic low. A mind twister isn't it? See *Figure 2*.

POSITIVE LOGIC	NEGATIVE LOGIC
BINARY 0 = + 0.2V	BINARY 0 = +3.4V
BINARY 1 = +3.4V	BINARY 1 = +0.2V
BINARY 0 = –6V	BINARY 0 = 0V
BINARY 1 = 0V	BINARY 1 = –6V
BINARY 0 = +1V	BINARY 0 = +15V
BINARY 1 = +15V	BINARY 1 = 1V
BINARY 0 = 0V	BINARY 0 = +5V
BINARY 1 = +5V	BINARY 1 = 0V

Figure 2. The mind twister.

A more accurate definition is when the most positive of the two voltage levels is assigned the binary 1 state, we say that positive logic is being used. Therefore, when the negative or least positive of two voltage levels is assigned to binary 1, we say that negative logic is being used.

PROPAGATION DELAY

The next characteristic of digital technology is *propagation delay*. Propagation delay is the amount of time that it takes for the output of a digital circuit to respond to the input level change. For example, when the input voltage changes from the binary 0 to binary 1 or from the binary 1 to binary 0 levels, the output of the logic circuit will respond at some finite time later.

Another important characteristic of digital logic circuits is

power dissipation. This is a measure of the amount of power consumed by the components in typical logic circuits.

Power dissipation, in milliwatts per logic gate (we will talk about logic gates later), is an average value since the power consumption is usually different for the binary 1 and binary 0 output states. The total power dissipation of the digital circuitry will also determine the size and cost of the power supply.

Two of the characteristics that we have considered so far, namely, *speed* (the ability to go or switch from one binary state to the other, or opposite propagation delay) and *power dissipation* are directly dependent upon one another in all types of digital logic circuits. The relationship between these two characteristics is such that speed is proportional to power dissipation. The faster a logic circuit switches, the higher its power dissipation. In order to get high-speed operation you must accept the penalty of high power dissipation. This trade-off or compromise between speed and power is one of the most important considerations that a digital designer must make in selection of type of logic circuit for a given application.

NOISE IMMUNITY

Noise immunity is a measure of the susceptibility of a logic circuit to noise on the inputs and outputs of a logic circuit. Noise is considered to be any extraneous and undesirable signal generated within the equipment itself or externally, which is added to and appears superimposed on the standard logic levels. All digital logic circuits have built-in noise immunity. Because of the voltage thresholds associated with the components and the circuit, most logic circuits are capable of rejecting noise spikes of a relatively high amplitude. The noise immunity of most logic circuits is from approximately 10 to 50 percent of the supply voltage.

Fan out is a characteristic that indicates how much of a load can be connected to the output of a digital circuit.

FUNDAMENTALS OF LOGIC CIRCUITS

There are two basic types of digital logic circuits, decision-making and memory. Both types accept binary inputs and produce binary outputs.

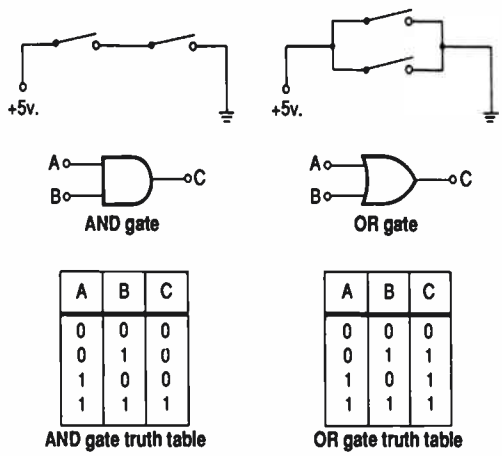


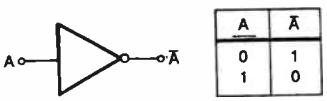
Figure 3.AND and OR gates.

Decision-making logic circuits do what their name implies, make a decision (output) based on the data on the input. Now it's time to talk about that gate I mentioned earlier. The basic element of a decision-making logic circuit is a gate. A gate has two or more binary inputs and a single output. There are two basic gates an AND gate and an OR gate. The AND gate has to have its inputs at the same logic level before a change in output level. The OR gate only has to have a change in the output level. To illustrate this further a supply voltage, switches, and a lamp will explain AND and OR gate (see *Figure 3)*. You will quickly see that the AND gate is like a series circuit and the OR gate resembles a parallel circuit. For instance, let's look at the AND gate in *Figure 3*; if we represented a binary 1 as closed switch and we only closed one of the switches, the lamp would not light because the circuit is not closed. If both switches were closed, or binary 1, the lamp would light indicating it also is at binary 1 state. Below the circuit pictorial are the symbols for their respected gate types, and the truth tables. The truth tables will give you all the various input and output combinations available for a particular gate, or logic circuit.

THE INVERTER

There are actually three basic decision-making logic elements, two we already discussed—the AND and OR gates. The third is an inverter. See *Figure 4* for its sample and truth table. The inverter simply has an output opposite of its input. In the next segment we will discuss the AND, OR, and the inverter in more detail and add to our gate library.

Before I leave you though, I would like to up-date you on the feedback from the two issues regarding education and the test. Although the response to the test was very positive, and many would like



to see some type of certification, or some way of knowing the technical qualification of an individual. The test, however, needs work. The questions were ambiguous, for example question #43 was... The attenuation of sound (in the acoustic environment) is known as—?

The answer I was looking for was *absorption*, although I had others who answered *transmission loss*. Based on the question, both answers are technically correct.

So back to the drawing board. If you are interested in being a part of developing a certification program or testing procedure please write me in care of **db Magazine**.

JOHN BARILLA

THE ELECTRONIC COTTAGE

MASTERING TIPS FOR THE HOME STUDIO: Part II

● It should be clear from Part I of this series just how important an ingredient mastering is in the quest for producing the most impactful final product—whether it be a cassette, a CD, or a soundtrack for video or film. Mastering, as we have demonstrated, is not just a luxury for major releases that come from top professional studios, but a necessity for home studio productions as well. We live in a very interesting age; an age when home studio productions can stand up very favorably to a production done in a half-million dollar studio. Unlike ten years ago, there is no such thing as an easily discernable "semi-pro" sound. Today, that epithet has much less to do with the level of equipment than the level of experience and sensitivity of the operator. Part I of this series showed definitively how many of the techniques used by professional mastering engineers can either be duplicated or at least, emulated in a more spartan studio—provided, of course, that one knows what to shoot for. And finally, we diagrammed a useful signal processing chain which included compression/limiting, EQ, exciting and gating; and while we have touched somewhat on the use of compression and limiting, we are now about to explore the remaining elements in the chain.

THE USE OF EQUALIZATION IN MASTERING

A little bit of well placed EQ can often go a long way to make a somewhat deficient mix sound quite engaging. The very nature of the word, "equalization", reveals precisely what should go on at this stage of the operation. The process involves the experimental discovery of excesses or deficiencies in the audio frequency spectrum and compensating for them. Now, much of this quest is self evident: if there's not enough bass, you add some bass; if there's too much bass, you subtract some bass—and the same goes for the high end. A well trained monkey could probably do that! But where it really gets hairy is in the realm of midrange frequencies. These are very powerful frequencies—not powerful in the sense of moving lots of air (like bass frequencies do), but powerful in the sense that only a few dB of boost or cut at a very specific frequency can really affect the character of the whole mix.

Why should this be so? Because the human ear is peculiarly attuned to midrange frequencies, so a small amount of equalization in the midrange can make a big difference in the way the mix is perceived.

Let's take a closer look at the midrange for a moment. First of all, midrange is not at all a monolithic category: it can take on radically different characteristics depending on which frequency is selected. Midrange sounds actually start down pretty low, say 400-1000 Hz, where the fundamental tone of the human voice and most instruments reside, and it extends upward to the 7-9 kHz where the most strident harmonics can be found. In between these two limits is an area (from about 4-6 k) to which the human is maximally sensitive.

This region is responsible for the overall "presence" of a track: whether it appears to emerge from closer to the source or closer to the listener's ears. Too much of these presence frequencies will put a mix distractingly in your face, but too little will make a mix seem distant and impotent. Obviously, some sort of a balance is needed, and that's why they call it equalization.

5 k is probably the most frequently manipulated frequency in the master engineers palette of sound. It is truly the echelon of first recourse for troubled midrange and can usually provide a quick fix. Rolling-off a little 5 k is often all that is necessary to take the bite out off a harsh mix; and a little boost at 5 k is often all that is necessary to give a life-like edge to a mix that is verging on blandness. Because of the ear's peak sensitivity to this frequency, 5 k is revered as almost a magic number. Many times, an adjustment in this area is all that is necessary.

But sometimes we need to probe a little deeper. Suppose, for example that the mix tends towards the bland side, but boosting 5 k accentuates a nasal quality in the vocal that is not flattering; then the search must go on. Carefully sweeping the frequencies above and below the 5 k region, a "happy frequency" can usually be found which will attain the desired effect without creating an additional problem.

Finding this frequency is sometimes difficult, but one technique that helps is to aggravate the problem first by setting the equalizer for maximum boost and finding the most aggravating sound, and then cutting in the same area. Be careful not to burn out your ears doing this. After you've found the area, give your ears a minute or two to adjust before making your final decision.

Another mid-range problem is vocal sibilance: an excess of "s" sounds. While this problem is best treated before mixing, sometimes a subtle sibilance problem goes unnoticed until two days after the mix. This problem can often be minimized during mastering if you can lock-on to the exact frequency that is causing the problem. Most of the time, the culprit can be located somewhere between 6 k and 8 k, but don't be surprised if you have to look higher or lower. Sibilance is in some complex way harmonically related to the size and shape of the vocalist's tongue/teeth connection. It's usually pretty constant- once you find it- but despite rules of thumb, you may have to hunt for it. Also, while we're on vocals: one major problem that can often be helped by a mastering EQ is a vocal track that is marginally tucked under the music. If you do your sweeps very carefully you can usually stumble on a frequency area that corresponds to the vocal "formant"—a frequency corresponding to the resonances of the physical structures in the skull and throat that are invariant no matter what note is sung. Statistically, these formants usually reside somewhere between 2.5 k and 3.5 k. Boosting in this area can remarkably improve the intelligibility of the lyrics. Complications can arise however, if this same frequency has already been accentuated on another instrument such as a buzzy electric guitar. Still, it's worth a shot. In most cases, a a good compromise can be found.

Before we go on, let's take one last hypothetical case. Suppose a mix has a sufficient amount of low-end warmth on it, but still seems to lack fatness. Bass boost of any sort is futile; it just muddies things up. Where do you look now? Well, chances are you probably have what I call a "midrange hole". This syndrome was caused by the mixer's zeal to make everything sound nice and bright. What gets accented are the ear titillating harmonics; what gets lost are the fundamental tones. A little bit of boost on the lower midrange (400-800 Hz, perhaps even up to around 2 kHz) will usually fill in the hole quite nicely. As with everything in the world of EQ, the converse is also true: a mix that sounds like most people look after a holiday dinner (having a bulge around the middle), can often be trimmed down to size with some judicious cutting in this lower midrange area.

The midrange is a fascinating frequency band. It has many colors, and changes like a chameleon from octave to octave. The best thing to do is to experiment when you have some down time in the studio. Try different experimental EQs and see how they hold up on various playback systems. A good mastering EQ should sound relatively the same whether you play it back on big studio monitors or a small boom-box. Perhaps some of the earth-shaking bass might disappear, but the relative fullness should stay the same irrespective of playback system. The key to this kind of consistency is a properly equalized midrange.

USING AN EXCITER

The process of "exciting" a mix is something that entered into the mastering vocabulary in the mid-seventies with the advent of Aphex's proprietary Aural Exciter. The Aphex process involved synthesizing harmonics—in other words, adding harmonics that don't exist naturally on an individual instrument or on an overall mix. This type of exciting can work quite well in cases where EQ is not effectual. EQ can only bring out a harmonic if it is already present; it cannot add harmonic richness. And even if the harmonics are present but relatively weak in amplitude, added EQ will result in additional background noise—which is not a very wise trade-off.

So, in some cases an Aphex-type exciter is the only tool that will work. My experience is that subtle amounts of high harmonic generation can be added to almost all mixes and will result in a nice shimmer that contributes to lifelikeness and stereo detailing. But let the user beware of excesses here: too much Aphex can be really grating on the nerves. Some wisdom and restraint needs to mediate the whole process. The human ear is notoriously deceptive in its affections towards ultra-high frequencies. It gets used to hearing a certain level of added highs and unconsciously says,"Hmm, if 5 percent Aphex sounds good, 10 percent will sound even better. Right?" Wrong! So be careful, lest you be seduced. So it's best to shut down for a minute and let your ears come back to earth before making a final decision.

It should be noted that there are other devices on the market that could be roughly classed under the category of "exciters". They generally work on different principles than the Aphex process of generating new harmonics. For example, the BBE Sonic Maximizer divides the frequency spectrum up into several bands and makes dynamic adjustments in the various ranges, reducing or accentuating frequencies in response to the program input. The overall effect seems to be making the mix more evenly textured across the board—helping patch up some of those midrange holes I spoke about previously. This can be a really helpful device. In many cases it can eliminate the need for a complicated EQ, and can give a mix lots of punch without getting peaky or harsh sounding. The Aphex and BBE can be used in conjunction with each other, so long as the Aphex is the **last** device in the signal chain.

Another approach to exciting is the concept of upward expansion, as implemented by the Rocktron Exciter/Imager. Radically different from the above two methods, this device adds a narrow-band filtered high frequency component back into the mix in proportion to the amplitude of the program information. It's kind of like a very quick hand on a high frequency equalizer that boosts highs in response to program level. But unlike standard equalization, when nothing is playing (or when signal is low) it closes down, thereby adding no extra noise. The Rocktron exciter is also available with a single-ended noise reduction module (Hush II) that can be helpful in reducing noisy tapes. If your mix is clean you shouldn't need to use it for that purpose, but interestingly I've found another use for the module. Since this is based on the principle of upward expansion (opening a filter envelope in response to program information), if used in a subtle manner it will actually give some punch to a mix that is too placid and uni-dynamical. Snare

drum hits and other peaks—because they trigger the momentary addition of high frequency content—will seem louder and more exciting than before. Obviously, this kind of effect is not something to be used on classical music, but for pop music it works incredibly well.

THE FINAL GATE

Today's digital medium has no tolerance for noise. There is no masking of shoddy engineering by a comfortable blanket of analog tape hiss. So if you are mastering to DAT, you need to be careful of any kind of "idling" noise coming from your console, effects returns, compressors, etc. If your signal is hot enough, these artifacts will never be heard, but when the song is about to start or has faded to nothing, you should be printing absolute silence. Here's where an expander strapped-in as the very last device before your mastering deck comes in very handy. I did say expander and not gate. Why? Because the expander function will usually track a fade much more sensitively than the more switch-like function of a gate. (Actually, if a gate has a release-time control which can be set for more than 1 second, a gate can also be used.) In any case, such a device will assure that your mixes pop into bold relief without any tell-tale noise prior to or after the program.

SOME UNORTHODOX CONCEPTS

If you take the notion of mastering somewhat beyond the classic sense of the word, you will realize that all it really boils down to is that you now have a second chance to make a mix sound even better. For example, in retrospect perhaps you think the mix sounds a little dry. Well, now is your chance to add a touch of reverb. Perhaps a tight ending seems to disappear too quickly. Then how about cranking up your reverb decay time to 5 seconds and activating it on the last chord. Do you wish that the mix had better stereo imaging? How about putting one side into a tight chorus with a 50 ms delay. Want to bring out a center channel guitar solo?

How about feeding both sides into a monaural delay line and folding it back into the center channel—just for the solo. If you EQ the return just right—boosting the frequencies dominant in the guitar and cancelling everything below and above, it will work quite neatly. (Trust me. I know it sounds wacky, but it really works!)

The point is this: you now have an opportunity to make your mix 2 percent, 5 percent or 12 percent better than what it was before you started messing with it: quieter, more dynamic, brighter, more balanced, punchier, smoother, whatever. This is your final word; your last shot before it's out of your hands and into the audience's living room. So go for it. Pull out all the stops. That's what mastering is really all about. db

CURTIS CHAN

Affordable Audio Hard Disk Recording/Editing Systems

We asked the author for an overview / review of the digital audio workstations of today. What follows is just that. Since the author is also a manufacturer of such a product, this report includes an evaluation / report on that product as it was used to produce segments for the Winter Olympics.

FOR MANY DECADES, AUDIO QUALity and its respective technology base were little more than an afterthought in the audio for video post production and programming markets. Audio quality was characterized by such famous quotes as "Throw a mic out there", "We'll fix it in the mix" and the "Three inch speaker theory" meaning the audio quality at the end point dictated the effort expended getting there.

