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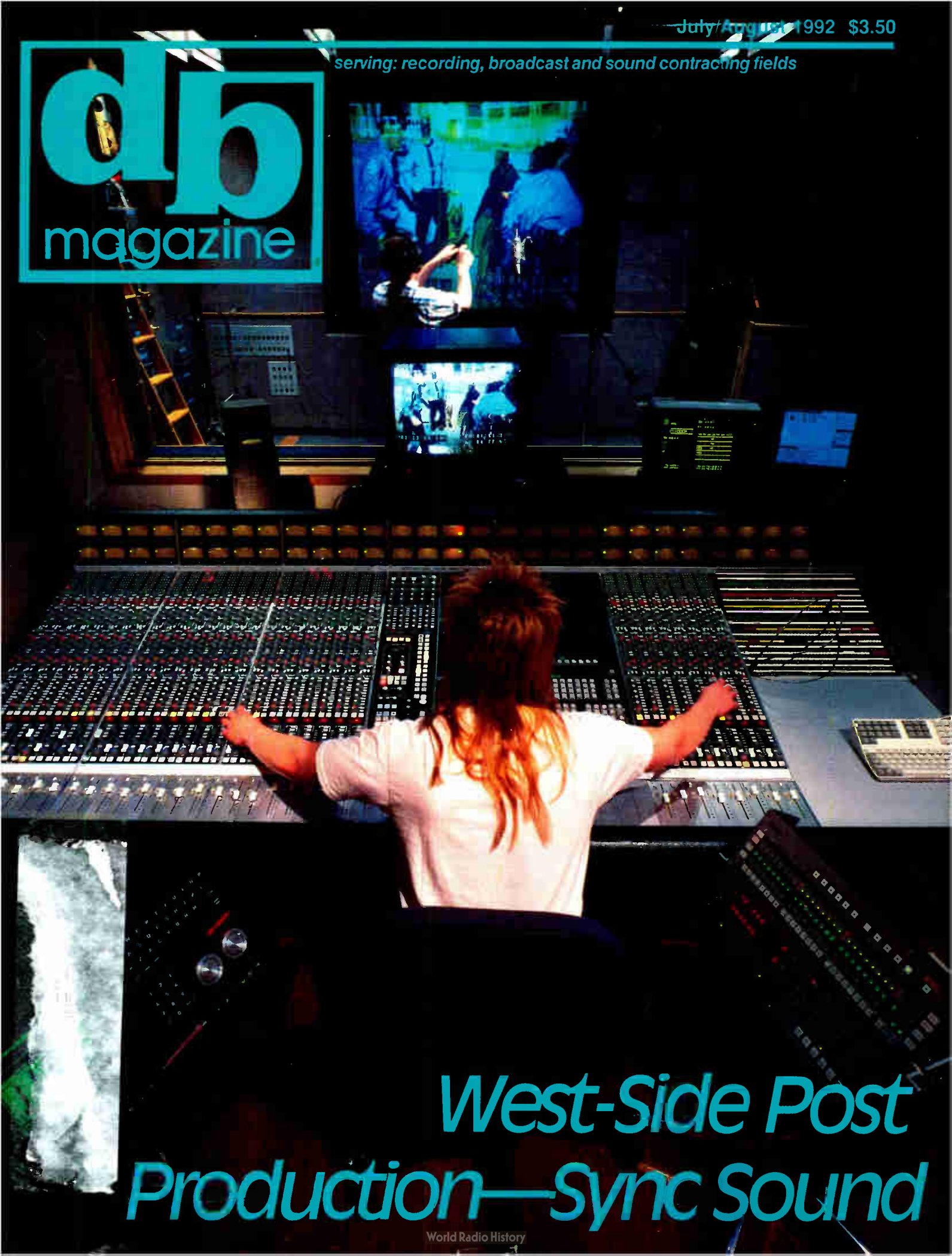
db magazine

serving: recording, broadcast and sound contracting fields



West-Side Post Production—Sync Sound

July/August 1992 Vol. 26, No. 4

db magazine

serving: recording, broadcast and sound contracting fields

THE SOUND CONTRACTING ENGINEER

THE RECORDING ENGINEER

THE ELECTRONIC COTTAGE

About the Cover

● Sync Sound's first Control Room A. Note the foley stage in the background. Engineer Ray Palagy is at the console. We want to also note that this photo, as well as all the photos in the story were done by photographer Robert Wolsch.

DEPARTMENTS

Calendar

● **The Society of Motion Picture and Television Engineers** (SMPTE) will hold its **134th Technical Conference and Equipment Exhibit, "Images in Motion- The Second Century,"** from Nov. 10 to 13, 1992 at the Metro Toronto Convention Centre, Toronto, Ontario Canada. The annual conference and exhibit, one of the world's foremost technical gatherings for the television, motion-picture, and electronic imaging communities, will include in-depth technical paper sessions on such topics as digital video compression, innovations in motion imaging, and advances in established motion-picture and television technologies; a look at the latest film and video equipment from almost 200 manufacturers; and tours of several Toronto technical facilities. Two all-day tutorials- one called "Multimedia World" and the other called "The Post Experience" -will precede the conference concurrently on Nov. 9. Also highlighting the conference will be a keynote address on Nov. 10 by Patrick Watson, chairman of the Canadian Broadcasting Corporation, a noted author, television personality, and producer. For more information, contact Carol King at SMPTE, (914) 761-1100.

Two all-day tutorials will precede the Conference

1. **Multimedia World Tutorial**, Nov. 9th

"Multimedia World" will provide information on the latest developments and trends in media integration. The tutorial will be followed by a series of hands-on workshops covering multimedia production, teletraining, and communications. A separate papers program and equipment demonstration are also planned. "Multimedia World" is geared toward hardware suppliers, applications developers, content creators, publishers, and end-users of multimedia. The session will focus on display, processing, control, and communications. The program will benefit those who want to understand the overall concept of the technology and its emerging trends.

2. **The Post Experience Tutorial**, Nov. 9th.

"The Post Experience" will focus on both the creative and technical aspects of audio, film, and video post-production (editing and special effects). Emphasis will be on the electronic post-production process. topics will include film transfer, off-line and on-line editing, color correction, special effects, sound effects, Foley, automatic dialogue replacement, and mixing. The tutorial will include the screening of dailies and a sit-down luncheon featuring a guest speaker. A discussion on international versioning, distribution, and closed-captioning, will complete the day.

● The 1992 edition of the **International Conference on Three Dimensional Media Technology** will take place November 3-5, 1992, at Le Centre Sheraton Hotel, in Montreal, Canada.

The conference program will cover the following topics:

db magazine

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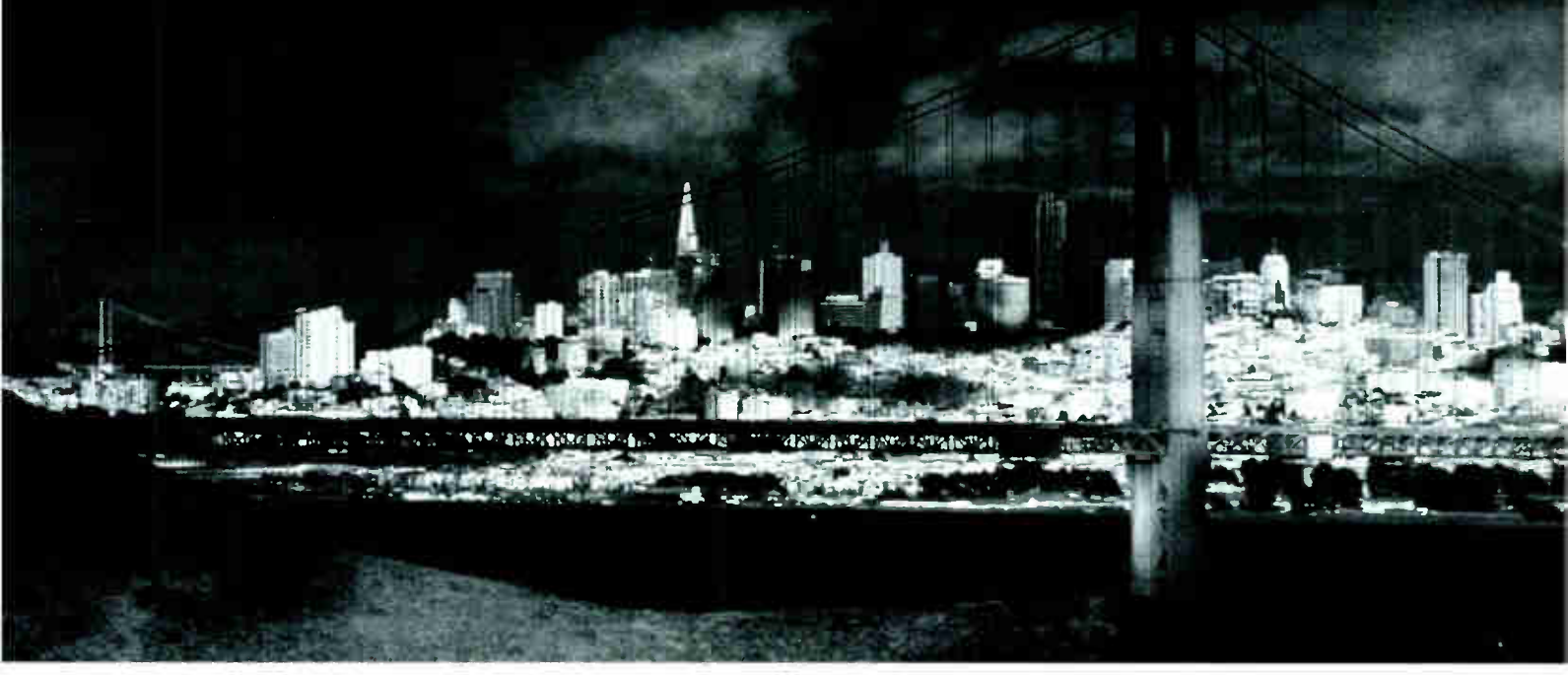
3Dmt'92: International Conference on Three-Dimensional Media Technology, 7141 Sherbrooke St. West, Montreal, Quebec, Canada H4B 1R6, (514)848-2539, fax (514)848-3492.

● The **12th biennial Kentuckiana Sound & Communications Seminar** will be held at the Airport Hilton Inn, Indianapolis, IN, October 19 and 20, 1992. More than 50 manufacturers and their representatives will exhibit in the 6,600 square foot ballroom. Indiana and Kentucky sound contractors as well as area distributors of compatible products are invited to attend. Seminars on pertinent topics will be conducted by industry experts during the two day event. Exhibit hours are 9AM to 5PM on Monday and from 9AM to 3PM on Tuesday. Indiana/Kentucky independent sales representatives sponsor this gathering every two years. For more information contact show manager: Andy Baker & Associates, 2700 E, 55th Place, Indianapolis, IN 46220. Phone: (317) 253-9667.

● **West L.A. Music's sixth annual Music Expo**(formerly the West L.A. Music Keyboard Show) will be held August 29th and 30th at the Los Angeles Airport Hilton. The show is a two day consumer event which offers musicians, producers and composers the opportunity to meet directly with manufacturers and top artists for hands-on demonstrations of the latest music products. The show has expanded this year to include everything for musicians, including guitars, drums recording equipment, sound systems, computers, music software, keyboards, and accessories. Many top artists and industry professionals will conduct seminars and demonstrations. The 1991 show featured appearances by Trevor Rabin and Alan White of Yes, Michael Wolff and Starr Parody of the Arsenio Hall Show, Brad Gillis of Night Ranger, Chester Thompson of Genesis, and many others. The 1991 show was also the subject of a feature story on MTV's daily news program, "The Day in Rock."

Exhibits will feature the latest in guitars, drums and percussion, plus digital and hard disk recording technology, pro audio and sound equipment, and keyboards. New Product premieres will be featured. There will be displays dedicated to computer music systems, including Apple, Macintosh, IBM, and Atari, plus working demonstrations by Opcode, Steinberg-Jones, Coda, Passport, Mark of the Unicorn, and many more. Exhibitors will include AKG, Alesis, Digidesign, Digitech, E-mu, Ensonig, Korg, Marshall, Mesa-Boogie, Peavey, Roland, Tascam, Yamaha, and many others. West L.A. Music's past shows have been very successful, attracting over 3,000 musicians, engineers, music educators, celebrities, and industry experts, as well as hobbyists and other music enthusiasts. This year, by expanding the show to include guitars and drums, we expect an even greater response with record breaking attendance. The show is being presented this year in association with UCLA Extension's Entertainment Studies. UCLA Extension's involvement with the Music Expo reinforces not only the importance of the show as an essential event in the area of music, but also West L.A. Music's commitment to making education a key element of the show. The West L.A. Music Expo is being co-sponsored by BAM Magazine. The LAX Hilton features private demonstration rooms, full multi-media capability, and two theaters for live performances, seminars and new product introductions. Tickets for the show are available at West L.A. Music or any Ticketmaster location.

San Francisco Welcomes the AES 93rd Convention, October 1–4, 1992



With an eye on the present and an ear to the future, the AES 93rd Convention will span today's audio science with the emerging products and technologies of tomorrow.

In vibrant San Francisco, neighboring the specialized creativity of Silicon Valley, the AES 93rd will offer a comprehensive program of technical papers, workshops, seminars, and tours, along with an impressive, international range of exhibitors, to produce an audio experience that should not be missed. Plan to be a part of the AES 93rd at the **Moscone Center** in San Francisco, October 1–4, 1992.

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LARRY ZIDE

West-Side Post Production —Sync Sound, Inc.

Sync-Sound is a multi-room post-production facility in Manhattan, NY. Located far on the west side near some of the major television studios, but far from the Madison Avenue advertising crowd. The entrance is small, almost hidden on the 10th Avenue side of 450 West 56th street.

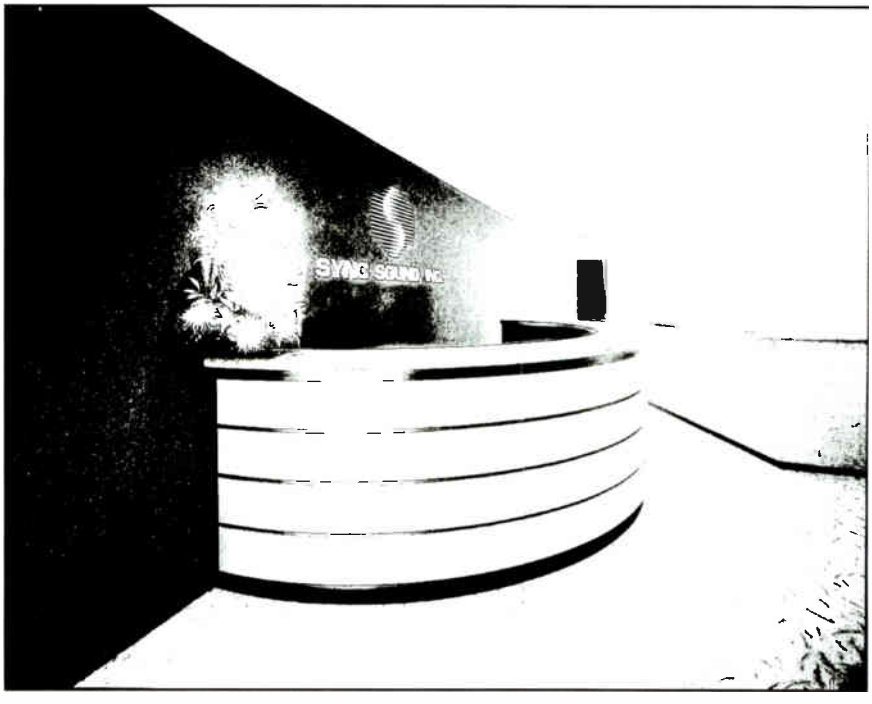
My appointment was with Bill Marino, president of Sync-Sound. When I arrived, I was ushered into an attractive entrance way and led to a large well-equipped fully functional kitchen. From there, I was led on a tour of the place (impressive even by mid-city standards) before sitting down with Bill, and setting up my Sony Walkman Pro and stereo microphone.

I began by asking him when and how Sync Sound had started.

"My partner Ken Han and myself, both worked for Bob Liftin at a studio called Regent Sound, which was one of the very first audio-for-video facilities in the country. That was also here in New York. That studio actually grew from being purely a music studio in the fifties, doing a lot of the big fifties hits, to being a sound-for-picture house when the very first audio synchronizer who was invented and put on the market by ECO Corporation in 1974! A little bit of ancient history. At that moment you can really say that Regent entered into the audio for picture business, for the first time being able to synchronize with timecode, a multi channel, (at that time) a 16 track machine against video picture. At that time we were running a one-inch video helical scan machine. They were early machines.

"And as a matter of fact I had had some experience on the road doing sporting events for television when I met Bob. He was very much interested in television. When he did any sound for television at all, his eyes would light up; we became really good friends and had a nice relationship. I worked there for seven years and that's where I met my partner Ken Han. Somewhere along the line, actually, probably about six/seven years along the line, we started thinking about our own facility. Bob had taken ill and was sort of winding down his operation. We always dreamed of a facility that was specifically designed to do audio post-production from the very beginning—not a recording studio that had been adapted to do audio for television facility layout. We thought how it might be different if we *could* start from scratch and build a facility specifically designed to do post production sound. And we thought about everything that would go into that, types of machine control systems. We dreamed about it for awhile. And at some point after whole piles of proposals and meetings, we were able to start Sync Sound.