Similarly, the advances in audio technology has also been taking a back seat to video. Fortunately, the marriage of audio and video media in the form of music videos, MTS broadcasting, cable TV, Hi-Fi VCRs, camcorders and the like have dramatically changed our thinking about audio. This new awareness from the public has also caused the professional industries to re-evaluate their own requirements for audio, from production techniques to playback quality. At the same time, companies are becoming more budget conscious and streamline oriented in their operations to be competitive in the marketplace. More and more, companies are looking for products that are cost competitive, have high "earn out" value, meet their operational goals and are user friendly to operate. Additionally, companies are purchasing equipment to help them diversify their operations in the wake of the recession.

Curtis Chan is General Manager of the Pro Audio / Video Group at Roland Corp. US.

Although media compatibility remains a problem, the DAW industry is starting to address a common platform in which files can be exchanged as a first step toward the long road to standardization.

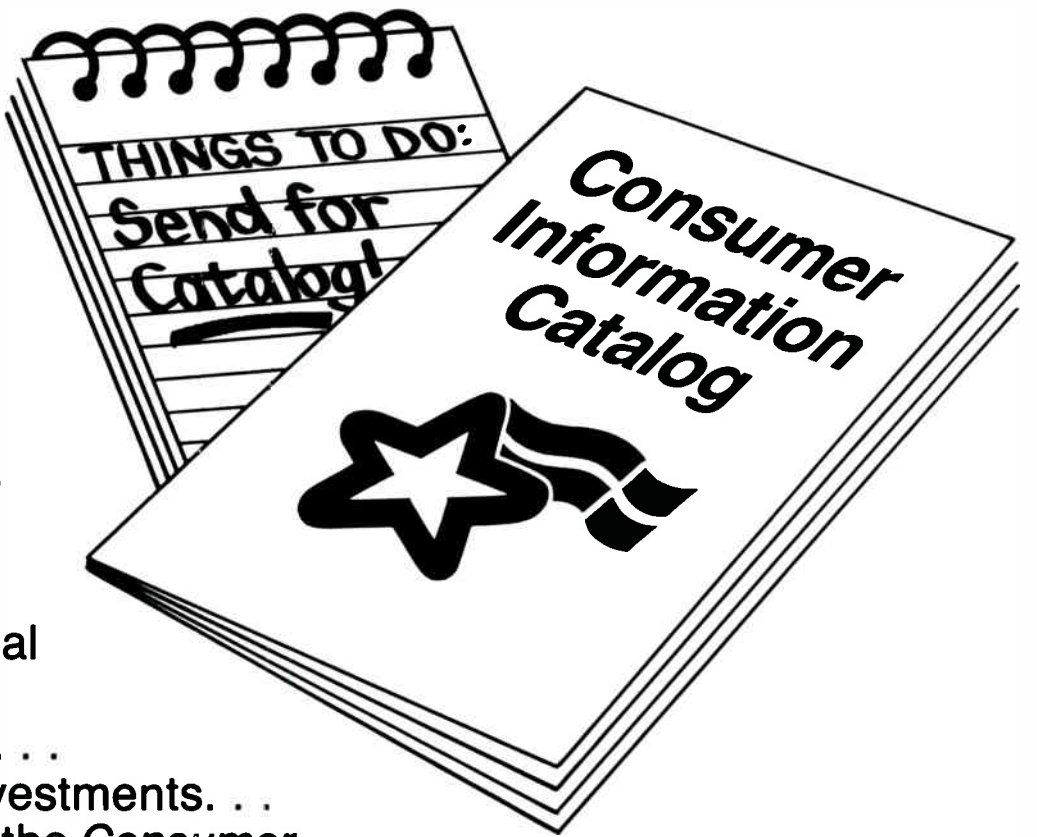
All we have to do is look at the recording industry to see this. The top end studios are becoming boutique studios with select clientele, while the middle ground studios are diversifying to stay alive. All the while, the home and project studios are fast encroaching on the middle markets of what used to be the 8 to 24-track studios.

Within the last decade, we have seen many new products appear that have helped to solidify the importance of audio for both music and in video/film post production. Unfortunately, those products did not change the way the industry dealt with audio until the development of the Digital Audio Workstation.

Since its introduction, the Digital Audio Workstation (DAW) has been changing the way that the industry records and edits audio. The DAW contains five basic parts: a computer processing unit, an operating system, a user interface, an input and output section and a storage device. DAWs offer several advantages to linear based systems. The most basic of which is the random nature in which a DAW such as Roland's DM-80, deals with audio data which results in a more expedient means to produce the end product. In addition, the integration of custom hardware and software results in several useful forms of DSP functions normally found in discrete products such as time compression/expansion, sampling, mixing options, and waveform generation. However, given the time saving, more creative thought can also be given to the audio post production process.

Although media compatibility remains a problem, the DAW industry is starting to address a common platform in which files can be exchanged as a first step toward the long road to standardization. In the interim, the price for DAW

Put Our List On Your List



Our list can help you do the other things you have on your list. Such as buy a car. . . estimate social security. . . start the diet. . . check out investments. . .

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storage memory has substantially decreased over the years so that adding 24-tracks of storage is quite affordable. Recent DAW companies have introduced workstation systems that will allow the end users to purchase their own over the counter drives (which meet certain factory specs) from any computer retailer which saves the end user money that can be allocated to other needs. Roland's DM-80 is an example of this philosophy. Combined with extensive editing features, built-in digital mixer and low cost storage, the DAW offers considerable savings and time over conventional analog systems.

Indeed, the marriage of audio and computer based technologies in the form of a DAW offers the production facility a new way to record, edit, enhance and conform audio for video. But is purchasing a DAW the right answer for your facilities needs? If so, how much should you spend and will you be able to amortize the purchase within your business cycle? And what are some of the criteria used in the development of a DAW? The questions could go on and on. In the last half decade, the audio/video marketplace has become inundated with hard-disk recorders searching for buyers. The successful DAW company of the near future will balance internal product ideas with market research so that the optimal product approach will be engineering and market driven. The result is DAWs falling into three main categories.

The first category is the customized stand-alone integrated system whereby users will purchase a main system platform and add options to suit their requirements. Most of these systems offer options specific to the product. Examples of this type are the AMS AudioFile, Digital Audio Research SoundStation II and the New England Digital Post Pro SD. The primary advantage being able to offer a premium performance product to serve a specific application or narrow market niche. In this case, the end user base and manufacturer indirectly forms a symbiotic relationship in which both parties livelihood is dependent upon each other.For narrow niche high-priced products, the manufacturer is dependent upon their market base to provide a consistent flow of revenue for ongoing product development. Most of these products serve boutique markets where clients buy the creative expertise of the DAW and its user, thereby generating equitable "earn out" to pay for the purchase. These industry leaders and end users assume a certain amount of risk in the form of custom hardware and software to be on the cutting edge.

A responsive manufacturer should listen to the market needs and develop appropriate product. For example: the user interface should be operationally intuitive.

The second type of DAW shares the processing power of a computer platform (IBM/Mac/Atari) with their own plug-in DSP options and/or with a central processing unit. Examples of this type of workstation includes the Sonic Solutions Sonic System, Studer Editech Dyaxis and the Turtle Beach 56k. This type of approach is quite common and is relatively risk free since the main processing system usually is a computer that has a proven track record. However, it should be noted that the performance limit cannot exceed the host computer's raw processing power unless the plug in card becomes the host processing system, leaving the computer's CPU to do just housekeeping and possibly interface communications.

The upside is that the end user doesn't have to pay for the host computer's development and the options can usually run on several platforms. The possible downside is that depending upon the number of companies involved in the hardware/software development cycle and how well the company's service structure is implemented, the end user may be confronted with several companies to call when the system is down.

The third type of DAW is an affordable modular approach which integrates high performance digital audio processing into a self contained unit and utilizes either a dedicated remote or a host computer for a user interface. This type of approach rewards the user with an optimal balance of power because all of the processing is done by the DAW and the computer or remote are used solely as an interactive user-interface. Both units can then be operating at their respective performance peaks. Examples of this type of DAW are the Alpha Audio DR-2, Akai DD1000, Lexicon Opus and the Roland DM-80. Although it is quite possible to develop this type of platform using discrete devices and multiple circuit boards, the drawbacks in terms of cost, real estate, heat dissipation, reliability and hardware dedication should be considered. On the other hand, the ability to develop this type of "affordable" platform dictates the development and usage of DSP and VLSI chip technology. The result is a quality platform that is highly featured, performance oriented, software changeable, reliable and affordable.

A responsive manufacturer should listen to the market needs and develop appropriate product. For example: the user interface should be operationally intuitive. The controls should be intuitively familiar, fast to operate and easy to understand. Currently, an intelligent combination of hardware controls combined with software control seems to be the best solution, also developing an intelligent software interface whose command set can be user-definable through software macros. Perhaps software icons can be called up to redefine menus and their order specific to the operators needs. In addition, the system should have a quick learning curve with ease of operation. Obviously, I am most familiar with the Track Manager Software for the DM-80 which provides extensive help menus and has an online tutorial built-in. Simple operations should be directly accessible through simple steps and not have to go through "new tools" to make life more complicated. Another need would be the ability to expand the basic system either in hard-

ware or software so that technology obsolescence doesn't occur six months after purchase of the system. Other items should be an integrated solution, whether it be a sole device incorporating different DSP utilities or a modular approach where specific devices can be connected to form a system and be able to be controlled via a single user interface or at the most, two; and the product should be accessible to third party vendors to further enhance the system's application breath. The last item is the perception of value.

The pro community has always been faced with paying for advancements in technology.

The new breed of DAW purchasers will look at many attributes of the product in addition to seeing if the company will be around to support it in the future, this also indirectly impacts technology obsolescence.

Crest Films, Ltd—Audio for Video in Albertville

● The 1992 Winter Olympics held in Albertville, France gave Crest Films Ltd. the opportunity to try out Roland's DM-80. Crest produced 20 feature segments for CBS Sport using footage shot from the athlete's point-of-view and highlighting the art and techniques of various Olympic events including luge, bobsled, downhill skiing and hockey.

Alan Teitel, Crest's chief engineer decided to wait until he had the DM-80 to begin work on post production for the Olympic project. Alan felt that of all the hard disc systems he was considering this one was the one with the layout, flexibility and packaging for their task.

Alan used an eight-track DM-80 and two phase change optical drives for all the audio editing jobs. In post production the unit was synchronized with a ¾-in. VTR and for mastering it was slaved to a D2 machine.

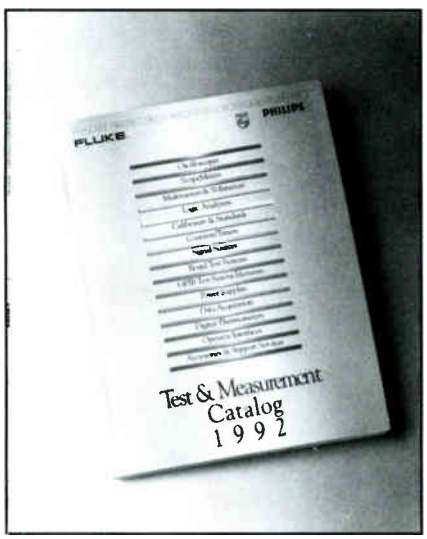
Alan said "We transferred music scores recorded on DAT to the DM-80 and flew in sound effects from our CD library as well as sound effects recorded in the field on DAT.

All audio production was conducted entirely in the digital domain from field recording to mastering.".

Crest is now preparing a commercial for Merrill Lynch and also a company promo and Teitel is very pleased with the sound quality. He commented, "The whole system works great." db

NEW PRODUCTS

CATALOG

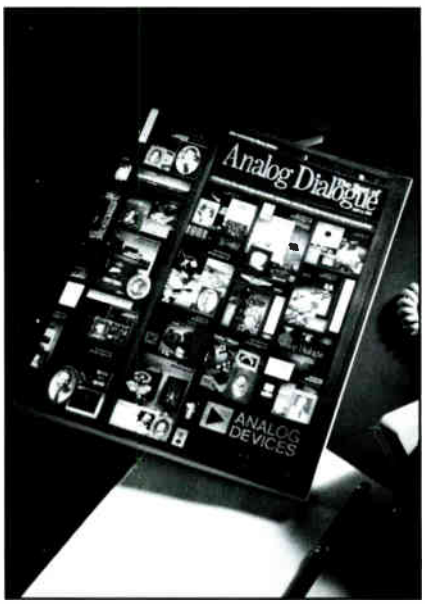


● The 1992 Fluke and Philips Test and Measurement Catalog is a 440-page catalog which integrates the product lines of the two companies into 17 major categories, and a full color introduction section highlights new products in categories such as DMMs, oscilloscopes, ScopeMeters, reference standards, board test systems, timer/counters, power supplies and software. The catalog includes descriptions, photos, specifications and ordering information for over 600 products and customer support services. A listing of the companies application literature and a list of sales offices, technical centers and distributors is also included.

Manufacturer: John Fluke Mfg. Co., Inc.
Price: Free of charge
Circle 50 on Reader Service Card

A BOOK

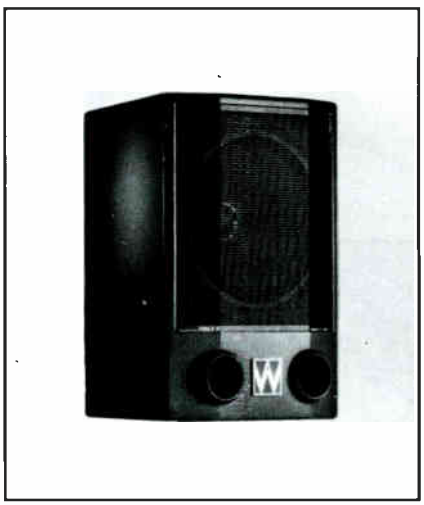
● *The Best of Analog,* a 224-page collection of the most useful and requested material from Analog Dialogue (a company-published technical and applications journal), features articles from the 25-year history of this journal. The compendium features articles, tutorials, and problem-solving products. The collection is arranged in chronological order, with an index to find specific items. As a technological history of the company—and by analogy a major segment of the electronics industry—the subhead of the collection traces the growth and evolution of the company via "A journal for the exchange of operational amplifier technology" to "A forum for the exchange of circuits, systems, and software for real-world signal processing."



Manufacturer: Analog Devices
Price: Free of charge
Circle 61 on Reader Service Card

ENGLISH MONITORS

● Imported from England, Wharfedale Force 9 Loudspeaker are designed and engineered to provide superior clarity in versatile sound reinforcement applications. Force 9 loudspeakers provide the combination of outstanding quality and high acoustical performance within a compact design for portable or permanent installation. The Force 9 loudspeaker has a newly designed SMS coaxial driver featuring a 12-inch silicon impregnated paper cone and a one inch formed titanium compression driver, sharing common magnet. The sturdy enclosure has a ¾-inch thick front panel and ½-inch thick back and side panels, mitered and glued together for precise fit. The coaxial driver mounts on the front panel protected by a perforated steel grille. The loudspeaker weighs only 38 lbs. and has a dimension of 22 x 15 x 14 inches. Extended bass response is achieved by two front firing tuned ports. The trapezoidal cabinet and optional mounting brackets allow for easy arrangement of multiple loudspeakers. A recessed handle permits convenient transportation and positioning. Force 9 drivers are protected from overload by two positive temperature coefficient devices with indicating LEDs flashing on cabinet front. Other specifications include a sensitivity of 98 dB SPL at 1 meter on axis, 1 watt pink noise, a maximum SPL of 122 dB at 1 meter continuous and a 60 degree horizontal and 60 degree vertical nominal coverage. Power handling 250 watts (IEC RS 426A).



Manufacturer: Optim Audio, Inc.
Price: $999.00
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MIDI CONTROLLER/EDITOR

● The PC 1600 is a versatile, easy-to-use MIDI controller and universal editor designed for use in both live and studio applications. Equipped with a variety of control devices, this unit provides an indispensable tool for trouble free editing, quick on-stage adjustments, and precise studio mixing. There are sixteen sliders, sixteen switches, two control voltage inputs, a data wheel, and a MIDI setup string, each of which may be programmed to transmit practically and MIDI command. All of these definitions can be stored together as a PC 1600 preset. Sixteen character names allow presets to be referenced by an entire song title or product name. When using a preset, several "snapshots" of the slider positions can be saved using the SCENE function. These can easily be recalled later for precise mixdowns.

The features of the PC 1600 have not been buried under a slow, confusing user interface. The intuitive user interface allows the user to make quick and painless modifications to existing presets. The powerful copy function and extensive use of the sliders for editing presets reduce most functions to just a few keystrokes.