Figure1. Reception at Sync Sound.



THE BEGINNINGS

"We formed the company in 1983, and we opened our doors in August of 1984.Our first session in here was pretty challenging because we were doing a Peggy Lee Live Concert, of all things. It was one of her, probably, the last one that she's done. It was recorded 24-track by a friend of ours, David Hewitt, in the Record Plant black truck which he had just purchased; which was kind of interesting cause it was recorded 24 track digital. The digital machines had never been hooked up to the synchronizers that we were using. Vendors had

no interface, or cables or constants or anything so we had that to deal with. We had a new SSL console, a brand new editing system of our own design, all of which had never been used before, so it really was quite a challenge. We had this booking prior to our opening and I would say, I literally spent a week here without ever going home, the week before we opened. So it was an interesting experience, but we made it work. We have a lot of old war stories about our first days in operation."

Sync Sound is up to nine rooms now, But there was much less in 1984. Bill continued, "We started with one mixing room and the central equipment room. We had at that time 8,500 square feet of space. Since then we have acquired some more, but we had that 8,500 square feet and we were occupying maybe a quarter of it with the one control room and the equipment room. We had a wall that ran down the entire length of the place to keep from scaring our clients because it was a big cavernous space. But, the one mixing room and control room are pretty much how you see them now. We've been growing ever since. Every couple of years, we've taken on some sort of expansion. We built Studio C next, which is our mixing and pre-lay room. We built that the year after we opened. Then the following year we built a room that was actually our first digital editing room, but at the time was a MIDI room and also had a Synclavier II in it with about ten megabytes worth of storage on hard disc."

AN APPETITE FOR MORE

Ten MB of storage is only a couple of minutes of stereo sound. Bill laughed and continued, "Well, it whet our appetite for digital editing—random access editing. And then after that, in another spurt, we built our Studio A, which is another SSL mixing room, and our foley stage, and our sound effects room. And about 1986, we put in our first AMS AudioFile system. Every couple of years from then, we've been adding on and we've been lucky enough to get some more space and now we're up to 12,000 feet of space—nine rooms."

Figure 2. Control Room A. The foley room's stage is clearly seen through the glass behind the console.

I wanted to know why particular digital editing systems were chosen? Bill answered, "Actually, like I said, the very first system we used in here was a Synclavier II system. They were the very first to come out with any system. And as they put it at the time 'this is the last synthesizer that you'd ever buy'. But the truth of the matter is, is they really did have the jump on everybody, and I guess by all the rights they should own this business.

But they were all so busy doing a *musical instrument* that was very successful with a lot of people, and I think somewhere along the line some other people capitalized on the post-production applications and maybe even got a little ahead of them at that time."

Figure 3. Control room B with video projection on the screen.

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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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Figure 4. Control room C. A voice-over booth is also in the room.

THE FIRST SYSTEMS

"The system that turned a lot of people's heads one year at an NAB was a system from DroidWorks called a Sound Droid and it was right around that time I saw an additional Sound Droid demo and they were taking orders for the Sound Droid system at the show—pre-orders.

"It's hard to pin it down, but it was '84 or '85. A lot of people walked away from that demo thinking that they just had to have one; thinking that this was definitely *it*. And they were very successful in showing certainly what a product like that could do. At that time, there was also another little booth way off in a corner, small booth from a company called AMS,

Studio F is the sound effects library. An extensive data base and two Sony Jukeboxes permit quick access.

and they were showing their delay lines and there was a fellow there demonstrating a thing called an AudioFile which at the time was just a storage and retrieval system for sounds; it almost seemed like an electronic cart machine, like a hard disc based cart machine...

"It wasn't much of an editor. At the time...they called it AudioFile too, they stored little bites of audio in this thing. You have eight outputs and eight trigger keys and you could record into the AudioFile, these little bites of sound and you could press the trigger keys and make them start somewhat like a multi-cart player, it wasn't very fancy. And from its humble beginnings I kept my eye on this system. This must have been more like '84 because we bought our first machine in '86. Every show that I went to, the NAB shows, the SMPTE shows, the AES shows, I always made the rounds; I made sure that I took a look to see how they were doing with that AudioFile thing. It's funny but the Lucas SoundDroid and film project started to fade away for reasons still completely unexplained to me from a business standpoint, they never delivered.

"I really have digressed quite a bit. Yes, I did continue to watch the AudioFile. I kept watching it show after show. It steadily was getting better and better. Around that time we had some other products that were starting to enter the market, some of the synthesizers, vendors, samplers and certainly NED and Fairlight started thinking about television as well. One SMPTE show, it was probably '85 or so, I took another look at AudioFile and all of a sudden now it was not only playing from triggers but playing locked to picture and chasing time code, it was actually chasing incoming time code and outputting in up to five channels of audio simultaneously.

And there was the ability to do head and tail editing, you know, simple editing. At that point we realized that we could work with this thing. That it would definitely be some use to us. We had one in on demo and we were very much excited about the idea of using AudioFile especially for sound effects which was really our main experience with random access edit-

ing. The biggest drawback that we could see at that time was there was no way to load sounds off; once we started a project there was no way to take the project off and then put it back on again—we had to continue it. We'd spoken to the people at AMS, 'Look, if you can get this thing to back up and restore files you'll get yourself another customer'. They assured us that they were in a process of doing that, and that they would be able to deliver a system to us that did back up and restore. At that point we placed our order and we took delivery of the first system on the East Coast, in 1986."

I wanted to know if at that time there were other systems coming on as well. Bill answered, "There were some products being developed but nothing that actually ran. I saw a couple of Japanese products at that time; I saw a couple of ram-based editors. There was also a thing called Compusonics that was actually out on the market at that time. That was one of the very first editing systems. It was very simple. It was a thing that ran, I can't remember the exact bus, but it used a standardized computer that could record and play back two channels of audio in either mono or stereo sound. And it would trigger against picture. That was also on the market. In fact, somewhere along that line, somewhere right around then, they stopped making them. And there was also some talk about the company winding down its operation."

NINE WORKING ROOMS

Sync-Sound is currently up to a total of nine rooms. The discussion turned to the equipment in these editing rooms and how many were virtual clones of the first AudioFile rooms. Bill continued, "Equipment-wise, they *are* clones. As far as their capabilities, they are almost identical. They're decorated a little differently, especially the first two rooms. But their function is really identical.

"How we got to four AudioFile rooms was not an automatic thing. We certainly, as engineers, realize that technology is constantly expanding almost exponentially, and that it would be foolhardy to think that you can find your product, or your editor of choice and just stick with it because things *do* change—very quickly. And vendors do leapfrog each other in terms of their ability and application of new technology. So it was really, has been and continues to be an ongoing process of keeping in touch with everything that's coming out and everything that's being developed. And it was really the successs of the first unit that dictated, actually necessitated, our getting a second unit. We had clients that, once exposed to editing on AudioFile, didn't want to work any other way and didn't want to go back to tape-based editing. It was difficult first to service all our clients with one system. So that really lead to another, but I went to all the shows and I've always been checking up on the progress of every other system, especially at that point—it's also another turning point; you have one, but maybe there is something better. And we basically have bought one system a year since then. And every year is as much of an agonizing ordeal as the year before, checking out everything that's on the market."

Figure 7. Studio G is one of four AMS AudioFile editing suites.

What I then asked if each time they were expanding with yet another system, was this entirely business driven?

Bill's reply, "It was, absolutely. Absolutely. It was totally business driven. We are not a big company or by any means an R & D company or one to just have an idea that it would be nice to have a bunch of AudioFiles, each one led to the next demand for editing time..."

I wanted to know why a NED Post Pro room was still active and how it was used. Bill answered, "Well, the major difference that I see with the Post Pro, especially at this time, versus the AudioFile or most of the other editing systems that are out there, is that there's also a sampling system; in that it uses a keyboard to trigger sound. There's an old ram sub-system that operates with the keyboard and that opens up some other possibilities, a different style of working. You can have simultaneously, the full keyboard loaded with sounds four layers deep, and be able to trigger off these sounds in real time, using all ten fingers and also your feet, with the foot pedals for further expression. So there are some real time foley-like things that can be done—playing sound effects, playing the sound effects instruments so to speak. Very helpful for non-real type foleys, for instance, for space-sounds foleys, or ultra slow-motion foleys, or sounds that would be done ordinarily by a human being, but it gives you the combination of having electronic

Studio D, another AMS editing suite.

sounds that can be done in real time. We looked at what was out there in the way of samplers, and there are certainly a lot of inexpensive samplers out there, but it was the integration of high-quality sampling with the disc-based editing system that sold us on the Post Pro.