Manufacturer: Peavey Electronics Corporation

Price: $349.99

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NEARFIELD SPEAKER SYSTEMS

● The advanced designs of the new MS103 and MS63 Ultimate Fidelity Nearfield systems were developed over years of research into the problems of high level reproduction in the near field. Both are true three-way systems uincorporating a 12-in. (MS63) or 15-in. (MS103), woofer, a 6-in. carbon fiber mid-range cone driver, and a waveguide-coupled soft dome tweeter. The engineers also paid particular attention to off-axis response. To maintain dispersion at a constant 120 degrees from 500 Hz up, the MS Series tweeter is coupled to the air using a specially designed WGPTM waveguide. Spectral balance is maintained across the entire soundfield, producing stunningly natural reproduction. A carbon fiber mid-range cone, minimum diffraction baffle, asymmetrical crossover filters and other innovations are added evidence of the MS Series' uncompromising quest for ultimate fidelity at high SPLs.
Manufacturer: Eastern Acoustic Works
Prices: MS103-$1,295.00, MS63-$1,095.00
Circle 53 on Reader Service Card

VERSATILE MONITOR

● This Monitor allows a user choice of four interchangeable horns for the compression driver. The horns in this 12-in. co-axial are easily accessed by removing the grille, and may be replaced or rotated by a simple push and twist. The stage designer may then creatively focus sound where it is wanted by selecting the pattern

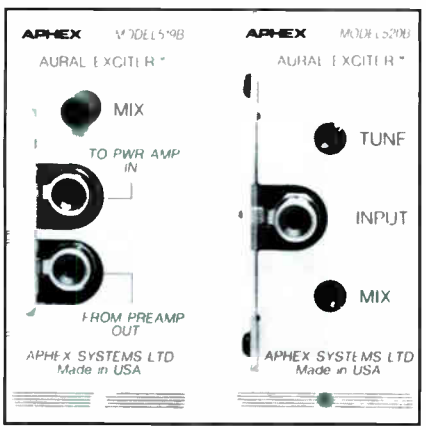
suitable for a particular performer. Sized in less than one cubic foot, the company co-axial format allows high phase coherence and point source imaging, while maintaining a very low profile. The Power Cooling, utilizing less than 1-dB of amplifier input power, cools the voice coils and eliminates heat from the cabinet, thus allowing unprecedented levels of power output, as well as great intelligibility and high fidelity. The active cooling technology enhances stage presence with great dynamics and no coloration. Yet, a single Monitor can offer long-term output of 128 dB. Also these compact monitors are the options of granite or marble cabinetry. Aesthetically distinctive, these solid-stone enclosures will enhance decor, and are specifically designed for church stages and refined performing arts centers.
Manufacturer: Bond ElectroAcoustics
Price: $2,495..00
Circle 54 on Reader Service Card

WIRELESS TRANSMITTERS

● The new L11 Body Pack Wireless Transmitter is 30 percent smaller than its predecessor, the L1, and it features several improvements, including: a new, efficient surfacemount circuitry design for superior mechanical stability and 40-50 percent longer battery life (with no reduction in radiated power); low

noise preamplifier stage for quiet operation; durable ¼-wave trailing antenna for maximum signal radiation noiseless microphone mute switch; adjustable 40 dB input sensitivity range control; and special shielding for increased protection from audio/RF interaction. The L11's cleaner output signal also allows a larger number of L Series Wireless systems to operate simultaneously. Use of up to 10 systems at once is now possible in most geographic areas and 28 frequencies are available. The L11 is available as part of L Series diversity and non-diversity wireless systems, supplied with or without wireless lavalier, headset and instrument microphones. The L11 will also accept inputs from cabled microphones and electronic instruments.
Manufacturer: Shure Brothers Inc.
Price: ranging from $360.00 to $665.00
Circle 55 on Reader Service Card

NEW AURAL EXCITERS



● The Aural Exciter Modules are designed to install in one input module space in the rear of TOA 900 Series, University (Raymer) 9000 Series, Gemco and Peavey MA Series power amplifiers, taking its power from the amplifier. Both models feature a jumper selectable Bass Boost for 0, +6 or +12 db boost. The Model 519B connects to the amplifier's preamp audio output. The Model 520B is a single channel muting input card. Its RCA type phono jack takes any line level unbalanced input. The operating level may be selected for –10dBV or +4dBm in both models.

Manufacturer: Aphex Systems

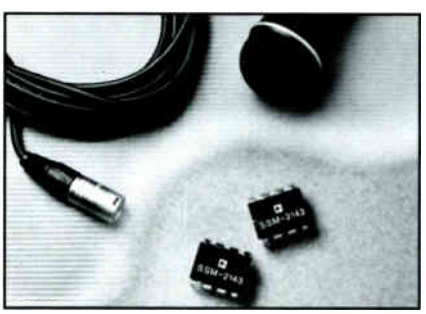
Price: $99.00

Circle 56 on Reader Service Card

COMP/LIMITER

● This new 425 Dual Compressor/Expander/Limiter integrates RMS compression to smooth out dynamic extremes, downward expansion to minimize hiss, hum and other background noise, and peak limiting to eliminate the risk of overload distortion—all in a single rack space. The 425's two channels operate in stereo or dual-mono modes for quick, easy, professional results on single instruments, vocals or complete mixdowns. The combination of downward expansion and compression allows the use of high compression ratios without obtrusive "breathing." At the same time, the peak limiter provides "last resort" protection against overload distortion. Dynamic range is 112 dB and distortion is typically .04 percent. Careful control of time constants and related circuit details lies behind these impressive numbers. Other unique designs include Cross-Couple Active Integrators that combine program-dependent attack times (for ultra-low distortion) with manual Release times (for creative control).
Manufacturer: Symetrix, Inc.
Price:$579.00
Circle 57 on Reader Service Card

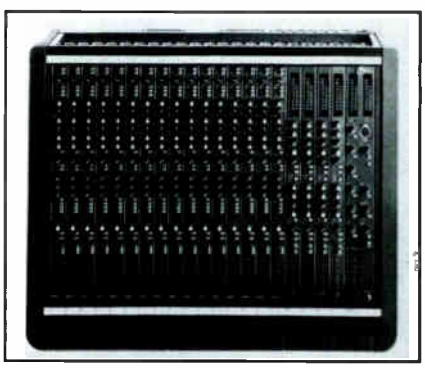
NEW AMP CHIPS



● The SSM-2143 is a fully integrated balanced line receiver system for audio and iindustrial applications requiring high immunity from electro-magnetic interference. The SSM-2143 diferential amplifier with a gain of –6 dB (G = ½) offers 90 dB common-mode rejection at 60 Hz and 85 dB at 20 kHz. Housed in either a single 8-pin miniDIP or SOIC package, the device complements the SSM-2142 balanced line driver introduced earlier this year. Together, the SSM-2142 anmd SSM-2143 provide a high-performance, unity-gain and compact solution to driving and receiging analog signals over long cable runs in noisy environments.

Two gain options make the SSM-2143 flexible enough for use in consumer, professional and automotive audio equipment, as well as industrial applications. For applications requiring gain of ½, its input stage is designed to handle signals as large as +28 dBu (0 dBu = 775-mV rms). A gain of 2 can be realized by reversing the input and reference connections. Slew rate is 10 V/s and total harmonic distortion is 0.006 percent at 1 kHz and less than 0.004 percent over the full audio band, even while driving low impedance loads. Specified operation is guaranteed over the extended industrual temperature range of –40 degrees C to +85 degrees C. The SSM-2143 is packaged in an 8-pin plastic miniDIP. SOIC packaging will be available in Spring 1992.
Manufacturer: Analog Devices, Inc.
Price: $1.75 in 100s
Circle 58 on Reader Service Card

NEW CONSOLES



● Interface, a new series of modular mixing consoles offering several features, come in 8-, 16-, 24-, 32-, and 40-channel mainframes, with the 8-channel version also available in a rack-mount configuration. Various stereo master, group output, and input modules are available.

Four group mixing buses allow the use of up to four group output modules. Six auxiliary buses are also provided, giving six additional mixes with master level controls. Optional input and output transformers are available to isolate the electronically balanced XLR connections.

Interface offers several features not found on competitive consoles, including: Five-element LED level indicators on each channel, for precise indication of channel levels. Padded microphone inputs, which allow for treater input levels without peaking. This feature is especially ideal for situations where high-output signals are encountered.

Auxiliary sends are switchable to direct channel output, enabling one channel to drive an effects device without tying up an entire mix bus. Pre/post switch on auxiliary sends one and two enables use as a monitor or effects send.

Manufacturer: Mark IV Audio, Inc.

Prices: 8 channel-$4,506.00; 16 channel-$$6,984.00; 24 channel-$9,399.00; 32 channel-$12,076.00

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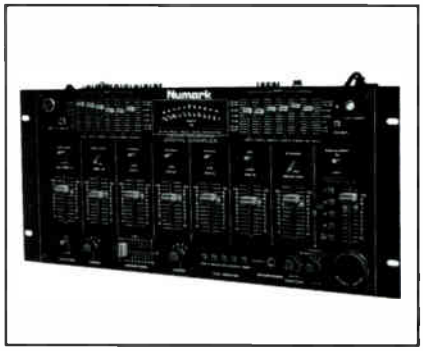
EQUALIZED SAMPLER/MIXER



● The DM1475 is a 4 input channel, rack mountable unit with inputs for 3 turntables, 5 stereo line sources, and 2 microphones. An assignable crossfader allows you to direct any stereo input to the left or right crossfader position for crossfade mixing. For fast, accurate sampling, the DM1475 features push-button source selection and cueing. A large, oversized push-button control provides lightning-fast triggering off the sampler's write and playback functions. Sampled material can be triggered for single or repeat playback at the push of a button. The sampler also allows the operator to switch from the single play (stutter) mode to the repeat (loop) mode without dropping a beat. The repeat mode allows the DJ to grab 4 bars of music and seamlessly repeat forever. A remote jack is provided on the rear panel for use with an optional foor switch (model FS775 for hands-free triggering. The DM1475's front panel also features a dual six-band graphic equalizer for custom sound tailoring and a 12-volt BNC light socket for an optional gooseneck lamp. Other controls and features include LED peak-reading indicator, low-cut filters, talkover switch and master level control.

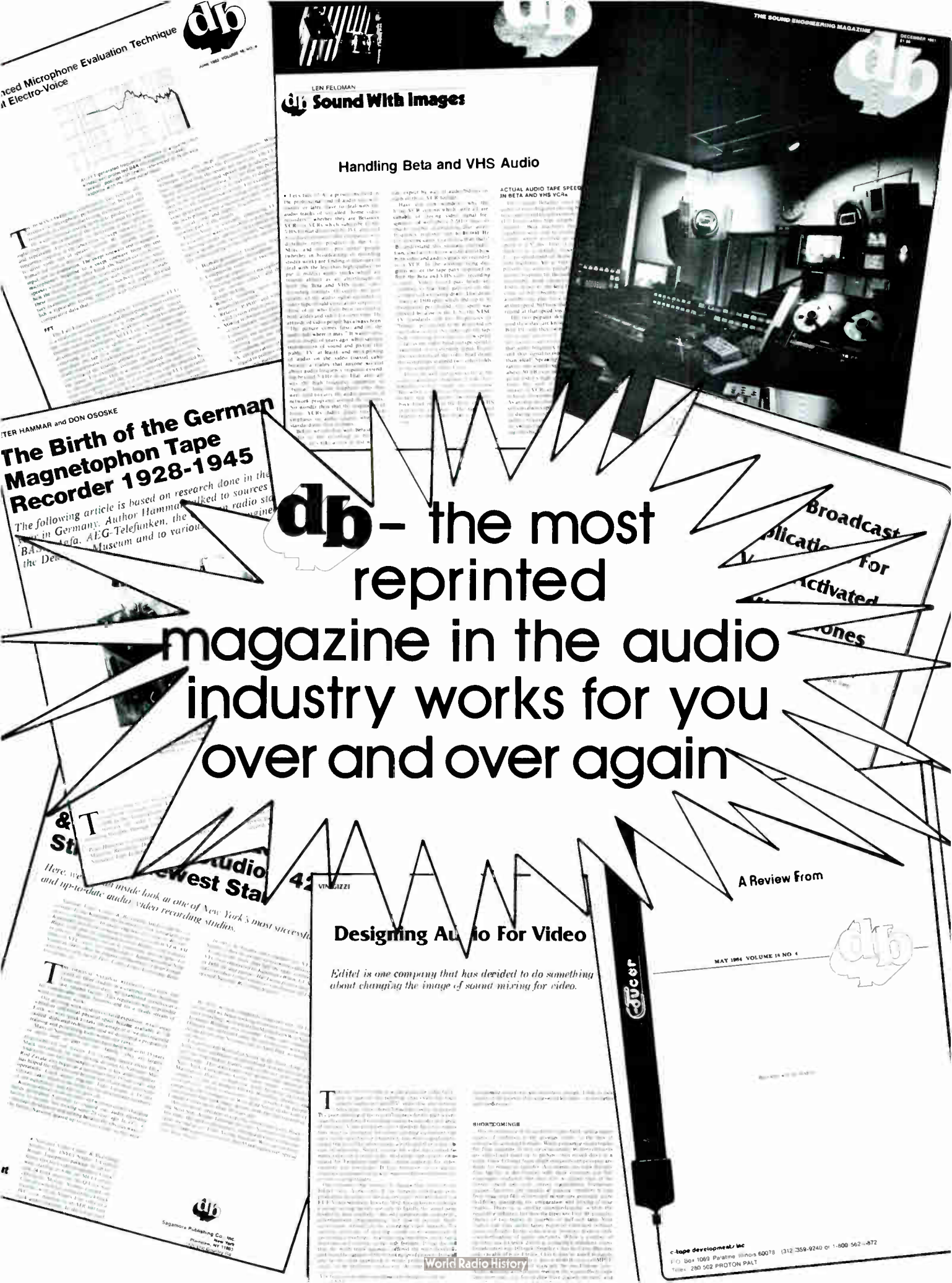
Manufacturer: Numark Electronics

Price: $750.00

Circle 60 on Reader Service Card

Department of Corrections

In Janauary/February's Buyer's Guide on Speaker Systems, computer gremlins struck in a way that we thought could not ever happen. What occurred was that the headlines for amplifiers were placed on the computer generated charts. Just above, the correct heads at full size. Photocopy and paste them in position in that issue.



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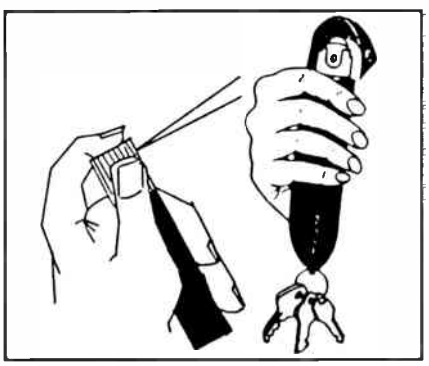
USED TAPE. Ampex 456-¼ 2,500 ft. on metal reels. Less than two years old. No leaders—$7.00/reel; one leader—$6.00/reel. **ASC Tapes, P.O. Box 3752 Hollywood, CA 90078, FAX-818 563-1860.**

AMPEX 440-2 in console, iron motor, works great $1,500. Four track also available. **ASC P.O. Box 3752, Hollywood, CA 90078. FAX-818 563-1860 for details.**

Recording Studios and Broadcast stations work around the clock, so more than most need a safe personal protection device to ward off those who present a threat to safety.



Instantly-Effective BODYGUARD-The Magnum Powered Pepper Spray (5% oleoresin capsicum) has proven superior to Mace, CS and CN tear gas in personal protection. The convenient purse/pocket unit comes in a key ring holster providing you with 25 one-second blasts at a range of 3-5 feet that will render your adversary/attacker helpless from 30-60 minutes with *no* after effects.

Price: $15.00 + $1.50 postage/handling.

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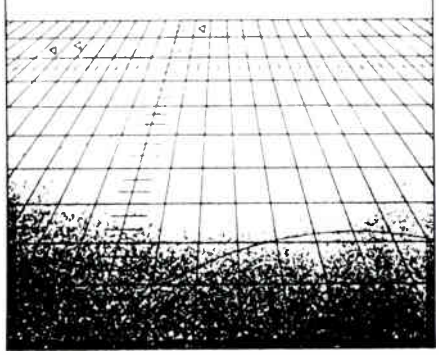


WANTED

TEAC C3RX or Tascam 122 cassette deck. Jim DeClercq, (313) 825-5309 work, (313) 772-4687 home.

Closing date is the first of the second month preceding the date of issue.

Rates are $1.00 per word with a $25.00 minimum. Boxed ads are $40.00 per column inch. db Box Numbers are $8.50 additional for wording "Department XX" plus $1.50 additional for postage and handling.

Quantity discounts are: 3X—15%; 6X—30%.