THE EQUIPMENT ROOM

All the editing suites are interconnected through a central equipment room. Bill continues, "Essentially it houses all our tape machines, all of our 24 track, 48 track, 4 track, all of our analog, digital and video tape machines, along with all of our edit control systems, the main frames for all of our AudioFiles, mag recorders and the like. There's central patching for audio, where we can patch 32 channels of audio on one connector, on one zero insertion force connector, so all of the outputs and inputs, all of the multi-track tape machines, all the inputs and outputs to all of the consoles and all of the noise-reduction units all come up in that multi-way patch bay. So we can put any multi-track machines into any room, into any room's console in a very short period of time, with very little fuss. Besides that, we have in that room edit control systems for our mixing rooms that were designed by us. We wrote a lot of software for those systems as well; they provide total machine control patching in a 75 ohm coaxial patch bay. So along with the audio from those machines, control can be patched from any room and we can put any machine on any control bus for any of the rooms. Between those two systems and some video switching, we were able to connect any machine to any room essentially on the fly, and from session to session.

OTHER EQUIPMENT

Where are the sync systems? What about other control systems? Bill's answer, "We have two types of keyboards in each room, one is a custom keyboard with a two shaft encoder or type shuttle knobs and fluorescent displays. There are 102 push buttons on that panel as well laid out so that there is direct control of many functions. Besides that there's also an IBM style computer and display that serves as a second terminal to the system. And that essentially is the control system—the front end of the control systems; the master bus controller for each of those systems is in the equipment room as well as all the individual controllers for each tape machine. The individual controllers and the master bus controller can be located up to a thousand feet apart. And there is a theoretical limit of 94 machines on any control system at any time. So there's a lot of overkill."

In today's market there is continuing recession. I wondered how this was affecting present and future planning. Bill replied, "Yes, there is a recession, I have to admit at this point. The funny thing is—necessity and adversity have spawned creativity and what we're looking at here is a situation where we really have to be looking at how our clients are being affected by the recession. And it's really teaching us to be more efficient. That's being dictated by a lot of the production projects. and that's going from the top to the bottom, from network television shows and films down to industrial shows, things like that. All across the boards budgets are lower and we are being asked to be more efficient in our use of studio time and editing time. And technology is allowing that. And the other thing we're interested in is new markets. The thing that we have looked at and we've been addressing are some new markets for us in the area—advertising and feature films, in New York. So, where we used to concentrate on what we had been doing for a good number of years, it has opened our eyes to new possibilities.

"And also as I said before the main thrust is being efficient and being able to pass on the savings of that efficiency to our clients."

Sync Sound Equipment List—Specified by Room

Studio B

SSL 6000 E/G Series automated console

Voice-over booth/video projection/Surround Sound monitoring

Studio A

SSL 4000 E Series Automated Console

ADR/Foley Stage with Video Projection and Video

Streamers

Studio C

Soundcraft 2400 Console

Voice-Over Booth

Studo D

AMS AudioFile Plus digital editing systems with 4-hours memory

SFX Network

Studio G

AMS AudioFile Plus digital editing systems with 4-hours memory

SFX Network

Studio F

Leornardo & Geffen Data Base Systems

SFX/Music Libraries On

2 Sony Jukeboxes

Studio J

AMS AudioFile Plus digital editing systems with 4-hours memory

Studio K

AMS AudioFile Plus Digital Editing Systems with 4-hours memory

SFX Network

Studio L

Sony 3036VF Automated mixing console

NED Post Pro SD

16 Disk and 16 RAM Outputs 32 Stereo Voices/Trip Keyboard

Equipment Room

AUDIO RECORDERS

Sony PCM-3348 Recorders

Sony PCM-3324 Recorders

Otari MTR-90 W/24/16/8-track Recorders

Sony PCM-1630 2-track Recorders

Sony PCM-F1 Recorders

Sony 7030 time-code R-DAT

Fostex D20 time-code RDAT

Otari MTR-20 4-track recorders

Centertrack TC, stereo, and mono Nagras

MTM 16/35mm magnetic film recorder

35/16mm optical playback

Cart machines

Nakamichi audio cassettes

VIDEO TAPE RECORDERS

Sony BVH-2000 1-in. w/Dolby

Sony BVH-2830 1-in. w/digital audio

Sony D-2

Sony BVU-850 SPs

JVC 8250s

VHS-HI-FI

1-in. layback for PAL and SECAM video tape

Sony BVW60 BETACAM SP

Sony BVW70 BETACAM SP

Sony BVW75P PAL BETACAM SP

NOISE REDUCTION

Dolby SP-24

Dolby CAT 43

Dolby SR/A

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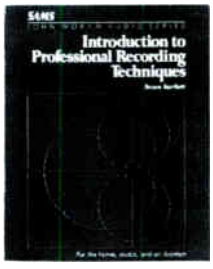

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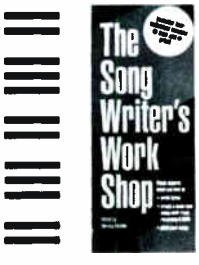

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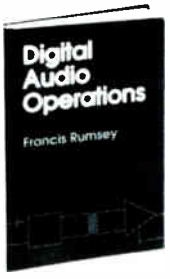

Leaving the higher levels of theory to other digital audio texts, this handbook emphasizes principles for the studio and those aspects of digital audio appropriate for day-to-day sound engineering operations. It describes the sampling process, error correction, editing systems and different recording 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.

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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.

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ED LEARNED

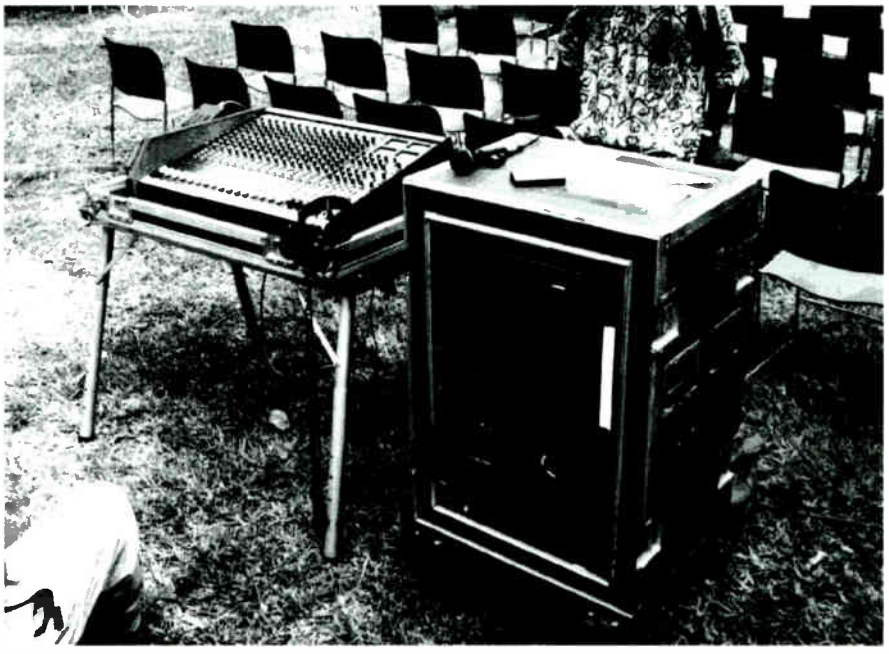
International Sound Reinforcement—West Africa 1992

REGULAR READERS OF MY INternational updates were probably wondering what happened to me! It's no mystery; for the past few months I've been working in West Africa, again under the auspices of the USIA Arts America program. If you missed the itineraries **db** posted in the "People, Places & Happenings" section, my tours took me to Benin, Burkina Faso, Cameroon, Congo, Gabon, Ghana, Guinea, Ivory Coast, Mali, Niger, Nigeria, Sao Tome, Senegal, and Togo over the first half of 1992. It was my pleasure to have worked with two excellent groups: the Pharoah Sanders Quartet and the Holmes Brothers. Pharoah is no stranger to jazz fans: his collaborations with John Coltrane in the 60's thrust him onto center stage of the New York jazz scene, garnering both dedicated fans *and* controversy. His playing today, however, repudiates the validity of "labeling" by music critics: this onetime "angry young tenor" is now playing some of the sweetest, most lyrical sax on the planet.

The Holmes Brothers, another quartet, are a versatile band fronted by Sherman and Wendell Holmes. Their first record, "In The Spirit," released in 1990, was greeted with unanimous critical acclaim from blues aficionados. After 20 years of playing the blues circuit this "debut" was long overdue—it showcased a band of musical maturity and stylistic integrity. While best known as a blues band, this versatile group also handles R & B, C & W, and gospel music with aplomb - and does them all in one show, which can really keep a soundman busy!

In terms of style and presentation, both groups were radically different. They presented different challenges sonically too, yet I knew going in that I would have to use the same sound system for both groups.