ALL CLASSIFIEDS MUST BE PREPAID

Send copy to:

db, The Sound Engineering Magazine, 203 Commack Road, Suite 1010, Commack, NY 11725.

Buyer,s Guide Consoles and Mixers

The information on the following pages is supplied by the respective manufacturers. An address list of those manufacturers is at the end of the Guide.

ADVANTAGE (division of Biamp Systems)

Advantage One 7 EX Mic/line Mixers
These mixers are part of a modular mixing "system", which includes automatic mixing, remote control, EQ, gain control, and limitless input/output capabilities. ADVANTAGE ONE includes: 8n mic/line inputs; talk-over muting; phantom power. EX is an 8-channel expander.
Price-available on request

Advantage 601I Mic/line Mixer
These mixers are single rack space, 6 input mixers. Inputs are provided to accept signals from mics, standard line level devices, and devices such as telephone lines, which require a 600 Ohm transformer input. Features include: talk-over muting; phantom power; optional transformers.
Price-available on request.

Advantage PM602 Presentation Mixer
These are rack-mount audio mixers designed specifically for multi-media presentations in board rooms, corporate facilities, schools, etc. It controls audio from video tape, audio tape and compact disc, as well as signals from mics and auxiliary mixers.
Price-available on request

Advantage SCM 7500 Stereo Club Mixer
These mixers are designed as complete control centers for night-club sound. It controls audio from turntables, video and audio tape, compact and laser discs as well as signals from mics and auxiliary equipment. It also includes 6 stereo outputs, sub-woofer output, and extensive routing and patching.
Price-available on request

Advantage 7/3000 Powered Mixer
These are complete sound complete sound systems combining a 7-channel mixer, a 9-band graphic EQ, and a 300 watt power amplifier into a rack mounted package. Features include: 2-band EQ; 2 Aux. sends; mixer output patching; amp-limiter; phantom power.
Price-available on request

Advantage D60M Powered Mixer
These mixers are designed primarily for public address applications with distributed speaker systems. Features include: 2 mic/line inputs; talk-over muting; announcement chime; remote control; mixer output; 9-band graphic EQ; 60 watt amplifier; 25/70 V auto-former table-top or rack-mount.
Price-available on request

Advantage DP/M 28 Distribution Preamplifier/mixer
These are single spaced units, which combine a 2-channel mic/line mixer with an 8-output distribution preamplifier. A "mode" switch allows operation either as a single 2X8 distribution preamplifier/mixer or as two independent 1X4 distribution amplifiers.
Price-available on request.

ALTEC LANSING CORPORATION

3208A Sound Reinforcement Console
This model has 8 inputs and 5 mixing channels. Outputs include stereo left and right, mono and monitor. Each input channel has 3-band EQ, phantom power, multiple effects sends and pre-fade cue, and pre-face record outputs. Unit may be rack mounted. Dimensions-Height: 17.5 in.; Width: 19 in.; Deep: 6 in. Weight is 27 Lbs.
Price- $1,355.00

3216A Sound Reinforcement Console
This model has 16 inputs and 5 mixing channels. In features the model 3216A is similar to the 3208A, except for rack

mounting. Dimensions-Height: 20.75 in.; Width: 29 in.; Deep: 6.25 in. Weight is 40 Lbs.
Price-$1,934.00

3224A Sound Reinforcement Console
This model has 24 inputs and 5 mixing channels. In features this model is similar to the models above, except for rack mounting.
Dimensions-Height: 20.75 in.; Width: 39 in.; Deep: 6.25 in. Weight is 46 Lbs.
Price-$2,640.00

Interface Series Mixing Consoles
These models are suitable for sound reinforcement and recording systems. They are available with 16, (model INT-16P), 24 (model INT-24P) and 32 (model INT-32P) inputs. Each console contains 4 Group Modules and 1 Stereo Output Module. The Mixer configuration is very flexible. There are four mixing sub-groups and six aux buses as well as six independent outputs. The "pro" Input Module features 4-band EQ, high-pass filter switch, 48 volt phantom power, variable gain and insert jacks for connection to external signal processing devices.
Prices-16-channel is $9576.00; 24-channel is $12,888.00; 32-channel is $16,558.00

1700C Modular Sound Reinforcement Mixer
The unit has 6 input ports and 1 output. Traditional bass and treble controls and a high performance limiter circuit are all adjustable from the front panel. This model features phantom power, 2 mode muting with "slave and Priority" settings, high-pass and low-pass controls and remote volume control circuitry. Dimensions-Height: 5.25 in.; Width: 19 in.; Deep: 12.50 in. Weight is 15 Lbs.
Price-$470.00

1689A Sound Reinforcement Mixer
This is a compact rack mounting unit that requires only 1.75 in. of rack space. It has 2 inputs and 1 output. Each input is switchable for either mic or line level. Front panel controls include input level, bass, treble and master volume.
Dimensions-Width: 19 in.; Deep: 8 in.. Weight is 7.5 lbs.
Price-$988.00

1692B Sound Reinforcement Mixer
This 2-channel mixer is a rack mounting unit with 6 inputs and 2 outputs. Each input may be assigned to either or both of the output channels by using convenient front panel switches. Front panel bass, treble, input level and individual output level controls are included. Dimensions-Height: 5.25 in.; Width: 19 in.; Deep: 8 in. Weight is 13 lbs.
Price-$2,248.00

AMEK/TAC U.S. OPERATIONS

TAC B2
Compact modular audio mixing console for video post and sound reinforcement applications, in 8/4/2, 16/4/2 and 28/4/2 formats. All formats available with stereo modules, and both parallel and serial interfaces to most major video editors. Dimensions-front to back: 20.41 in., height: 8 in. width: 17.13 in (8 input) or 26.69 in. (16 input) or 41.03 in. (28 input)
Price-8/4/2: $3,950.00; 16/4/2: $6,207.00; 28/4/2: $9,590.00

TAC BULLET
Similar to the TAC B2, this unit features 4 or 8 buses and LED or VU meter options, with up to 30 inputs. All formats available with stereo modules, and both parallel and serial interfaces to most major video editors. Dimensions-front to back: 20.41 in; height: 8 in.; width: 17.13 in. (8 input) or 26.69 in. (16 input) or 41.03 in. (28 input)
Price-10/4/2: $4,463.00; 16/8/2: $7,257.00; 28/8/2: $11,080.00

TAC SR6000
Sound reinforcement/TV monitoring console, available as 24/8/2, 32/8/2 or 40/8/2. All have eight VCA groups, eight mute groups, plus 10x8 matrix; a split auxiliary system (sixteen sends maximum) plus VCA grouping of outputs; parametric EQ, four stereo line inputs, input metering. Dimensions-(40 input console): front to back: 34 in; height: 15 in.; length: 66.43 in. weight approx. 330 lbs.
Price-24/8/2: $40,943.00; 32/8/2: $50,226.00; 40/8/2: $59,500.00

AMEK BCIII
Multi-format broadcast/production console includes such features as: up to four stereo subgroups, Rupert Neve designed TLA input amplifiers, stereo image controls, M/S capabilities, optional VCAs and the ESM32 serial interface provide AFV control in video post production applications.
Dimensions-vary depending on chassis option
Price-from $17,640.00 for a 12/2 format.

AMEK CLASSIC
Stereo broadcasting console system featuring a wide variety of options, including multi-track monitoring, metering (moving coil, LED bargraph, high resolution plasma bargraph),dynamics and automation ((VCA,GML Moving Fader)
Dimensions-front to back: 39 in.; height: 41 in.; width: 78 in. (32 inputs) or 97 in. (48 inputs) or 117 in. (64 inputs)
Price-starts at about $70,000.00

AMEK EINSTEIN
A new automated recording console aimed at small production facilities, mobile units and project studios. It has sixty-four inputs, all with faders and four band EQ. Optional : SUPERTRUE automation and VIRTUAL DYNAMICS packages.
Dimension-front to back: 41 in.; height: 44 in.; width: 55 in.
Price-$35,000.00 for 64 SUPERTRUE automation-ready inputs.

AMEK HENDRIX
A space efficient, multipurpose, multi-track console based on the technology and concepts used i n the MOZART system. SUPERTRUE automation system now features VIRTUAL DYNAMICS, an option that provides advanced compressors, gates, limiters, expanders and auto-panning through a software-based package. Dimensions- front to back: 46 in.; height: 45 in.; width: 77 in. (40 inputs) or 112 in. (56 inputs)
Price-$93,516.00 for 40 inputs with SUPERTRUE automation

AMEK MOZART
A 32 bus, in-line console with a very high level of automation via the SUPERTRUE system: 15 switches per input module are automated in addition to the fader and mute. The mic and line preamps, EQ section, and bus driver on the MOZART RN Series are all designed to the highest specifications by Mr. Rupert Neve. Dimensions- front to back: 48 in.; height: 43 in. width: 99 in. (40 inputs) or 136 in. (56 inputs) or 170 in. (80 inputs)
Price-starting at $107,882.00 for 32 SUPERTRUE automation-ready inputs

APPLIED RESEARCH & TECHNOLOGY

Phantom Series Consoles
This series is designed for the recording and as a high-headroom live console. The 2408 features include: 16 XLR channels plus 8 additional line channels; multi-function metering; solo and muting per channel; 4 monitor sends; 4 post fader aux. sends; 4 master subgroups and XLR outputs. In addition it has 8 dedicated line returns; panning; soloing; assignable and separate outputs for a two channel control room output, or 2 track tape group submix. Separate XLR talkback input can be assigned to the main or monitor sends. For live applications the 2408 offers 4 monitor mixes; 4 aux. mixes; 24X4 subgroups and independent controls; outputs for each mix, monitor, main and subgroup; channel insert points for each channel, 8 direct outs for solo performer headphone monitoring, stereo headphone outputs, 3-band EQ with para-sweepable midrange, phantom power. The 2408 (24 channels) and the 1608 (16 channels) are rack mountable. The 3208 has 32 channels.
Prices-available on request

ARX SYSTEMS See our ad on page 2

DI-6S
This unit features six active DI Boxes and a six channel line mixer in a one rack unit package. Other features include multiple balanced outputs, individual ground lifts, Ch and master volume, clip LEDs and a headphone output.
Price: $649.00

AUDIO-TECHNICA U.S., Inc.

AT4462
A true stereo field mixer, this unit features two stereo and two center channel pannable inputs, stereo output, a pre-fader "cue" for each input, a unique MODU-COMM™ IFB circuit, and slate tone with internal slate mic.
Price: $1,395.00

AUDITRONICS, INC.

210 Series Broadcast On-Air Console
This unit is available in 4 standard mainframe sizes (6, 12, 18 and 24 dual input modules) with multiple options. It retains all features of classic 200 Series consoles and has many features including optional 3 caller Telephone module.
Price-depending on configuration

310 Series Broadcast Producton Console
4 and 8 track production with 16 track mixdown and overdub. It is available in 6 standard mainframe sizes (16, 24, & 32 input modules) with multiple options. Standard features include 4 Aux send and returns, 4 or 8 output submastering, 4 group master faders, VCA fader control, cue, stereo solo, stereo monitoring, phantom mic power and a complete metering package. Serial interface for Video Editor is available.
Price-depending on configuration

400 Series Broadcast Production Console
4 and 8 track production with 16 track mixdown and overdub. Available in 6 standard mainframe configurations (18, 24, & 30 input modules). Standard features include 2 Aux buses, VCA level control, patch insert switch, LED indicators for machine control status, stereo solo, cue, stereo monitoring and a complete metering package.
Price-depending on configuration

700 Series Multi-Track Broadcast Production Console
24 track production console available in 4 standard mainframe sizes (24, 32, 40 & 48 input modules) to meet the varying needs of the OB van broadcaster. Standard features include all input and output modules, 4 effects send buses, 2 FB buses, 24 multi-track outputs plus direct assign, 9n group master faders, VCA fader control, cue, solo, monitoring, phantom mic power and complete metering package.
Price-depending on configuration

800 Series Broadcast On-Air Console
Brand new, utilizing hybrid technology, it has 3 mainframe sizes (12, 18 & 24 dual input modules). Stereo program, audition, utility and Aux. output buses, 2 mono output buses, 2 line Telco module. It has an extensive user-programmable logic control system. All push button controls are electronic with LED status indicators. All faders are precisely stereo balanced controlling VCA's.
Price-depending on configuration

850 Series Broadcast/Work Station Console

Identical to the 800 series console with the addition of signal processing and routing options electrically and physically in line with input and output modules. This console is a companion to the 800 on-air console and is designed for sweetening and special production with your work-station.
Price-depending on configuration

900 Series Television News/Production Console
Designed specifically for television on-air newscast and production. There are 3 mainframe sizes (24, 32, & 40 input channels). The heart of this unit is a computer controlled Input Preselect System directly addressing your house router system.Set-up memory and recall in supplied with optional alpha-numerical read-outs on each input module. Other versions with and without the computer control are available. Standard features include: 4 Aux. send and returns, 8 output submastering, 4 group master faders, VCA fader control, cue, stereo solo, stereo monitoring, phantom mic power and a complete metering package. Serial interface for Video Editor available.
Price-depending on configuration

BIAMP SYSTEMS

Legend Recording Consoles
These in-line modular recording consoles feature: discrete transistor pre-amplifiers; 3-band sweep EQ with bypass and HPF; 4 Aux. sends, balanced group outputs and tape returns.
Prices-2016 is $6499.00; 3216 is $10,074.00; 3224 is $10,339.00

Columbia Eight-Submaster Sound Reinforcement Consoles
This series is available in 24, 32, and 40 input versions. Features include: discrete transistor pre-amplifiers; 4-band EQ with sweep mids; 8 Aux. sends; balanced inputs and outputs.
Prices-24-channel is $7,699.00; 32-channel is $9,399.00; 40-channel is $11,099.00

Olympia Four-Submaster Sound Reinforcement Consoles
This series is available in 24 and 32 input versions. Features include: discrete transistor pre-amplifiers; 4-band EQ with sweep mids; 6 Aux. sends, balanced inputs and outputs.
Prices-24-channel is $6,699.00; 32-channel is $8,399.00

Newport Four-Submaster Sound Reinforcement Consoles
This series is available in 16 and 24 input versions. Features include: discrete transistor pre-amplifiers, 3-band EQ; 4 Aux. sends, 4 Aux. returns, balanced inputs and outputs.
Prices-16-channel is $2,699.00; 24-channel is $3,383.00

Cascade Stereo Sound Reinforcement Consoles
This series is available in portable 12 and 16 input versions, as well as an 8 input rack mount version. Features include: discrete transistor pre-amplifiers; 3-band EQ, 4 Aux. sends; balanced inputs and outputs.
Prices-8-channel is $1,199.00; 12-channel is $1,759.00; 16-channel is $2,099.00

Rackmax II Stereo Sound Reinfocement Mixers
This series contains many of the same features as the larger Biamp consoles such as: discrete transistor pre-amplifiers; 3-band EQ; 4 Aux. sends; balanced inputs and outputs. The RackmaxIIEX includes: 4-band EQ; 6 Aux sends.
Prices-12-channel is $1,659.00; 16-channel is $1,999.00; 16-channel EX is $2,859.00

MAXXAM Electronic Instrument Mixer
These rack mount mixers are designed primarily for electronic musical instruments and provide input, send and patching capability. Features include: 8 stereo inputs; 8 mono inputs; 2 mic pre-amplifiers; 4 Aux. sends; 4 stereo returns, balanced inputs and outputs.
Price-Maxxam 8+8 is $1,332.00

MIXPAK Powered Sound Reinforcement Mixers
These are complete sound systems combining a multi-channel mixer, a 9-band graphic EQ, and a 300 watt power amplifier into portable 6 and 8 input versions. Features include: 2-band EQ; 2 Aux. sends; mixer output patching amp-limiter.
Prices-6-channel is $714.00; 8-channel is $814.00

CARVIN

FX844 is a sound reinforcement/recording console with 8 in, 4 out capability. It has 250 watt/channel at 4 ohm amplification.
Price: $1,149.00 sold direct only.

FX1244 is as above but with 12 by 4 configuration.
Price: $1,499.00 sold direct only.

FX1644 is as above but has 16 by 4 configuration but no power amplification.
Price: $1,699.00 sold direct only

FX2444 is as above but has 24 by 4 configuration.
Price: $2,299.00 sold direct only

MX1688 is a recording consoles with 16 inputs and 8 outputs.
Price: $2,995.00 sold direct only

MX2488 is similar to the MX1688 but offers 24 in by 8 outputs.
Price: $3,995.00 sold direct only

CREST AUDIO INC.

Gamble Series Ex Monitor Console

Configured with 48 input channels with 16 mono mix buses that feed a 16X16 matrix which feeds 16 output channels, each channel includes 4 band full parametric EQ, 24 dB per octave sweepable low cut filter, stereo aux level and pan, 20 segment LED meter and 8 programmable scene mutes. Has 20 segment LED meter.