Figure 1. The mix point in Accra, Ghana.



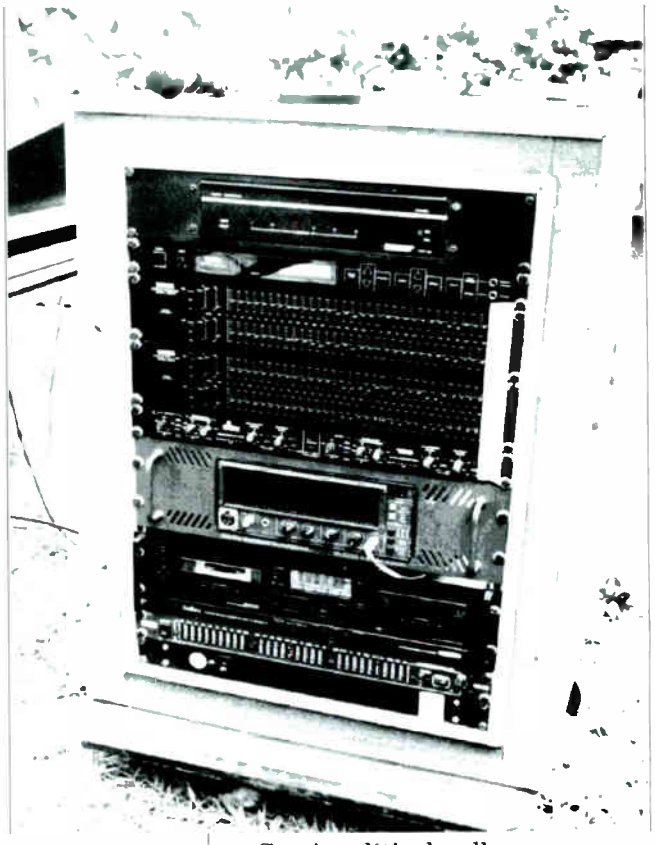
Before this year, I'd never worked in sub-Saharan Africa before. I had, however, used the USIA sound system previously for North African tours. The agency owned several sound systems for use in developing countries; it was dogma that local sound system suppliers either didn't exist or couldn't provide adequate equipment for a touring musical group in Africa. The system I used was stored in Paris; it would be shipped air freight to Abidjan, Ivory Coast, our first stop with Pharoah, and then travel with us as excess baggage for the duration of our tours. This basic system was composed around Bose 802 house speakers, JBL 4602B stage monitors, and QSC 3500 power amps. Mixing (see *Figure 1*) was handled by a 16 input Soundcraft 200B; house electronics included Rane & Yamaha graphic EQs, Yamaha SPX-90II reverb, and a dbx 166 (see *Figure 2*). Mics included EV ND-457A; Shure SM-57, SM-58, & SM-81; AKG D112; and Whirlwind direct boxes. I could customize the system only by supplying additional equipment on my own, subject to a weight limit of 50 lbs. I would have preferred to augment the processing package differently for each group, but to keep weight and size within budget parameters I elected to carry only select microphones.

RANGES OF VENUE SIZES

Inevitably, the size of venues on tours such as these can vary from an ambassador's living room to a

30,000 seat outdoor stadium. A sound system of finite size can only handle venues of finite size, with the type of group further defining ystem capability. For planning purposes, it was generalized that the USIA system could only handle indoor venues of up to 1,500 people; larger facilities or outdoor shows would require extra equipment. I asked for a list of prospective venues with the idea that we could identify potential candidates for augmentation well in advance of the group's arrival; this would give our local sponsors enough lead time to arrange for local sound equipment. My plans for local augmentation were met with skepticism in some circles; several old Africa hands seemed convinced that acceptable gear just wasn't available. I suspected another possibility: where there is increasingly sophisticated popular music, there will also be increasingly sophisticated sound equipment. A few years ago, African music was an exotic taste, popular only with those in the know. The mainstream success of Paul Simon's "Graceland" project, the runaway popularity of the "worldbeat" phenomenon, the proliferation of ethnic radio programming - these and many other factors conspired to put African music in the ears of more Western listeners than ever over the past few years. As a result, recent tours of the US and Europe by top African pop artists like Alpha Blondy, Kanda Bongo Man, Youssou N'Dour, and Lucky Dube have enjoyed unparalleled success. When these groups returned to Africa, their expanded expectations of production quality could provide the impetus for changes in the quality of African sound contracting. Optimism really was necessary; with a fixed budget for shipping equipment, I really didn't have any other choice: for larger shows, I *had* to count on local gear. I asked the local USIA offices to encourage contacts between me and local contractors during my stay in each country; while I was trying out local systems, I could also realize a golden opportunity to assess the local sound reinforcement scene. As I suspected, things *are* rapidly changing; it is a most interesting time for sound systems in Africa.

Figure 2. A closup of the electronics rack.



MURPHY'S LAW

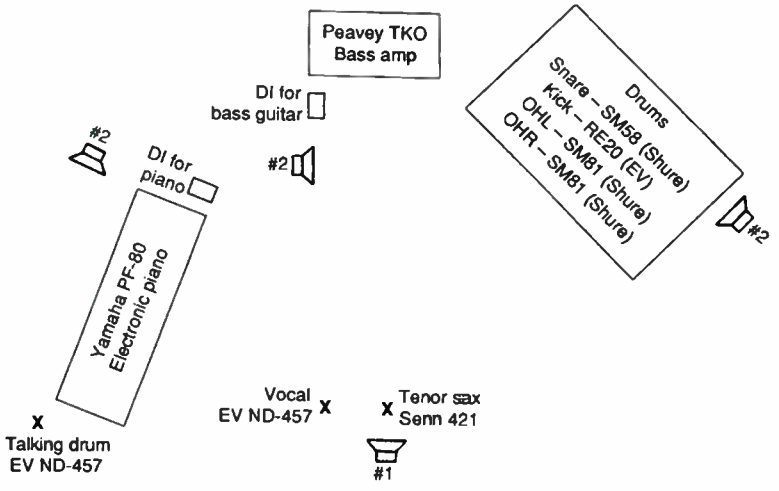
Circumstances beyond our control; that phrase certainly got a workout on these recent Africa tours. A representative sample of calamities we dealt with:

A. A flight is cancelled for no apparent reason, necessitating 8 hours of ground transportation across a border.

B. Our venue is burned to the ground by rioting students 48 hours before we play there.

C. A political rally usurps our venue hours before a show—signed contract be damned. The changing political climate in West Africa during the past few months also came into play. There was unrest in Togo and Congo; a coup in Sierra Leone prevented our late-May visit. These factors all contributed to lengthy customs searches, long airport layovers, and ground transportation miscues. A sense of humor helps, but it's the attitude of the people in West Africa that really saved the day. West Africans

Figure 3. The layout used for Pharoah.



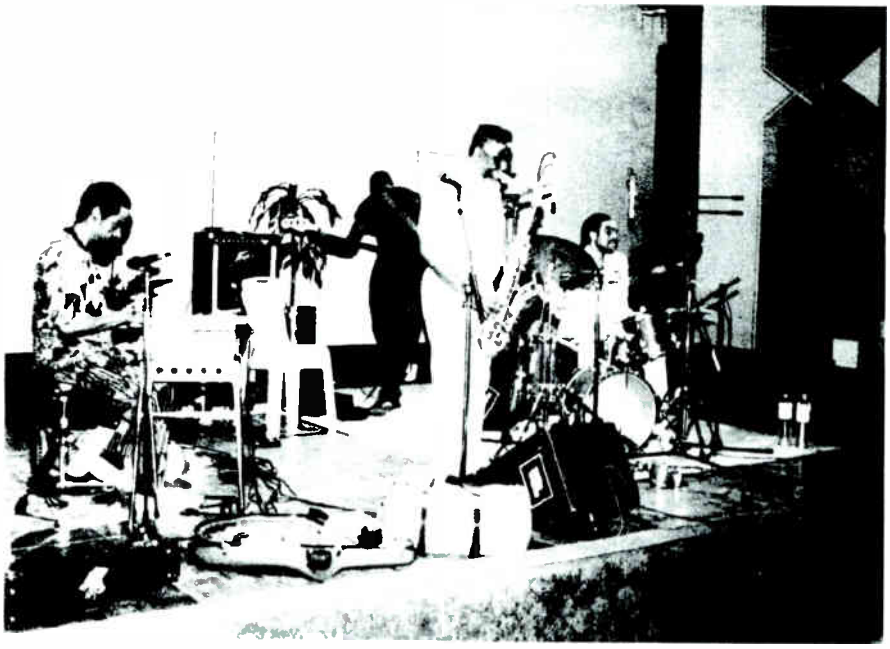


Figure 4. Pharoah Sanders' sound check in Yaounde, Cameron.