Price: $74,900.00

Gamble House Console

The standard console consists of 56 input channels, 8 stereo subgroups, 8 stereo matrixes and a comprehensive internal patchbay. Features on each input channel include: a 4 band full parametric EQ, 24 dB per octave sweepable low cut filter, 10 aux sends, 8 programmable scene mutes and a 20 segment LED meter.

Price: $74,900.00

DDA

Profile Console

This console is equipped with: 24 bus with 24 track monitoring; 56 module chassis which gives 32/24 format; 136 inputs available in mix; 4 band parametric EQ on all modules; split solo in place; full patchbay and automation available.

Dimension-Height: 42 in; front to back: 43 in.; Length: 96.6 in.

Price-available on request

Interface Console

This unit is equipped as follows: 8/16/24/32 inputs; 4 sub groups; tape monitoring; parametric sweep mid range; stereo in place solo; stereo line input options; 6 aux sends; direct out each channel.

Price-available on request

DOD ELECTRONICS

1642 Mixer

This is a 16 line and 8 balanced mic inputs for use as a 16X4 for recording or a 16X2X2 for sound reinforcement. Four discrete mix buses out; 6 configurable pre or post sends; 2 sub groups, solo to mains. There is a convertible table top to rack mount.

Price-available on request

1222XL and 122RM Stereo Mixers

These are 12-channel mixers. Features include: balanced XLR and unbalanced ¼ in. jacks on all channels; two stereo effects return groups; L/R outputs, high mid and low EQ; phantom power, two effects sends per channel, monitor sends. XL model is table top, RM model is rack mount.

Price-available on request

822XL AND 822RM Stereo Mixers

These are 8-channel mixers with the same specs as for the 1222XL and 122RM.

Price-available on request

ELECTRO-VOICE, INC.

BK-42 Series Mixing Consoles

This series in configured in 8, 12, 16 & 24 channel mixing consoles. They have high speed op-amp, three band parametric EQ, and rack mountable versions are available.

Dimensions and prices:

BK-842: Height 5.5 in.; Width 19 in. Length 17.5 in. Weight 33 lbs. Price-$1,250.00

BK-1242: Height 5.5 in.; Width 23.75 in.; Length 20.5 in. Weight 41 lbs. Price-$1,510.00

BK-1642: Height 5.5 in.; Width 28.75 in.; Length 20.5 in. Weight 49 lbs. Price-$1,820.00

BK-2442: Height 5.5 in.; Width 39 in.; Length 20.5 in. Weight 63 lbs. Price-$2,500.00

61/81PMX Powered Mixers

These 6 and 8-channel powered mixers offer features that offer flexibility and convenience for both portable and fixed applications. Features include: 40 volt phantom power supply, digital reverb delay; 9 amps; optimum tone control and individual sends on each channel. Dimensions: 61PMX: Height 6.87 in.; Width 17.75 in.; Length 15.5 in. Weight 25 lbs.

Price-$1,000.00

81PMX: Height 6.87 in.; Width 17.75 in.; Length 15.5 in. Weight 27 lbs.

Price-$1,180.00

200M

This mixer includes a digital MOSFET amplifier capable of delivering 300 watts per channel into 4 ohms. An on-board 30-program Lexicon stereo digital effects processor provides studio quality effects. It also features eight mic/line input channels with a ninth channel having an RCA type connectors for CD/tape and ¼ in. phone jacks for instruments. Dimensions-Height 7.94 in.; Width 18.25 in.; Length 19.5 in. Weight 38 lbs.

Price-$2,798.00

100M

This mixer has a 100 watt per channel powered package for portability and ease of operation. It features 3-band channel EQ, gain control, monitor and reverb send, pan pot and channel peak indicator. Dimensions-Height 6.85 in.; Width 17.5 in.; Length 15.5 in. Weight 25 lbs.

Price-$1,980.00

FOSTEX

Model 2412
Inputs: 24 (48) X 12 X 2; aux sends: 3 X mono; 2 X stereo; monitor outs: mono X 3; aux returns: X 6; echo returns: X 6 EQ: Low/High-shelving; low-mid/hi-mid sweep. Insert send: X 60; insert receive: X 60; solo: in place; stereo muting: X 4 scenes.
Price-available on request

Model 820
Inputs: 12 X 6 X 2; aux. send: 1 effects send: 2 effects returns: X 3 stereo; EQ: low/low-mid sweep; high-shelving; solo: in place; stereo, optional MIDI muting.
Price-available on request

FURMAN SOUND, INC

MM-4A and MM-8A Rackmount Mixers
These are compact utility mixers suitable for sound reinforcement or recording. Features include: four inputs, mono (MM-4A) or stereo (MM-8A) outputs, pan posts on each MM-8A input, effects bus with send and return jacks, stereo auxiliary inputs with RCA jacks and level control, low cut buttons on each input are -3dB at 100 Hz, master fader, headphone amp with front panel jack and volume control. The "B" models also contain balanced ins with both phone and XLR connectors, mic/line switch. The "BP" models are the same as "B" plus 48V phantom power on all inputs and phantom power switch.
Dimensions-Height 1.75 in.; Width 19 in.; Deep 8 in. Weight 6 lbs.
Prices-MM-4A: $339.00; MM-4AB: $379.00; MM-4ABP: $415.00; MM-8A: $399.00; MM-8AB: $445.00; MM-8ABP: $475.00

DJM-8
This production mixer has the following features: eight stereo inputs (2 phono, 6 line) feed four input faders; by-passable crossfader with "Beat Sync" LRD's; 2 talk-over mic inputs with 2-band EQ, dim/mute button; cue button/LED on each fader; headphones can receive stereo cue/program blend or "split mono"; master and two Aux. zone faders; patch points aux switch for external processor; stereo VU meters; output 3-band EQ with proprietary Sub-harmonic Synthesizer; extra outputs for tape dubs (with or without talk-over); lighting system sync and mono subwoofer. Dimensions-Height 5.25 in.; Width 19 in.; Deep 8 in. Weight 12 lbs.
Price $849.00

MIDAS

XL3/16 Console
This console contains the following features: 16 inputs; 18 mix sends; 8 VCA groups; 8 stereo groups; input meters; 4-band EQ parametric; mix matrix; PFL or "solo-in-place". The XL88 Modular Matrix Mixer is an 8-into- line level add on to the XL3/16 or a stand alone mixer.
Price-available on request.

NEOTEK CORPORATION

Elite Series
These consoles are made to order for the recording/production/broadcast market. All products can be specified with a variety of inputs, frame configurations and custom features.
Prices-starting at $59,495.00

Elan Series
These are recording/production consoles with many of the same components of the Elite series, including frame design.
Prices-starting at $36,700.00

Encore Series
This is a film style re-recording console that is built to order.
Price-available on request

Essence Series
This is an ADR/Foley/Effects Lay up console designed for film and television.
Price-starting at $23,900.00

Esprit Series
This broadcast/production console is a new design developed as an on-air board as well as a production console.
Price-available on request.

PANASONIC-RAMSA

WR-S852
A 52/8/8/2 sound reinforcement console with 52 inputs, mono,monitor and submix, 8 groups, 8 aux, l-r output, 4-band EQ, 293 lbs. Dimensions-Height: 12in.; Width: 72.87 in.; Deep: 39.37 in.
Price: $36,300.00

WR-C900
A 32 input theater sound reinforcement console with true l-c-r panning 4-band sweep EQ, 4 groups, 4 aux, 191 lbs.
Dimensions-Height: 12.5 in.; Width: 63.75 in.; Deep: 36.37 in.
Price: $36,000.00

WR-S84OF
A 40 input stage monitor console, has 18 aux, 4-band sweep EQ, and monitor, mono, submix inputs, 293 lbs. Dimensions-Height: 12 in.; Width: 72.87 in.; Deep: 39.37 in.
Price: $38,500.00

WR-8616
A 32-input compact fully modular production console, has 16 + 16 mono, stereo, tape inputs, 4 groups, 4 aux, l-r output, 3-band sweep EQ, 114 lbs. Dimensions-Height: 10.5 in.; Width: 35.83 in.; Deep: 39.72 in.
Price: $12,000.00

WR-T820B
A 20 + 20-input recording console, has mono, tape and line inputs, 8 groups,4 aux and l-r output and can have up to 48 separate inputs for mixdown, 115 lbs. Dimensions-Height: 11.56 in.; Width: 42.125 in.; Deep: 32.75 in.
Price:$8,950.00

WR-S216
A sound-reinforcement mixer with 16 inputs of mono, line, stereo, 3-band mid-sweep EQ, and 3 groups and 3 aux outs, 47 lbs. Dimensions-Height: 5.87 in.; Width: 30.56 in.; Deep: 20.75 in.
Price: $2,850.00

WR-133
An 8-input sound-reinforcement console, user friendly with 2 groups and 2 aux outputs, 2-band EQ, rack mount option, 22 lbs. Dimensions-Height: 6.93 in.; Width: 18.25 in.; Deep: 16.125 in.
Price: $1,290.00

WR-M10A
A multi-purpose rack mixer with 4 + 2 inputs of mono, stereo, phono, 2 groups and 1 aux out, 2-band EQ, built-in compression and auto-mute, 15 lbs. Dimensions-Height: 6.93 in.; Width: 17.43 in.; Deep: 6.125 in.
Price: $900.00

WR-S44 SERIES
These 4-bus sound reinforcement mixing consoles are available with 12, 16 or 24 inputs. Other features include stereo Aux.; master L/R; 3-band mid sweep; balanced I/O, 100mm faders and up to 15/19/27 Aux. sends (depending on model). Dimensions and price-
WR-S4412: Height: 6 in.; Width: 25 in.; Deep: 22 in. Weight 41 lbs.; Price-$1,995.00
WR-S4416: Height: 6 in.; Width: 29.5 in.; Deep: 22 in. Weight 46 lbs.; Price-$2,395.00
WR-S4424: Height: 6 in.; Width: 38.62 in.; Deep: 22 in. Weight 61 lbs. Price-$3,195.00

PEAVEY/AUDIO MEDIA RESEARCH

2400PB Recording Console
This console, part of the production series contains the following features: 32 input channels, each with 8 sends and 4- band sweepable EQ.; 4-dual return channels; 24 submasters, each with two monitor inputs; master section includes MIDI command center, talk back, slate, RTT type patch with 300 patch paints, simultaneous PK/VU LED meter arrays. Dimensions-Height: 14.25 in.; Width: 94.125 in.; Deep: 41.81 in.
Price-available on request

1600 PB Recording Console
This console has the same features as the 2400PB with 28 inputs and 16 submasters. Dimensions-Height: 14.25 in.; Width: 77.625 in.; Deep: 41.81 in.
Price-available on request

2400 Recording Console
Part of the production series,, this console has the following features: 36 input channels, each with 8 sends and 4-band sweepable EQ.; 4-dual return channels; 24 submasters, each with two monitor inputs; master section includes MIDI command center, talk back, slate, 100mm faders. Dimensions-Height: 14.25 in,; Width: 94.125 in.; Deep: 41.81 in.
Price-$15,999.99

1600 Recording Console
The same features as the 2400 with 32 inputs and 16 submasters. Dimensions-Height: 14.25 in.; Width: 77.625 in.; Deep: 41.81 in.
Price-$12,999.99

800 Recording Console
The same features as the 2400 console available with 32 and 24 input channels and 8 submasters. Dimensions-Height: 14.25 in.; Width: 55.625 in.; Deep: 41.81 in.
Price-$11,499.99

AMR 1242 Recording Mixer
This unit has 12 input channels with 3-band EQ with sweepable mid; 2 aux./effects sends, XLR inputs (1-8); direct outs (1-4); assign switch; master section includes left and right main and monitor, 4 tape outs, 2 send and returns, 8 input monitor section, headphone output. Dimensions-Height: 4.625 in.; Width: 30.625 in.; Deep: 24.625 in. Weight 29 lbs.
Price-$1,449.99

LM 8
This is a sound reinforcement/performance mixer with the following features: 8 line level inputs with level, pan, mute and two aux. sends; 2 aux. returns with level and pan control; master left and right out with level control, headphone amplifier, stereo

input jack direct to left and right bus. Dimensions-Height: 7.25 in.; Width: 19 in.; Deep: 8.25 in. Weight 8 lbs.
Price-$299.99

AMR 64
This recording mixer contains the following features: 6 input channels with XLR mic and ¼ in. line inputs, preamp out, 3-band EQ with sweepable mid, insert patch points, assignment switch, aux. send; 4-channel monitor, headphone output L/R master outs, and is rack mountable.
Price-$599.99

PEAVEY/SOUND REINFORCEMENT & PERFORMANCE SOUND MIXERS

Mark VIII
This mixers is available with either 24 or 36 channels with 4-band sweepable EQ; eight aux. sends; assignment switches; PFL; eight submasters with aux. returns with 3-band EQ, PFL; L/R modules with slate; talk back; four matrix mix capability, communications module; clear-com compatible.
Dimensions and price-24-channel: Height: 14.50 in.; Width: 53 in.; Deep: 33.75 in. Price with power supply-$7,999.99
32-channel: Height: 15 in.; Width: 69.50 in.; Deep: 33.75 in. Price with power supply-$9,999.99

XR 1600D
This unit features: 16 input channels with 4-band EQ, 2 monitor and two effects sends; 2X300 watts into 4 ohms; master includes two 9-band graphic EQ's (L/R); effects A & B send and stereo returns; 16-bit digital stereo effects processor with 128 presets. Dimensions-Height: 6.5 in,; Width: 33.5 in.; Deep: 26 in. Weight 59.6 lbs.
Price-$1,999.99

MD III SERIES
These stereo mixers are available in 12 and 16-channel versions with 3-band EQ sweepable mid; 6 aux. sends; pre send and return patch; PFL. Master features aux. inputs to L/R master and all aux. buses, 4-aux. returns; 48 volt phantom power; 12 volt AC lamp socket; 2 LED arrays for L and R master. Dimensions and price-12-channel: Height: 5 in.; Width: 28.75 in.; Deep: 25.375 in. Weight 32 lbs. Price-$1,299.99
16-channel: Height: 4.75 in.; Width: 34.75 in.; Deep: 25.375 in. Weight 37 lbs. Price-$1,549.99

SRC 2400
This model contains the following features: 24 inputs; XLR balanced and ¼ in. unbalanced inputs; pre EQ send and return patch; 3-band EQ with sweepable mid, six aux. sends, PFl, full channel assignment, 4 submasters, stereo mix-down capability, four LED array meters, stereo record output.
Dimensions- Height: 4.75 in.; Width: 52.25 in.; Deep: 25.375 in.; Weight 54 lbs.
Price-$2,599.99

CD 9072
This model has CD/phono switches on all three phono music inputs; 4-way assignable crossfade switches; seven music inputs; mic effects loop; 7-band graphic EQ; cueing; 3-band EQ for both mics; twin beat eights; full stereo metering; headphone out with volume slider. Dimensions-Height: 10.50 in.; Width: 19 in.; Deep: 3 in. Weight 8.4 lbs.
Price-$399.99

Series 3680
Contains 36 inputs with 8 aux. sends; PFL; pre EQ send and return patch; 4-band sweepable EQ; 8 submasters with PFL; post slider send and return; aux input; 8 stereo aux. returns; matrix mixes of all subs and L & R; slate, talkback; intercom controls. Dimensions-Height: 14.625 in.; Width: 69.5 in.; Deep: 33.625 in. Weight 190 lbs.
Price-$10, 999.99

Series 2480
Same features as the Series 3680 with 24 inputs.
Dimensions-Height: 14.5 in.; Width: 53 in.; Deep: 33.5 in.
Price-$8,999.99

PZS Series Mixer
This mixer has 5 input channels with terminal strip inputs; four zone switches per channel; high & low EQ; level control; 2 mic inputs with paging capability; separate zone level control for all four zones; load impedance matching. Dimensions-Height: 5.875 in.; Width: 17 in.; Deep: 11.5 in.
Price-$459.99

RANE CORPORATION

SM 26 Splitter Mixer
This splitter mixer is designed for live sound and features master stereo inputs; 6 aux. inputs; 6 aux. outputs and master stereo outputs with separate level and mix/pan controls. The SM 26 can be operated as a line level splitter, mixer or both simultaneously, with high-current line drivers and 12dB gain. Dimensions-Height: 1.75 in.; Width: 19 in.; Deep: 5.3 in. Weight 5 lbs.
Price-$349.00

FLM 82 Stereo Line Mixer
Designed for recording, live sound and broadcast, this line mixer consists of four pairs of inputs (stereo); Master A and B outputs and two aux. loop jacks which may be used as direct aux. outputs. Also provided are flex bus in and flex bus out connectors so this module may be combined with other Rane Flex Series mixer modules to create mixing systems of complexity and flexibility. Control for each pair of inputs include concentric input level controls along with concentric aux. send controls. HR format. Dimensions-Height: 8.5 in.; Width: 1.75 in.; Deep: 8 in. Weight 4 lbs.