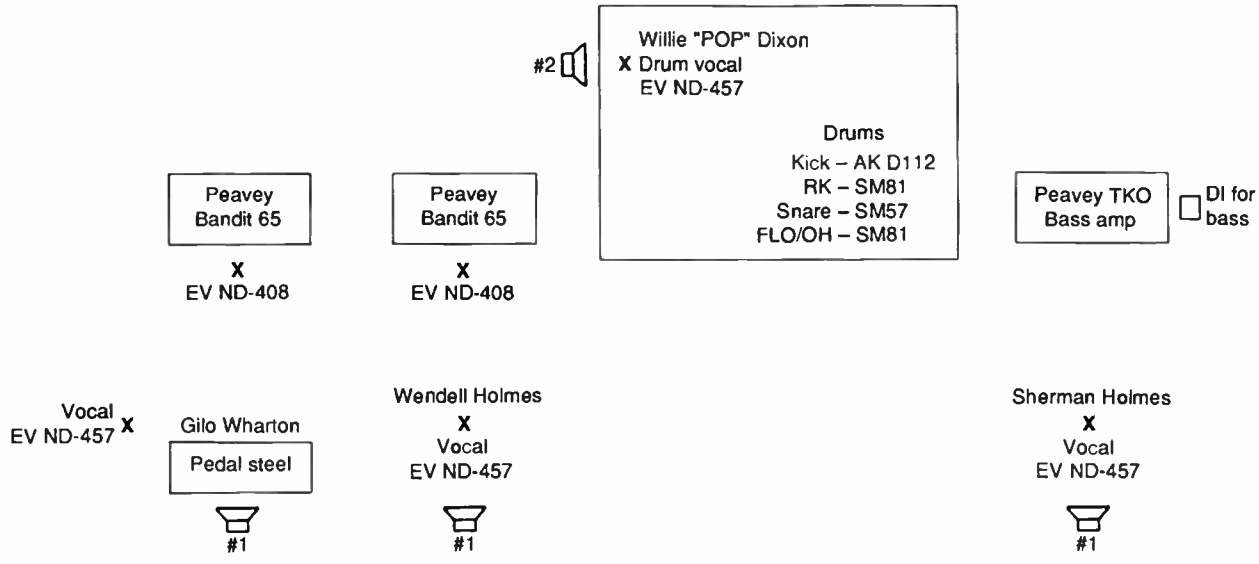
are very friendly by nature, and if you're sincerely open with them there is nothing they will not do for you. I'll remember the people, and all the friends I made, long after I forget about everything else! There is also a distinctive style in getting things done: nothing *ever* moves as fast, or is organized as smoothly, as we might like, but it always seems to get done. An attempt to understand, or at the very least to tolerate, this pace will save you a lot of brain damage and ingratiate you with the locals. And if you're interested in African culture, art, and music, I cannot think of a better region to visit.

EQUIPMENT

Before I get into describing the individual countries, it's necessary to take a quick look at the actual needs of each group. I'd worked with Pharoah previously: we did a 6-country South American tour together in early 1991. I knew he wanted a very open, acoustic sound: it made him nervous when the PA system became more dominant than the band's stage volume. Pharoah's ideal was for lots of dynamics, with the band more in control than the engineer. I felt it was important to let stage sound do as much of the work as I could; everyone was most comfortable when the PA system and stage sound blended seamlessly. It wasn't always possible, but here is how I approached it: if you could overtly localize more of the house sound coming from the PA than from the stage, then the system was too loud. Stage monitors, however, were a different matter: on stage, Pharoah liked to hear sax clearly point-source from his monitor. I knew the other musicians didn't need that much sax, so I arranged for Pharoah to have a dedicated monitor mix; the rhythm section would share another (see *Figure 3*).

Pharoah played both tenor and soprano saxophones on this tour;

Figure 5. The layout used for the Holmes Brothers.



occasionally, he played some of his numerous percussion instruments and sang/chanted. He supplied his own sax mic: a Sennheiser 421, which was usually set flat. However, there were a few occasions, most notably in highly reverberant environments, when we felt the sound was more coherent with 2 to 3 clicks of bass roll-off engaged. Pharoah would play with the mic facing the center of the bell of the tenor, occasionally "swallowing" the mic for certain effects. I only had one channel of patchable limiting available; I had to choose between Pharoah's vocal and sax channels. I chose Pharoah's vocal for two reasons: his dynamics were very pronounced vocally, and he didn't care for the effect compression had on his sax level. When he got loud, he wanted to *be* loud. I always had him "swallow" the mic at sound check so I could insure the monitors would stay "dry"; previous experience allowed me good success at anticipating when he might do this during a performance. I was usually able to make the appropriate house level changes manually, preventing overt blasts of sax and keeping things in the pocket. (See *Figure 4.*)

Pianist William Henderson performed most of the tour on a Yamaha PF-80 electronic piano; this was in lieu of a grand piano, William's preferred instrument. I was told that grand pianos were not readily available in Africa; by carrying our own piano we could at least count on the same type of instrument every night. I knew I'd better be prepared for an acoustic instrument too, so I brought along a pair of C-ducer piano pickups and an AKG 451/CK-1 mic, just in case. Another interesting thing about William: in this era of multiple monitor mixes and demands for increased level, he looked for just the opposite. He preferred to have his little corner of the stage as quiet as possible! Our PF-80 piano had 2 small speakers and an amplifier built-in; this minimal amplification system was all William needed to hear himself. He did not want a piano amp, and he preferred his floor monitor pointed away from him—I'd usually place it behind him, angled slightly towards bassist Russel Blake. This "indirect monitor" sound filled in just

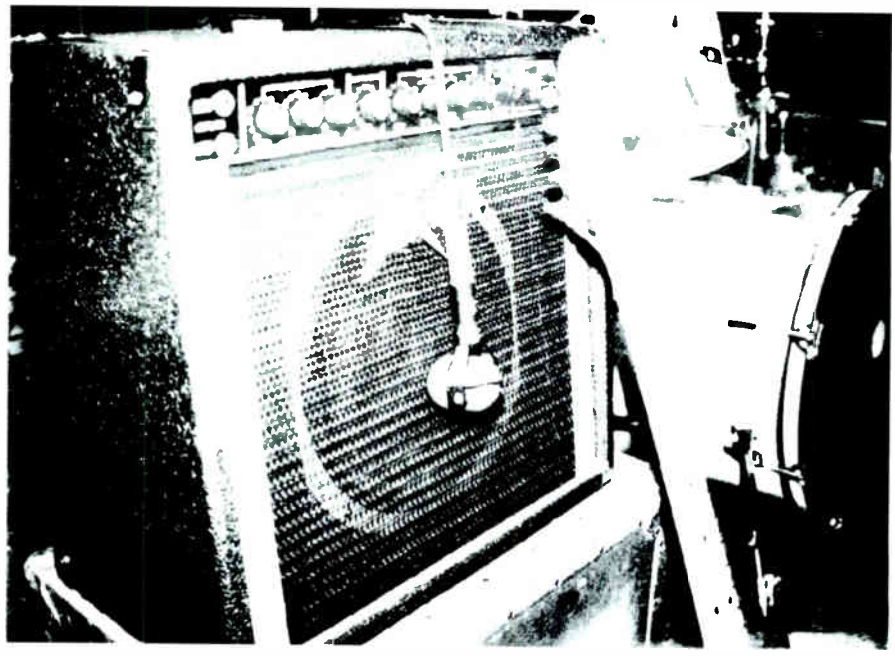


Figure 6. A clsoseup of the Holmes Brothers guitar micing with an EV ND-408.

enough of the sax and piano to give him the sound he wanted.

Russel Blake played a Fender Precision electric bass, using the USIA-supplied Peavey TKO 65 bass amplifier. He incorporated a preamp booster into his signal, which I initially took directly off the preamp output of the Peavey. However, after listening to one of my board tapes, Russel complained about compression on his bass. I explained that I didn't use any, which made us re-examine our DI situation. The TKO bass amp incorporated a built-in compressor circuit on the input, which could not be modified in any way by the operator. My preamp-out DI incorporated this compressor; to bypass it, we decided to insert the direct box between Russel's bass and the Peavey amplifier. This made Russel much happier. Monitor-wise, he liked a bit of sax, heavy piano and moderate bass drum. My

Figure 7.The Holmes Brothers sound check in Bamako, Mali.

only consistent daily problem with Russel was his stage volume: while his level was usually OK for Pharoah and Greg, it was almost always too loud for William! This called for some diplomacy on my part, along with some creative bass amplifier placement, but we usually achieved a workable solution with a minimum of ruffled feathers.

Drummer Greg Bandy played a basic Gretsch set of an 18-in. bass drum, 5 ½ X 14-in. snare, 12-in. mounted tom, and 14-in. floor tom. He used A. Zildjan 14-in. hi-hats, 22-in. ride, and 18-in. crash. In keeping with the general philosophy of an "open" sound, I chose to area-mic the drums.