Price-$399.99

FPM 42 Progam Mixer
Built for recording, live sound and broadcast, this mixer is a four input, two or four output microphone or line level mixer. Four 3-pin XLR inputs are included on the rear panel for input connections. Outputs are delivered to two ¼ in. tip ring sleeve outputs. Flex bus in and out connectors are also included so this module may be combined with other Rane Flex Series mixer modules to create mixing systems of any complexity and flexibility. Controls for each input channel include an input level control and aux. send control. A concentric master A and B level control is supplied to regulate the output level. HR format.
Dimensions-Height: 8.5 in.; Width: 1.75 in.; Deep: 8 in. Weight 4 lbs.
Price-$429.00

SM 82 Stereo Line Level Mixer
This unit for recording and sound reinforcement is an eight input stereo line level mixer. Eight pairs of ¼ input jacks supply signal to eight level controls and eight aux. send controls. Each of the eight stereo input channels also include a balanced control allowing proper positioning of the input signals in the stereo mix. A left and right aux. send jack is provided along with a left and right aux. return. Main expand and aux. expand jacks are provided allowing more than one SM 82 to be used in a system. Dimensions-Height: 1.75 in.; Width: 19 in.; Deep: 5.3 in. Weight 5 lbs.
Price-$599.00

FMI 14 Mixer/Microphone Preamplifier
This is part of Rane's Flex series designed for recording, broadcast and sound reinforcement. The input module is a complete mic mixing input channel. It has super low noise/distortion mic input stage and a 3-band accelerated slope EQ. Each of the two aux. send source points may be chosen from three locations: pre-EQ, pre-fade, or post-fade.
Dimensions-Height: 8.5 in.; Width: 1.75 in.; Deep: 8 in. Weight 4 lbs.
Price-$349.00

FMM 42 MIXER
Built for broadcast and sound reinforcement, the master module can function as a master output module in a regular mixer; primary functions include master bus A/B level controls with insert looping capability. The unit can also function as a stand-alone paging module with input provisions for mixing one or two line level signals to be ducked by the paging microphone. It also features ducker threshold and depth adjustment, ducker on/off switch, stereo/mono line level input and master output LED meters.
Dimensions-Height: 8.5 in.; 1.75 in.; Deep: 8 in. Weight 4 lbs.
Price-$349.00

FPM 44 Program Mixer
For recording and broadcast this is a 4 input, 4 output mic or line level mixer with phantom power available. It features terminal strip in and out; pre post aux. assigns. The unit has 2 master A/B outputs and an aux. A/B output with aux. send controls from each input. Input stage gain is switchable between 10, 40 or 60 dB and monitored by an overload LED on each channel. Dimensions-Height: 8.5 in.; Width: 1.75 in.; Deep: 8 in. Weight 4 lbs.
Price-$399.00

SIEMENS AUDIO INC.

NEVE VR Series Consoles
Multi-track recording consoles for the music industry with total storage and recall of virtually all console settings. Operable in automatic or individual channel mode, with high-resolution color graphic display. Console inputs of 36, 48, 60 72 and beyond.
Price-available on request

NEVE VRP Series Consoles
Multi-track consoles for audio, video post and film recording with total storage and recall of virtually all console settings. Dolby matrix monitoring on switchable four or eight-track buses up to 48 tracks; four and eight-track to stereo or mono television feeds; independent master recorder and stereo monitoring; separate feeds for music and effects; inset switching for Dolby DS4 matrix with solo interrupt; two and four-channel LCRS (left/center/right/surround) monitoring.
Price-available on request

NEVE Flying Faders Automation System
4th generation of moving systems from Neve, with expanded 12-bit resolution providing accuracy to over 4,000 digital steps. Allows all level to be stored to 1/10th dB accuracy. System is retro-fittable to all Neve consoles and most consoles from other manufacturers to a maximum of 256 moving faders.
Price-available on request

NEVE 66 Series
This series of stereo TV broadcast and production consoles have features which include an integral microprocessor controlled reset system for switch status and input gain, with an optional system able to restore other rotary controls and fader settings. Other features include: dual input mono and stereo mic/line channels; multiple clean feed system (mix-minus); 4-band parametric EQ; silent matrix switching; four or eight stereo groups; up to 12 mono and two stereo auxes.; and 24 or 32-track recording and post-production options.
Price-available on request

AMS Logic 2
This is the first large-format, stand-alone, all-digital post production/recording/mixing console in North America. Each channel strip controls 4 completely independent mono or stereo signal paths. 27 faders can control up to 108 fully equipped stereo channels, 63 up to 252. Features total dynamic automation of all functions and 48 fully automated aux sends. 8 main

outputs, 16 aux. 64-track routing. Totally re-configurable from stored set-ups, it integrates fully into the TV, film or post production environments.
Price-available on request

NEVE 44 Series
This is a new range of compact audio consoles for broadcast and video-post editing applications. Features include: stereo and mono input modules and 2 main stereo outputs; separate mic (transformer balance) and line (electronic balance) inputs on the mono module, plus line level (electronic balance) input on the stereo module. Selectable 3-frequency high pass filter followed by 3-band EQ with sweepable mid-bands. Provision for ESAM-II interface is also included.
Price-available on request

DTC-2 Digital Transfer Console
An enhanced version of the Neve DTC-1. New equalization consists of 2 pairs of selections for LF and HF, with a full range of peak/shelf responses in both sections. Mid-range band coverage between 1000 Hz and 3150 Hz with a choice of up to 7 different Q values. A/B store system to facilitate comparisons between different EQ settings. Optional dither as cure for low level distortion. New Neve A/D and D/A converters include special anti-aliasing and anti-imaging filters resulting in s/n figures exceeding 102 dB.
Price-available on request

SAJE-INFOSCÈNE TECHNOLOGIE INC.

The Memory Console in standard version contains 4-8 fader block 4-8 VU8 meter blocks and the computer. The separate audio rack can contain 16, 24, 32, 40 or 48 input modules, 8 dual output modules, monitoring serial interface and power supplies.All of the operating parameters of the console are digitally-controlled so they can be memorized and thereby benefit from the power of the host computer. Many options including SMPTE/EBU and MIDI control are available.
Price-available on request

SHURE BROTHERS INC. See our ad on Cover IV

Model M267
A microphone mixer with limiter designed for studio, remote or sound reinforcement use. 30 to 20,000 Hz; 120/240V AC; four switchable mic or line level balanced inputs with individual gain controls and low frequency roll-off switches; feedback-type gain controls for maximum clipping levels and dynamic range. Dimensions-Height: 2.72 in.; Width: 12.16 in.; Deep: 9 in. Weight 5 lbs. 2 oz.
Price-$520.00

Model M268
Portable microphone mixer designed for sound reinforcement, tape recording, and audio visual systems. 40 to 20,000 Hz; 120/240V AC; four low-impedance balanced and four high-impedance unbalanced inputs; high-level aux. input for tape, tuner and accessories. Dimensions-Height: 2.72 in.; Width: 12.16 in.; Deep 9 in. Weight 4 lbs. 1 oz.
Price-$315.00

Model FP31
Portable ENG/EFP/film production mixer for remotes. 30 to 20,000 Hz; battery power; three transformer-coupled, 3-socket XLR connector inputs switchable to low-impedance mic or line level; 2 transformer-coupled 3-pin XLR-connector outputs switchable to low-impedance balanced mic or 600 ohm balanced line level. Dimensions-Height: 1.875 in.; Width: 6.31 in.; Deep: 5.31 in. Weight 2.2 lbs.
Price-$1,065.00

FP32
Portable stereo ENG/EFP/film production mixer for remotes. 50 to 15,000 Hz; batter power; 3 transformer coupled, 3-socket XLR connectors inputs switchable to low impedance mic or line lever; transformer coupled left and right 3-pin XLR connector outputs switchable to low impedance balanced mic or 600 ohm balanced line level. Dimensions-Height: 2.31 in.; Width: 7.25 in.; Deep: 6 in. Weight 2.5 lbs.
Price-$1,450.00

FP42
Compact, self-contained stereo mixer for broadcast, recording and sound reinforcement. 30 to 20,000 Hz.; 120/240V AC or battery power; 4 transformer coupled XLR inputs each mic-line switchable with low-cut filters and cueing function; left and right channel transformer coupled XLR outputs with mic line and mono stereo switches.
Dimensions-Height: 3.125 in.; Width: 12.22 in.; Deep: 9.06 in. Weight 6 lbs 8 oz.
Price-$1,020.00

FP51
A compact, portable, gated memory compressor combined with a four input, one output mic mixer designed for broadcasting, recording and sound reinforcement. 30 to 20,000 Hz.; 120/240V AC or battery power; extremely low distortion, noise and RF susceptibility with wide flat frequency response at all compression levels. Dimensions-Height: 3.125 in.; Width: 12.22 in.; Deep: 9.03 in. Weight 6 lbs. 1 oz.
Price-$965.00

FP410
A portable automatic mixer for broadcast and corporate video use, featuring Shure's patented IntelliMix circuitry. Keeps unused open mics turned down and instantly activates them when needed. Handles up to four mic or line level signals. Front panel channel gain and master controls operate as in conventional mixers. Dimensions-Height: 1.75 in.; Width: 14.5 in.; Deep: 8.25 in. Weight 5 lbs.
Price-$1,595.00

SOLID STATE LOGIC

Ultimation G Series Console Automation System

SSL's combination moving fader/VCA console automation system with three modes of operation. Ultimation can work as either a dedicated VCA system, a dedicated moving fader system, or in a way that combines features of both systems. Ultimation is an extension of the G Series Automation, and is available as a standard option on all new G Series consoles or as a retrofit to any console using the G Series computer.

Price-available on request

SL 8000 Multi-Format Production System

This is an advanced post-production console, suitable for everything from music scoring to stereo surround sound mixing. It can work in any current or proposed format, but is particularly suitable for TV post-production with up to 4 stereo stripes; Dolby Surround TV post-production, film production from 4 strip LCRS to multiple DMEF dubs, 5/6 channel discrete mixes for HDTV, Dolby SR-D or Kodak CDS.

Price-available on request

SK 4000 G Series Master Studio System

The latest development in the classic Master Studio Design, the G Series features the most advanced signal processing and the new G Series Studio Computer, which utilizes 20 megabyte data cartridges, a full size keyboard and new software that handles large and complex mixes effortlessly, on and off line. It is also equipped with the Total Recall Computer. Options for the music production system include oxygen free cable for improved sonic performance, plus a choice of both G Series and E Series equalizers.

Price-available on request

SL 5000 GP

A production version of the SL 5000 console, it is specifically configured for television and radio production, and on-air presentation where routing flexibility and multiple output capability are essential. It offers 24 mono and 8 stereo channels with full EQ and routing to the main program bus, plus an additional 12 stereo balanced mix buses that are used for subgroups and independent main outputs. Options include Instant Reset and Total Recall computer systems, together with an auxiliary system and dynamic fader automation.

Price-available on request

SONY COMMUNICATIONS PRODUCTS COMPANY, PROFESSIONAL AUDIO DIVISION

MXP-3056 VF

This audio recording/remixing console is intended for use in recording studios. It has 56 channels which allows for interfacing with the Sony PCM-3348 digital audio multi-track recorder. Each input/output module features modular equalizers and mic/line pre-amplifiers. The Audio Group Master (AGM) function allows for audio grouping on the ACN bus and conventional in-line operation.

Price: up to $100,000.00 depending on configuration

MXP-3036 VF

Designed with a vacuum fluorescent (VF) light meter that displays various selectable scales including VU, BBC Peak, Din Peak, Nordic Peak and a d.c. scale. This d.c. scale indicates fader position in the automated version of the MXP-3036 VF. The automated version includes Version 2.0 software and optional wild faders that permit a user to increase the number of effects in a mix.

Price: up to $110,000.00 depending on configuration

MXP-3000

This series is a modular 24-bus console primarily intended for music recording applications. Available in 20-, 36- and 56-input frame sizes with many options including five types of equalizers, four input configurations, and automation choices.

Price: $55,000.00 to $200,000.00 depending on size and configuration

MXP-2900

The audio consoles is a modular audio-for-video system available from 8 to 36 inputs in four frame sizes. Extensive video interface options are available, mono and stereo modules, built-in compressor/limiters, and extensive routing and communication capabilities.

Price: $15,000.00 to $45,000.00 depending on size and configuration

MXP-290

An 8-input mixer designed primarily to be used in conjunction with a video editor in a post-production environment, it offers microphone, balanced, and unbalanced inputs on each input channel and balanced outputs, an internal audio edit preview function also included.

Price: $3,819.00

MXP210

This has all of the features of the MXP-290, except those related to video editor interface, the MXP-210, like the MXP-290, offers excellent audio performance in a rack-mountable mixer.

Price: $1,992.00

MX-P61VU

A 12-channel audio mixer. It is equipped with 12 mic/line inputs and 4 line outputs. Features include built-in 1 kHz test tone for precise level setting, high-cut and low-cut filters for convenient bandwidth limiting and a.c./d.c. operation.

Price: $10,675.00

SOUNDCRAFT

Delta Consoles

Delta 8-mono, stereo input modules w/various equalizer configurations; 6 aux. sends; 4 to 8 bus available w/8, 16 track tape monitor returns. Delta Monitor-10 mono & 1 stereo monitor mix for stage monitor and production foldback. Up to forty inputs frames available.

Price-from $3,900.00 to $20,000.00

Venue

8 bus live: 16, 24, 32 or 40 channel available; 8 plus 2 receive matrix section with meter bridge and center master section standard in larger frames. Inputs include 6 aux. sends; 4-band EQ; phase reverse; patented pad-less mic preamp; 4 mute groups.

Price-from $11,000.00 to $26,000.00

Sapphyre

Multi-track/production console w/in-line monitoring and sophisticated film/post features. Channels have 4-band EQ; integral noise gate for signal control; signal routing includes 6 aux. sends; track buses available as additional aux. sends; mono and stereo inputs available, full metering standard. Available in patchbay version also.

Price-$25,000.00 to $55,000.00

6000 Auto

16 or 24 bus recording console. Each input has 6 independent sends and 4-band EQ with 2 sweepable mids. Features include PFL and true solo in place; low crosstalk routing matrix; silent electronic muting. Available in 16-56 input versions. Automation package includes faders; mutes; VCA groups and noise gates.

Price-$12,000.00 to $52,000.00

Spirit Consoles

Live consoles-8, 16, 24 inputs w/ 3-band EQ; two sweep controls; high pass filter; 4 aux. sends; separate stereo/mono bus assignment allow various routing possibilities. Studio consoles- 16, 24 inputs w/ in-line monitoring for up to 56 inputs w/ EQ on all paths.

Price-$1,295.00 to $5,650.00

Spirit Monitor

This is a 24 channel console with 8 monitor outputs designed for on-stage monitoring applications. Each input module has balanced mic and line inputs with a 3-band, two sweep EQ design; high pass filter and polarity reverse. A 60mm fader controls the signal level sent to the eight monitor send controls. An ON and Pre Fade Listen control with LED indication complete each module.

Price-$5,650.00

Europa

This is Soundcraft's newest live reinforcement console. Frame sizes range up to forty inputs, each size standard with 4-band parametric EQ; integrated noise gate; eight VCA subgroups and eight mute groups. The VCA Soloing system incorporates solo clear. Full metering on all inputs and groups included. All inputs and outputs are balanced along with fully differential balanced busing. Twelve aux. sends each with individual on/off complete the module.

Price-from $35,000.00 to $60,000.00

Delta Ave

Audio production, audio follow video capability. Up to 16 inputs, mono or stereo. External control via parallel, GPI or Serial. Supports ESAM 1, ESAM 2, GVG 100; AMX 100; other popular protocols both in eavesdrop and reply mode.

Price-$6,000.00 to $20,000.00

STUDER/REVOX

990 Console

This is Studer's top of the line, digitally controlled console that is suited to a variety of applications including multi-track music recording and production, radio and TV broadcasts and post production. The 990 is available in sizes from as small as 20 inputs to as large as 80 inputs with up to 48 buses. There are optional modules available such as mono and stereo inputs, mono or stereo submasters, dynamic processors, in-line monitoring, bargraph and VU metering. Snapshot automation is standard with optional PC Graphic Control Unit for dynamic automation and all store and recall functions.

Prices-starting at $150,000.00

961/962 Console

This console is designed for a wide range of applications including post production, remote recording, on-air broadcasts. Features include up to 16 inputs; 4 master outputs; 2 aux. outputs; 3-band EQ on each input; compressor/limiter on outputs. An optional editor interface is available as well as a comprehensive range of peripherals and accessories.

Prices-starting at $13,4000.00

900 Series Consoles

This series can be configured for post production, on-air TV broadcasting, multi-track recording and other production tasks. Features include 12 to 60 inputs with 4-band EQ; mono or stereo inputs; multiple stereo masters. Moving fader automation is available. Outputs can include compressor/limiters. The 900 series can be customized to exact user requirements.

Prices-starting at $50,975.00

963 Console

This console offers flexibility for a wide range of music and broadcast applications. Housed in an extremely compact unit, it is available with 16 to 56 inputs; up to 8 subgroups; 2-4 masters; 3-band EQ on each input; a compressor/limiter on outputs. Alternate input modules, input pre-selectors metering, monitor mixes and machine remotes are available.

Prices-starting at $48,900.00

A779 Console
This is a compact, portable mixing console with 6 mono or 6 stereo inputs. Features include EQ;l 1 aux. bus and stereo master output. Designed for video edit suites, mobile and remote applications.
Price-$4,500.00

SUNN a division of Fender Musical Instruments

PSM-8 Mixing Console
This is a personal stereo mixer which includes 8 input channels, each with trim, effects send, bass and treble controls and pan control. Master section includes master faders, aux. and effects returns and headphone output.
Price-$419.99

RMX 4110 Mixing Console
This is a rack mount mixers whose features include 10 input channels; stereo and summed mono outputs (balanced & unbalanced outputs); monitor; effects and aux. (3-buses total); 3-stereo return lines; 3-band EQ; trim control; 6 rack spaces; three 12 segment LED output displays.
Price-$899.99

MX 4212 Mixing Console
Features include 12 channels each with high and balanced low impedance inputs; trim control; 3-band EQ; 3 send buses (eff/reverb, monitor and aux.) with internal jumper for pre/post assignment; pan; individual cue bus and precision channel fader. The master section includes phantom power; reverb; 2 switchable LED bar graphs; 4 master faders (program L/R, main, monitor); complete compliment of return controls; and cue with headphone jack and level control. Additional features include individual channel in and out patch points; direct in jacks and extensive back panel patching capabilities.
Price-$1,499.99

PX 2008 Powered Mixing Console
Sound reinforcement mixing console that has among its features the following: 8 input mixing system; two 150 watt amplifiers, one for the main house p.a. and one for stage monitors. Each input channel has a balanced XLR mic input and ¼ in. TRS phone jack; a channel access patch point; variable gain trim control, 3-band EQ; separate send level controls for monitors, effects and aux. send. Master section features separate 9-band graphic EQ for both main and monitors; send level controls; 2 returns; tape send; RCA phono jacks tape playback level control; LED VU meters, proprietary DeltaComp clip protection circuit.
Price-$1,299.99

PX 2012
Same as PX 2008 with the following additional: 12 input mixer; two 250 watt (at 4 ohm) amplifiers.
Price-$1,599.99

PX 2112
250 watts per channel into 4 ohms, 12 channels each with high and balanced low impedance inputs; trim control; 3 separate sends (eff/reverb,monitor and aux.); internal jumper for pre/post assignment; 3-band EQ; pan and channel fader. Master section features dual 10-band graphic EQ; phantom power; 2 switchable LED bar graphs; reverb; switchable compression; 4 master faders; channel in and out patch points; direct in jacks and back panel patching capabilities.
Price-$1,899.99

LX Series Portable Powered Mixers
The LX 1504 with 4 input channels and the LX 1506 with 6 input channels features: 150 watt (at 4 ohms) amplifier; balanced XLR mic input; ¼ in. phone jack; separate level controls for main, monitor and effects/reverb sends; 2-band EQ for each channel. The output section has master level controls to main, monitor and effects send levels; effects/reverb returns; aux. effects return; RCA phone jacks; patch bay.
Price-LX 1504 $399.99; LX 1506 $499.99

TASCAM See our ad on Cover II

M1500 Series
This series of recording mixers all employ dual Mix systems for recording flexibility, plus 3-band mid sweep EQ per channel. The M1516 is 16 in/4 group/16 monitor. The M1508 is 8 in/4 group/8 monitor. Dimensions and prices-M1508: H: 4.75 in.; W: 16.44 in.; D: 23.81 in. Weight 13.25 lbs. Price-$1,149.00
M1516: H:4.75 in.; W: 24 in.; D: 23.81 in. Weight 19.188 lbs. Price-$1,849.00

M2500 Series
This series of recording mixers feature in line monitor systems; MIDI automated channel muting and snapshot scene memory. The M2500 is 24 in/8groups/24 monitor. The M2516 is 16 in/8 groups/16 monitor. Dimensions and prices-M2524: H:6.25 in.; W: 39.31 in.; D: 25.25 in. Weight 57.188 lbs. Price-$3,999.00
M2516: H: 6.25 in.; W: 30.5 in.; D: 25.25 in. Weight 44 lbs. Price-$2,999.00

M3500 Series
This series of recording mixers feature in line monitor system that effectively doubles input capacity. The M3500-24 is 24 in/8 group/24 monitor. The M3500-32 is 32 in/8 group/32 monitor. The M3500-24ST is 24 mono, 8 stereo in/8 group/24 monitor. Dimensions and prices-M3500-24: H:12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-$7,499.00
M3500-32: H: 12 in.; W: 53.625 in.; D: 37.5 in. Weight 155 lbs. Price-$8,499.00
M3500-24ST: H: 12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-$9,499.00

M3700 Series
These automated recording mixers feature on-board computer for automation of VCA fader level; channel mute; aux. mute; monitor mute; EQ on/off; internal disc drive for data storage; on-board SMPTE reader/generator and MIDI in,out and thru included. The M3700/24 is 24 in/8 group/24 monitor. The M3700/32 is 32 in/8 group/24 monitor. Dimensions and prices-M3700/24: H: 12 in.; W: 44.125 in.; D: 37.5 in. Weight 133 lbs. Price-$12,999.00

M3700/32: H: 12 in.; W: 53.625 in.; D: 37.5 in. Weight 155 lbs. Price-$14,999.00

YAMAHA PRO AUDIO PRODUCTS

PM3000-24/32/40C
Available in 24, 32 or 40 inputs, 8 group buses, 8 aux buses (each Pre/Off/Post) and separate stereo bus, VCA assignable grouping with 8 submasters with automation interface 8 bus muting master system with safety override. XLR inputs are differentially balanced with 34dB trim and 5 position pad for optimizing gain structure.

Prices: PM3000-24: $34,000.00
PM3000-32: $39,000.00
PM3000-40C: $42,000.00

PM4000-24/32/40/48
Available in 24, 32, 40 and 48 inputs, 8 group buses, 12 aux sends, has 4 full stereo input modules, 4-band parametric EQ, solo cue, and 8 mix matrices.

Prices: PM4000-24: $44,000.00
PM4000-32: $49,000.00
PM4000-40: $55,000.00
PM4000-48: $63,000.00

DMP7D Digital Mixing Processor
All digital mixing and signal processing with digital inputs and outputs, 3 on-board Digital Signal Processors. Digital 3-band Parametric EQ on each channel. Preset memories: 32 internal, 67 external via supplied RAM Cartridge. Motorized multi-function faders, digital stereo output, compressor, 4 bar-graph meters and LCD parameter read-out.

Price: $5,995.00

DMP11 Digital Mixing Processor
All digital mixing and signal processing with analog inputs/outputs, 2 on-board DSPs. Digital 3-band Parametric EQ on each channel, preset memories: 32 internal, 67 external via supplied RAM Cartridge, digital stereo output, compressor. MIDI control of preset changes and parameter manipulations, 4 bar-graph meters and LCD parameter read-out.

Price: $1195.00

MC1204II/1604II/2404II/2408M
Available in 12, 16 or 24 inputs—4 program mix buses, 2 effects buses, 2 foldback buses and a cue bus, each input features a pad, gain control and peak LED for precise gain matching, 4 band EQ with the two mid-bands featuring quasi-parametric control, foldback 1 and 2, and ECHO 1 and 2 strappable pre/post EQ.

Prices: MC1204II: $3,100.00
MC1604II: $3,600.00
MC2404II: $4,300.00
MC2408M Stage Monitor: $3,995.00

YORKVILLE SOUND

AUDIOPRO SERIES
1212/1216 12 and 16 channel stereo powered mixing consoles with continuous power avg. per channel. (650 W at 2 ohms; 480 W at 4 ohms; 310 W at 8 ohms) the 1216 is 16X2X1; the 1212 is 12X2X1. Features include: 2 EFX sends; 2 monitor sends fully buffered channel patching; balanced XLR-¼ in. jack inputs; self correcting hum reduction outputs for balanced/unbalanced line compatibility; 48 V phantom power; selectable headphone monitoring; on-board speaker processor; dual 9-band graphic EQ for mains & monitors; 3-band channel EQ. Dimensions and prices-1212: H: 4.75 in.; W: 24.5 in.; D: 15.75 in. Weight 45 lbs.

Price-$2,449.00

1216: H: 4.75 in.; W: 29.8 in.; D: 15.75 in. Weight 50 lbs. Price-$2,699.00

508/512
8 and 12 channel stereo powered mixing consoles with same features as 1212/1216 but 250 watts cont. avg. per channel at 2 ohms.

Dimensions and prices-508: H: 5.3 in.; W: 19.8 in.; D: 15.75 in. Weight 43 lbs. Price-$1,799.00

512: H: 5.3 in.; W: 24.5 in.; D: 15.75 in. Weight 45 lbs. Price-$1,999.00

208/212/216
8, 12, and 16 channel stereo mixing consoles with the same features as above but un-powered. Dimensions and prices-208: H: 3.9 in.; W: 19.8 in.; D: 15.75 in.; Weight 23 lbs. Price-to be announced

212: H: 3.9 in.; W: 24.5 in.; D: 15.75 in. Weight 29 lbs. Price-to be announced

216: H: 3.9 in.; W: 29.8 in.; D: 15.75 in.; Weight 33 lbs. Price-to be announced

Addresses

Advantage—see Biamp

AMEK/TAC U.S. Operations
10815 Burbank Boulevard
North Hollywood, CA 91601

Altec Lansing Corporation
P.O. Box 26105
Oklahoma City, OK 73126

Applied Research and Technology
215 Tremont St.
Rochester, NY 14608

ARX Systems
28271 Bond Way
Silverado, CA 92676

Audio-Technica U.S., Inc.
1221 Commerce Drive
Stow, OH 44224

Auditronics, Inc.
3750 Old Getwell Road
Memphis, TN 38118

Biamp Systems
14270 NW Science Park Drive
Portland, OR 97229

Carvin
1155 Industrial Avenue
Escondido, CA 92025

Crest Audio Inc.
150 Florence Avenue
Hawthorne, NJ 07506

DDA
200 Sea Lane
Farmingdale, NY 11735

DOD Electronics
5639 S Riley Lane
Salt Lake City, UT 84107

Electro-Voice
600 Cecil Street
Buchanan, MI 49107

Fostex Corporation of America
15431 Blackburn Avenue
Norwalk, CA 90650

Furman Sound, Inc.
30 Rich Street
Greenbrae, CA 94004

Midas
200 Sea Lane
Farmingdale, NY 11735

Neotek Corp.
1154 West Belmont
Chicago, IL 60657

Neve—see Siemens Audio

Panasonic-Ramsa
6550 Katella Avenue
Cypress, CA 90630

Peavey Electronics Corp.
711 A Street
Meridian, MS 39301

Rane Corp.
10802 47th Ave.
West Mukilteo, WA 98275

SAJE-Infoscène Technologie Inc.
4600 Hôtel de Ville, Suite 200
Montréal (Québec) Canada, H2T 2B1

Siemens Audio Inc.
7 Parklawn Drive
Berkshire Industrial Park
Bethel, CT 06801

Shure Brothers Inc.
222 Hartrey Avenue
Evanston, IL 60202-3696

Solid State Logic
320 West 46th St.,2nd floor
New York, NY 10036

Sony, Professional Audio Division
3 Paragon Drive
Montvale, NJ 07645-1735

Soundcraft
P.O. Box 2200
8500 Balboa Boulevard
Northridge, CA 91329

Studer Revox America, Inc.
1425 Elm Hill Pike
Nashville, TN 37210

SUNN/Fender
7975 N. Hayden Rd.
Scottsdale AZ 85258

TASCAM, TEAC Corporation of America
7733 Telegraph Road
Montebello, CA 90640

Yamaha Pro Audio Products
P.O. Box 6600
Buena Park, CA 90622

Yorkville Sound
4600 Witmer Industrial Estate,
Unit 11
Niagara Falls, NY 14305

PEOPLE, PLACES & HAPPENINGS

● **Gauss** has restructured its loudspeaker division to place more focus on the growth of its products.

According to **Jim Williams**, president of Gauss, distribution of all Gauss speaker products will be handled in the U.S. by Altec Lansing's direct network of district sales managers.

"A shared distribution plan using Altec's district sales managers takes advantage of Altec's strengths in various critical markets and enables Gauss products to reach selective channels of distribution never before attained," Williams said. To take Gauss loudspeakers to the next market plateau, Altec's field sales force will initially focus its attention on the existing Gauss dealer network. In addition, Altec will use its extensive involvement with consultants and sound contractors to enhance the market for Gauss.

In the past, Gauss speaker products had been marketed through independent representatives. "In order for Gauss to expand its market share and broaden its product base, we feel it is essential to command more dedicated attention," **Paul Hugo**, sales and marketing director of Gauss, said.

Altec's district sales manager will ensure coordinated attention and technical support on a continuing basis to the Gauss long-term strategic commitment to the industry segment," Hugo added. "Altec Lansing is our spearhead to strengthening sales coverage and enhancing marketing effectiveness."

● **Lakeside Associates, Inc.**, a design and build company specializing in acoustic and electronic systems design for audio and video for the last 10 years, has relocated and expanded operations. They are now located at 9272 Jeronimo Road, Suite 123C, in the Irvine Spectrum. They have increased their staff from 6 to 16 employees. Lakeside's clients include film and video studios, recording studios, radio stations, and churches. They have worked on such projects as **Lion Share Recording Studios, Serafine FX, CBS Records**, and **The Plant**, to name just a few. **Carl J. Yanchar,** president of Lakeside Associates, Inc., since its inception, oversees all activities within the firm involving the acoustic and electronic systems design of audio motion pictures and television studios.

● **Yamaha Corporation** opened a West Coast Professional Digital Products Demonstration Facility at renowned **Ocean Way** studios complex. The facility consists of a fully-equipped control room and studio space, housing the first in a new product line called "Yamaha Professional Digital Products." These products, which provide everything needed to make all-digital recordings, are at the heart of this professional and comfortable working environment. Though the facility is not for commercial use, it is designed to allow key end users in the recording, video post-production and broadcasting industries to gain hands-on experience in an actual working environment. The facility also will serve to train dealers, and to generate demo material. Since its official opening on October 1st, the facility has already been the site of several all-digital recording sessions by well-known artists. The goal of these sessions is to generate multi-track tapes that demonstrate the sonic capabilities of an all-digital recording chain. Just a day or two after the doors were opened, blues guitarist Johnny Lee Schell, who played on Bonnie Raitt's hit album *Nick of Time*, and keyboardist Ian McLAgan, of Rod Stewart and *Rolling Stones* fame, stopped by with a couple friends and recorded a few tunes. Produced by noted session drummer and producer, Andre Fischer, the recording was then used as a demo at the Yamaha booth during the Audio Engineering Society in October.

The Pro Digital Products in the control room area consist of a DMR8 Digital Mixer/20-bit recorder, a DRU8 digital eight-track recorder, a DMC1000 Digital Mixing Console, a YPDR601 Professional Disc Recorder, as well as A/D converters, interface units, digital patch bays and accessories, and outboard signal processors.

The control room is acoustically isolated in order to best allow the user to evaluate the quality of the all-digital products. As an example of the sound quality of these products, the DMR8 Digital Mixer/Recorder has 120 dB of dynamic range—24dB more than a compact disc. and the DMC1000 is a 24-bit digital console capable of approximately 144 dB of dynamic range.

The studio area is well-isolated, spacious enough to accommodate either soloists or full bands, and features a variety of Yamaha professional musical instruments, including an assortment of Yamaha acoustic and electric guitars and the new T series tube amplifier designed by Mike Soldano; and SY99 Synthesizer; and RY30 programmable rhythm synthesizer; and a set of Maple Custom drums.

The opening of Ocean Way follows on the announcement of another recent milestone: the opening of a Pro Digital Demo Facility at Yamaha Communication Center (YCC) in New York, next to Carnegie Hall. This new installation joined a wide range of ongoing activities at YCC, including market support for authorized Yamaha dealers, musical instrument R&D, and a Show Room of Yamaha instruments for the general public.