I brought my own EV RE-20 for the bass drum, and used 2 USIA-supplied Shure SM-81 condenser for overheads. I also used a Shure SM-57 as a snare mic, positioned slightly off the drum to pick up a bit of high hat as well. I used this "snare special" exclusively to pick up Greg's brush work on ballads, something he did about 20 percent of the time.

I was fortunate in that Greg and Russel had similar ideas about what they wanted to hear from their monitors; with the Pharoah Sanders Quartet, I wasn't called upon to create compromise monitor mixes.

The Holmes Brothers posed an entirely different set of challenges. Their blend of blues with R & B called for anything *but* an acoustic open sound: a solid drum sound was needed, with both solos and accompaniment amplified through the PA. But foremost in the mind of band founder Sherman Holmes were the vocals. Fans of the Holmes Brothers always mention their signature 3-part harmonies first; while Sherman acknowledged the importance of a "weighty" band sound, he was most concerned with vocal clarity, intelligibility, and balance. He felt the proper vocal balance, especially with respect to monitors, had yet to be realized consistently live. I took this as a personal challenge. I planned to be the first engineer they had worked with to get it right! From our pre-tour conversations, I divined that drummer "Popsy" Dixon would require his own monitor mix; the 3 front-line musicians could live with sharing the other. Lead guitarist Wendell Holmes handled most of the lead vocal chores, but both Sherman and Popsy would be featured on select tunes as well. The math seemed daunting: I had to keep 3 vocalists happy with only 2 mixes. (See *Figure 5.*)

Wendell Holmes played a Fender Stratocaster guitar, using one of the USIA-supplied Peavey Bandit 65 guitar amps. When I was reunited with the sound system in Niamey, Niger, I discovered a shortage of mic stands—the inventory had been changed by the previous group without my knowledge. I realized that there weren't going to be enough boom mic stands in the system to allow me to mic guitar amps, something I had to do to present the group's music properly.

I'd brought several EV ND-408 mics along for use on the drum set, but quickly settled on using them as amplifier mics; I could use the mic's small size and swivel geometry to provide a perfect guitar amp mic sans stand (see *Figure 6*). Vocally, Wendell's dynamics ranged from a whisper to a scream - he was definitely a prime candidate for compression. I assigned my only patchable limiter to his input; his vocal mic was an EV ND-457A, the stock USIA vocal microphone. One advantage this mic had was excellent "reach": if Wendell strayed slightly off-mic, or if announcers had "fear of microphone," I had confidence that I could still get usable gain at a distance with this mic.

Gib Wharton played an EMI pedal steel guitar—yes, you *did* hear me right...pedal steel guitar! Gib kept me laughing with many stories of conversations he'd had with fans regarding his use of a pedal steel in a blues band. Many were astonished, some were outraged, but none ever asked for their money back! He really didn't need to defend its presence - he made it fit, and fit beautifully. Gib also played a Paul Reed Smith 6-string electric guitar on several tunes; both steel and standard guitar used another Peavey Bandit 65 guitar amp, mic'd the same way as Wendell's amp. Gib contributed occasional vocals, singing low bass parts, using another ND-457A.

Bassist Sherman Holmes used a Schecter Jazzmaster Bass, played through the same TKO bass amp that Russel used. I chose to return to a amplifier preamp output DI because of Sherman's playing style: he played without a preamp booster, and his touch on the instrument itself was softer than Russel's. Therefore, Sherman put less level into the amp, resulting in less compression from the Peavey's internal limiter.

Our problem was perceived level: Sherman really wanted a lot of low end on stage, and a 70 watt amp into a single 15-in. speaker just was not going to do that. We tried to compensate by keeping the amplifier physically close to Sherm on stage. Vocally, Sherm used a ND-457A; dynamically, his was a consistently powerful voice, so once I set a level I didn't have to change it that much from song to song. Sherm did an excellent job of mixing himself by working the mic: he'd back off for harmony parts, move in for leads or response. (See *Figure 7.*)

Willie "Popsy" Dixon played a combination of Yamaha and Tama drums, with Sabian cymbals. I used an AKG D-112 on his bass drum; a Shure SM-57 on his snare. After that, my mic'ing varied wildly, according to the size of the venue. Most often, I used a Shure SM-81 on the rack tom, another SM-81 positioned as a combination floor tom/overhead mic; Popsy's positioning of his ride cymbal vis a vis the floor tom made this viable. In larger halls, I would use a pair of SM-58s on the rack and floor, using the SM-81s as dedicated high hat and overhead mics. Regardless of gig size, I always used an ND-457A mic for Popsy's vocal. His voice was truly amazing: in the scheme of the group's harmonies, he most often sang the high parts. Without a doubt, he has the strongest falsetto voice I've ever worked with. Even in head voice, I had his gain and level set lower than everyone else for proper balance! The wisdom of a separate monitor mix was based on his desire for drums: he wanted heavy kick in his wedge, along with a good vocal blend. Unlike many singers, he wanted his voice even with the others in terms of level. db

CHRISTOPHER JAFFE, D. ENG. (HON.)

Music and Communications Building—Cleveland State University

The design of music education facilities at the university and conservatory level should take into account the musical needs of communities within their geographic regions.

SINCE THE REQUIREMENTS OF each locality are different, it follows that the design of these facilities should not be a rubber stamp of other buildings but a carefully thought out process that integrates the needs of students, faculty and the community at large.

For example, a music school in New York City does not need to make its performance halls available to the community for professional concerts. New York City has a multitude of concert and recital spaces and a school such as Juilliard can dedicate its performance spaces to student productions.

Cleveland, on the other hand, does not have an acoustically satisfactory mid-size downtown concert hall. Therefore, when Cleveland State University planned its new music building, a 1,000-seat recital hall was included as part of the program despite the fact that a hall of this size was not a priority requirement in the music school's educational mission.

Over the years, we have been involved in a multiplicity of university and conservatory projects which had to be specifically tailored to the educational needs of each school and the performance needs of their respective communities.

At the Interlochen Music Academy for example, the curriculum included musical theatre, dance and drama, as well as music. For this reason, the stage at Corson Hall in the Grand Traverse Performing Arts Center was designed in the proscenium format, incorporating a limited capability for flying scenery. This allowed our firm to meet the school's requirement that there be no compromise in the musical acoustic quality of the room, while still enabling dance and drama performances to be presented using roll drops, wagons, traveling scenery and unit sets. In addition, the hall serves as the main performance venue for the local populace of Traverse City and its environs.

At Western Michigan University in Kalamazoo, the Dalton Center incorporates a unique 360 degree multi-media performance space that is responsive to the school's electronic arts program as well as a small recital hall that doubles as a venue for master classes. Kresge Auditorium, a large multi-use hall built on campus prior to the construction of the Dalton Center, already fulfilled the needs of the community for presenting major events.

Based on these experiences, it is obvious that the programming of a music educational facility must be carefully formulated and that community-based activities planned for such a building should be incorporated into the design at the very start of the project.

DESIGN CONSIDERATIONS

Music schools present a consulting professional with some of the most difficult acoustical design problems that he or she may ever encounter. Not only must the acoustician provide outstanding musical environments for teaching, practice, rehearsal, performance, and recording, but he or she has to satisfy the tastes of a myriad of professors, many of whom are outstanding instrumentalists and vocalists in their own right.

The acoustical design issues of a school of music include the traditional "big three elements" of architectural acoustics: room environment, sound and vibration isolation (from both external and internal noise sources), and mechanical system noise control.

In addition, the acoustician must be aware that many of the performance and rehearsal spaces double as recording venues for both professional and archival recordings. Considering the wide dynamic range and low noise floor of digital recordings, background noise control in these rooms has become an extremely critical factor.

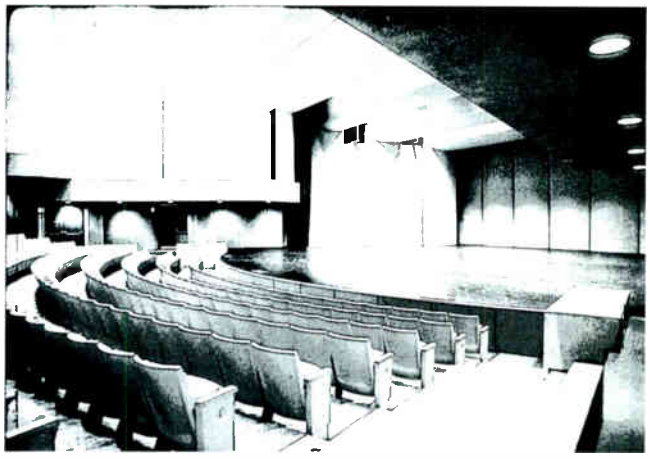


Figure 1. A view of Waetjen Hall, Cleveland State University.