"The development of a Professional Digital Products Department demonstrates the Yamaha commitment to professional recording, video post-production and broadcast markets," said Peter Chaikin, sales and marketing manager for Yamaha Professional Digital Products. "With demo facilities on both coasts in key production centers—L.A. and New York—we can best demonstrate the advantages of Yamaha all-digital technology."

● **Ahmed Agrama**, President of **Intersound Inc.**, the Hollywood-based post production facility, announced the appointment of two new employees.

In his new position as Chief Technical Engineer, **Fred Diether** will be responsible for overseeing studio design and construction, equipment installations and maintenance and technical staff training. Diether has had twenty years experience in the post production and audio industries. His background includes work on three Gold records and an expertise in electronic and digital systems. Diether has attended Los Angeles Valley College, majoring in physics. Prior to Intersound, he was with Devonshire Studios in north Hollywood, California for four years as Chief Technical Engineer.

Serge Perron's duties as Chief Remix Engineer will involve all facets of post production audio. Perron is originally from Canada, where he accumulated eight years of mixing and audio experience in recording studios in both Toronto and Montreal. In addition to serving as recording mixer for television programming, commercials and corporate videos, Perron has a Master's degree in Sound Recording from McGill University, and has also taught Recording at the

University level. Perron's most recent position was with Chace Productions in Hollywood, where he restored sound for vintage films and conformed them to video.

Newly acquired audio and video equipment includes: a Sony MXP 3036 (72 Input, 24 Output) Audio Console, an Otari 8 track MX-70, two D-2 video machines, and a CMX 3500 Video Editor with Dynamic Motion Memory.

"During the past thirteen years our company has grown tenfold, and we look forward to continuing that growth. With the addition of team members of the caliber of Fred and Serge, and the continued acquisition of new technology, Intersound will maintain its position as a leading post production facility in the entertainment industry," stated Agrama.

● **The Sony Professional Tape Division**, a division of **Sony Recording Media of America**, has announced the promotion of **Kenneth F. Wiedeman** from Director of Sales and Marketing to Vice President, Sales and Marketing, and the naming of **Joseph E. Tibensky** to the position of Director of Marketing.

In his new position, **Ken Wiedeman** will oversee the operation of the entire Sony Professional Tape Division, including its strategic marketing and planning, the coordination of sales, marketing and operational staffs, as well as the service and distribution of Sony professional tape products. Wiedeman joined Sony Recording Media of America in 1985 as its National Sales Manager and has since held the positions of Marketing Manager and Director of Marketing. In 1990, Wiedeman was named the Director of Marketing for the Sony Professional Tape Division.

● **Museatex Audio Inc.** of Calgary Alberta, Canada has purchased technology rights and certain assets of the **Shure Consumer Home Theater Sound (HTS)** business. The agreement stems from a series of talks between the two companies, both of whom are recognized contributors in the consumer audio marketplace. Shure HTS is well-known for its pioneering efforts in the Home Theater Sound field and its award-winning Acra-Vector Logic circuitry (the technology utilized in the Shure HTS5300 Type III Decoder, *Stereophile's* only Class A Motion Picture Surround Sound Decoder). Museatex has earned its reputation for expertise in the field of audiophile digital signal processing. By combining their technological resources, Museatex will soon be introducing a new generation of digital signal processing surround sound products. In addition, Shure HTS's extensive U.S. dealer base will augment the high-end consumer distribution lines established by Museatex.

Bob Schulein, General Manager of Shure HTS, believes the arrangement will result in significantly superior consumer Home Theater products. He notes, "After extensive discussions, Shure HTS and Museatex have found a way to continue the refinement of the critically-acclaimed Acra-Vector Logic decoding circuitry while matching it with the superior performance of Museatex's digital signal processing technology. "Museatex President **Kurien Jacob** adds, "We intend on working closely with the Shure HTS dealer network to make current and future units accessible to the high-end audio consumer."

Museatex will commence immediately to sell current HTS products, while Shure HTS will continue to sell its current stock of products through its established dealer network. Also, Shure will continue to provide service for all Shure-branded products, while Museatex will service products sold under its name. On the professional side, Shure and Museatex will engage in a cooperative effort leading to the joint development of new digital Sterosurround encoders and decoders for music broadcast, commercial, and industrial productions. Shure HTS engineers will play a key role in developing these new advanced Acra-Vector Logic Digital Signal Processing components.

Shure Brothers Incorporated, Evanston, Illinois-based manufacturer of microphones and circuitry products, has also appointed **Alan B. Shirley** to its newly created position of Manager, Technical Markets and Strategic Planning.

Shirley joins Shure after completing his Masters of Management Degree (MBA) at the J.L. Kellogg Graduate School of Management, Northwestern University, with majors in Marketing, Finance, and International Business. Shirley also holds a B.S. Engineering degree from Purdue University with a major in Acoustical Engineering.

During his former tenure with Shure as Product Line Manager, Wired Microphones, Shirley directed the introduction of the popular Beta Series Microphones, now recognized as a premier product for live sound reinforcement. Before joining Shure, Shirley worked for Electro-Voice in several marketing management assignments.

In his new capacity at Shure, Shirley will manage the Marketing Departments for broadcast, communications, music industry, and sound contracting markets. He will also be responsible for overall corporate strategic planning.

● **Analog Devices, Inc.** announced that it has entered into a strategic alliance with **Hewlett-Packard Company** of Palo Alto, California that will provide both companies with state-of-the-art digital and mixed-signal submicron IC technology. Under the terms of the agreement, Analog Devices gains immediate access to HP's submicron CMOS and BiCMOS technologies, and the two companies will jointly develop advanced mixed-signal processes based on this technology. Although products designed by Analog for these processes will initially be manufactured in HP's facilities, the agreement gives Analog Devices the right to obtain a license to manufacture products based on these processes in its own facilities when Analog's production requirements justify the investments needed to bring submicron manufacturing capability in house.

● **Daniel Gravereaux**, President of **Optim Audio, Inc.** announced today an agreement in principle with **Whiteley Electronics Limited**. The agreement names Optim Audio, Inc. as distributor/importer of Whiteley Electronics Limited Public Address product lines. Whiteley Electronics Limited was founded in 1926 as the Whiteley Electrical Radio Company Limited by Alfred H. Whiteley and started in a very modest way by supplying the radio industry with electron tubes and coil holders. Soon switches and loudspeakers were introduced to the range of products. The largest single step forward came with the production of permanent magnet moving coil loudspeakers. Whiteley 'Stentorian' loudspeakers set new standards in Hi-Fi performance and quality and were recognized as such on a worldwide basis.

"We are very excited about this wonderful opportunity to work hand and hand with Whiteley Electronics Limited", said Daniel Gravereaux. Whiteley Electronics long standing reputation for innovative design and quality workmanship will prove a valuable force in the American sound reinforcement market place. We are very pleased with our new association, with Whitely, and look forward to many years of representing their innovative, state of the art products."

● **Crest Audio Inc.**, a leading manufacturer of professional power amplifiers and **Gamble** live sound consoles, has formed a new division for the design and manufacture of a full range of low- and medium-priced professional mixer products. Devel-

opment will be directed initially toward live sound and recording applications, with the first series of products slated for a summer 1992 introduction.

The new division, called **CrestMix**, is headed by **Chuck Augustowski** as division manager/sales and product manager. Chuck had been vice president/sales manager of **Allen & Heath USA** from 1981 to 1991. Joining him is design engineer **John Petrucelli**, also an Allen & Heath alumnus. Chuck says CrestMix "will maintain the same design philosophies and quality standards that have made Crest a dominant force in pro audio." **John V. Lee**, president of Crest Audio, expects CrestMix to follow the successful track of Crest's amplifier lines: "As Crest Audio has become a world leader in professional power amplifiers, s o we believe that in the next few years we will be a leader in mixing consoles as well."

● London-based **Chop Em Out**, one of Britain's top CD mastering and editing specialists, is to become the first independent facility in Europe to offer a complete mastering and preparation service for Philips' much-anticipated DCC (Digital Compact Cassette) format.

Developed by **Philips** in association with **Matsushita**, DCC has been widely-tipped as the digital replacement of the ubiquitous conventional compact cassette, combining the proven hi-fi performance of digital audio with convenient text capabilities. The impact of the format's introduction this coming autumn is certain to be governed by the widespread availability of a healthy catalogue of pre-recorded music titles. With this in mind, the early appointment of Chop Em Out reflects the hardware manufacturer's commitment to minimize software production bottlenecks for the European launch.

Chop Em Out is one of the principle companies operating out of the **Trinity Mews** complex in West London. It is well known as a leading audio post-production center and recently added a fourth digital mastering suite. A range of purpose-designed DCC mastering equipment is due for delivery shortly, allowing the company to accept music material in any format and to produce a fully-verified DCC master, encoded with PASC digital audio and ITTS (Interactive Text Transmission System) information. An intense internal training programme with Philips has been initiated, and Chop Em Out's full DCC mastering service will be up and running before the end of March, a healthy six months before DCC hardware makes its intended consumer market debut.

● **Ampex Recording Media Corporation** announced the appointment of **Ernst L. Ranft** as Vice President of Operations, according to Thomas J. Wheeler, President of Ampex Recording Media. In his new position, Ranft will be based at the company's Opelika, Alabama manufacturing facility. Prior to his appointment, Ranft was a partner in **Lifestyles LP**, a Columbia, South Carolina land development company. He had previously been general manager of the Columbia-based Tamper Division of Canron, Inc., a leading international manufacturer of railroad equipment.

With the General Motors Corporation for 17 years, Ranft served in positions of increasing responsibility, including director of engineering for the company's Hydramatic division in Detroit Michigan and plant manager for GM Strasbourg SA in Alsace, France.

In addition to engineering degrees, Ranft has a Masters Degree in mathematics from the Rochester Institute of Technology, as well as an MBA from the Massachusetts Institute of Technology where he was a Sloan Fellow.

● **SoundStation**, the digital audio production system from **Digital Audio Research**, has been confirmed as the market leader in Japan. According to the results of a recent survey of the country's post production facilities taken by a major Japanese trade publication, *Eizoh Shimbun*, SoundStations accounted for 71 percent of the high-end digital workstations purchased in this particularly demanding market during 1991.

● **Russ Berger Design Group, Inc.** of Dallas has been contracted by **Sony Music, New York** to provide acoustical and technical design for the recently acquired 20th Century Fox film stages located on 54th Street in New York. Sony plans to use the renovated stages as a full-service media facility.

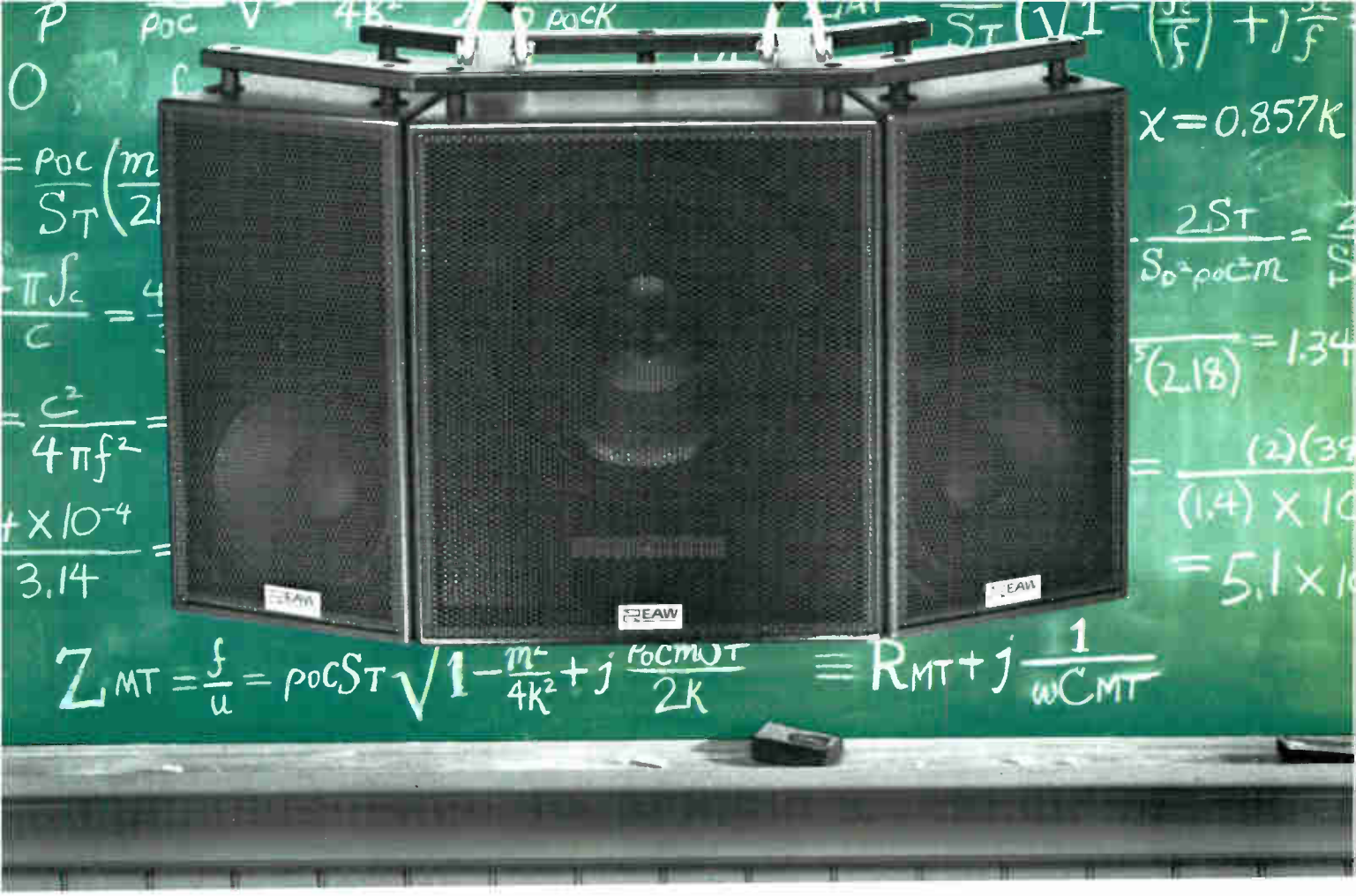
Russ Berger Design Group and architect, New York Design Collaborative have already begun the design process. Additions include modernization of the existing stages, the addition of video editing suites and video control, rehearsal studios, audio mixing control rooms and relocation of Sony's entire 52nd Street recording studios. Anticipated opening of the facility will be late 1992 or early 1993.

The "Fox stages," which are more than 70 years old, date back to the pre-'20s when film studios began to locate offices on the East Coast thus allowing them easier access to Broadway stars. Sony states, "the first use of sound on film, a Movietone newsreel, was achieved there in 1927 and the first Paul Whiteman 'soundies', films made in the '40s specifically for juke boxes, were shot there as well."

● **Rane Corporation** is celebrating 10 years of professional audio design and manufacturing. The company was founded in 1981 by Steve Brakken, Linda Arink, Richard Bernard, Larry Winter and Dennis Bohn. Rane introduced 4 products in 1982, including pioneering the "Constant-Q Graphic Equalizer Design." Since then Rane has earned several patents, including an improved constant-Q filter design, a power amp design and in 1991 a patent for the "Accelerated Slope Equalization" circuitry. Rane now manufactures over 45 products which are used in a variety of application worldwide. These include live concert sound systems, churches, hotels, discos, theme parks, teleconferencing, recording studios, cinema & theatre, post-production and broadcast. Rane has earned a strong reputation for consistently producing very innovative, high-performance, cost-effective designs.

● **Ray Bloom** has been promoted to the position of Director of Sales and Marketing for Rane Corporation. In this new position Bloom will be responsible for managing Rane sales staff, which includes two new Regional Sales Managers, Rane sales representatives, existing customer base, new accounts and dealer/rep training programs. Bloom joined Rane corporation in 1989 in the capacity of National Sales Manager. He came to Rane with 13 years of varied experience in the audio industry. **Larry Winter**, Vice President of Sales and Marketing says Bloom is very deserving of this promotion. "When Ray joined Rane, we knew the results would be rewarding for all concerned."

Rane Corporation has also named **Jeff Davis** and **Jon Ferren** as Regional Sales Managers. Davies and Ferren will be responsible for managing Rane sales representatives, maintaining existing accounts, developing new accounts and training sessions. Davies and Ferren are both new to Rane Corporation. Between them they bring 19 years of audio experience and knowledge to Rane. Davies has spent the last several years in retail management. Ferren has also been involved in the retail audio business for many years, developing training and promotional programs.



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