ROOM ACOUSTICS

Recital Halls

The crown jewel of every music education facility is its recital hall. These rooms are difficult to design since they have to accommodate a variety of ensembles with wide differences of sound power output (full orchestra to violin soloists).

Recital halls in large cities are never required to accommodate an orchestra and chorus of 250 individuals, but a conservatory recital hall may handle a piano soloist or a string quartet one day, and a full symphony with chorus the next. For this reason, we design conservatory recital halls to have 1.5 to 2 times the volume-to-seat ratio that would be required for a 2,500-seat symphony hall. This translates into a range of 450 to 600 cubit feet per seat in these educational performance centers.

Since we are dealing with such wide differences in power levels, elements such as variable drapes and panels, portable absorptive units, tunable reflectors and demountable shell panels all play an important roll in enabling the room to function properly.

Rehearsal, Teaching and Practice Rooms

Rehearsal, teaching and practice rooms are more dedicated spaces. These rooms will vary in size and cubic volume depending on the sound power levels of the instrumentalist or ensemble using the space.

Symphonic rehearsal rooms should never be less than 25-ft. in height and choral rehearsal rooms should be designed at a minimum of 20 ft. In the best of all possible worlds one would add 5 ft. to the above heights for each room.

Variable and demountable acoustic elements should be provided to assist in tailoring the acoustic environment of these rooms to meet user preferences.

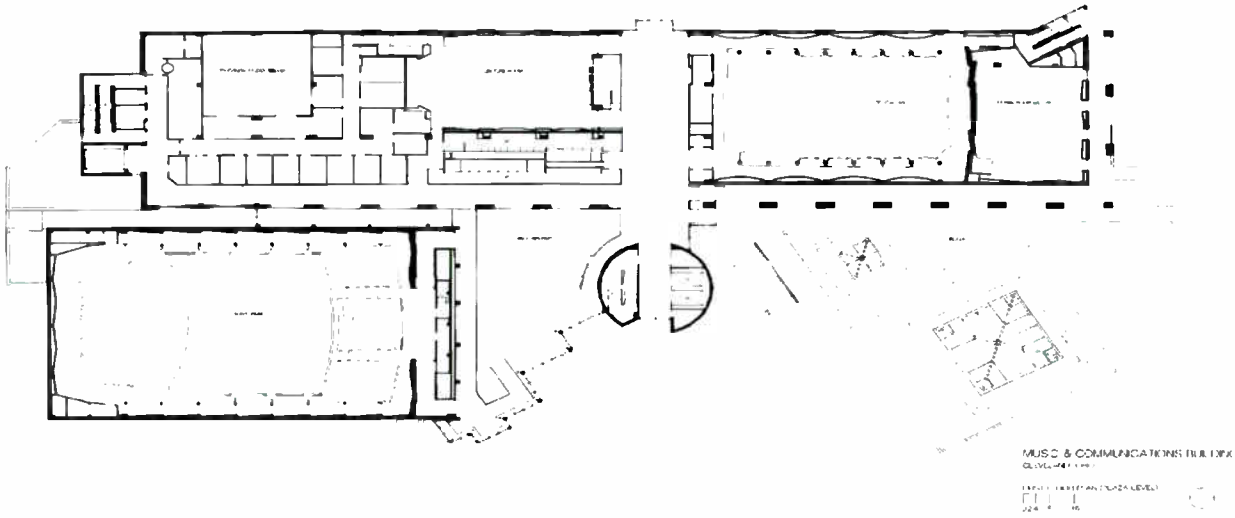
ISOLATION

Sound isolation from space to space is an unusually tough assignment in a music education building since all the rooms are in such close proximity. Cost estimators rarely have complete information about (or understanding of) the thick, complex walls, floating floors and other items the acoustical engineer may require, therefore sound isolation is the issue most likely to push a project over budget, or compromise its acoustical integrity.

Cost estimators traditionally work from a schematic room layout, pricing constructions based on STC (Sound Transmission Class) numbers of walls and/or rooms, which indicate the isolation required between types of spaces—STC 50 for classrooms or practice rooms, STC 60 for music spaces, etc. They would then consult a manufacturer's spec book (e.g., "STC 50 = drywall partition") and assign a cost. But because cost estimators' understanding of STC is usually different from the acoustical engineer's, the resulting prices often are unrealistically low.

We strongly recommend having the acoustical engineer provide not only STC numbers, but also a writ-

Figure 2. Floor plan of the Music and Communications Building.



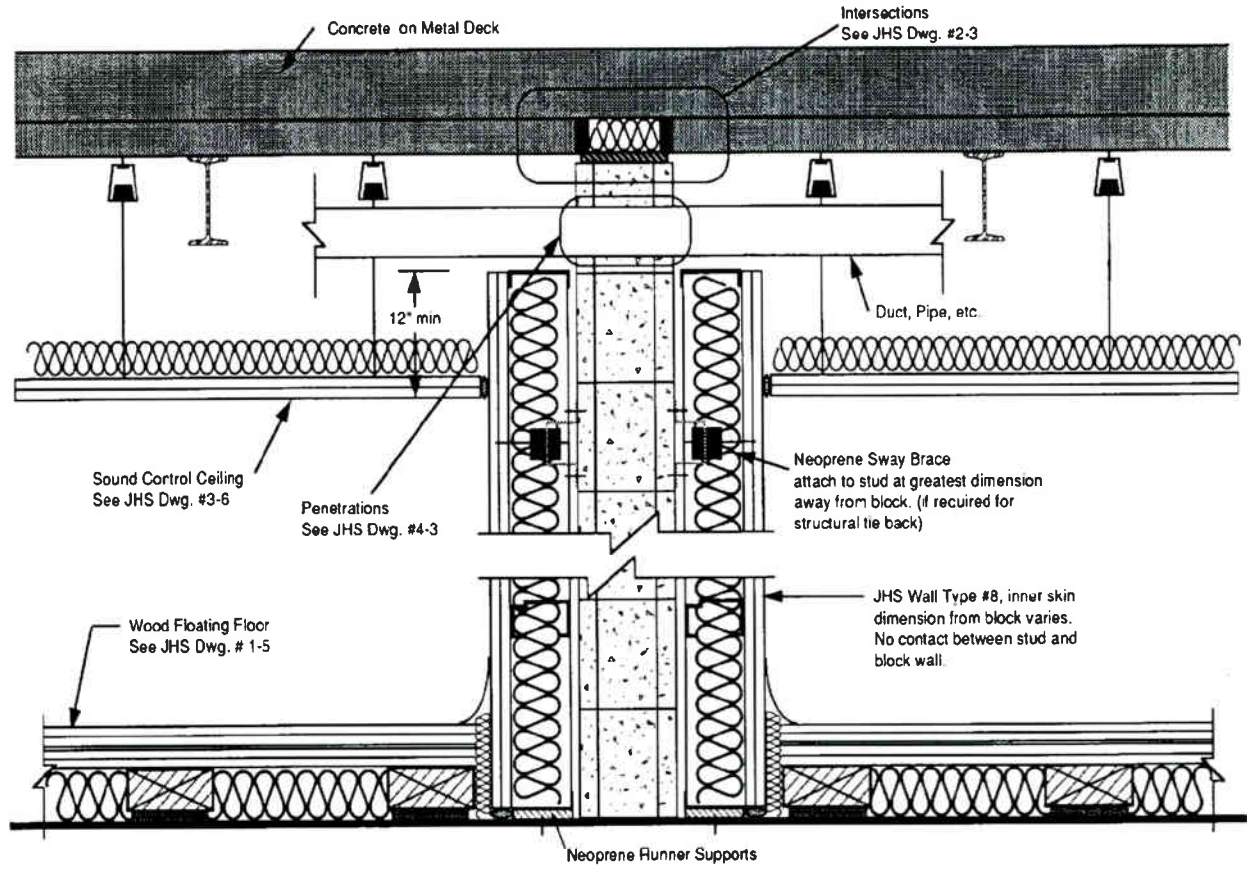


Figure 3. Details of the common music practice room showing both the isolation floor and ceiling interface.

ten description of the partitions for the estimators' reference. It should be detailed enough to include construction materials (double-layer gypsum stud wall, fiberglass batt, etc.) yet generic enough to permit tuning of partitions as the design develops. Such guidelines make it much easier for estimators to correctly judge the quality and cost of the required acoustical materials, and avoid surprises down the road.

Care must be taken to prevent the occurrence of sound flanking paths from one room to another. Conduits, piping and ducts that penetrate walls and ceilings must be isolated from these partitions through the use of resilient gaskets and caulking materials.

Doors are notorious flanking paths. One must specify high STC acoustical doors with gaskets and bottom seals for all critical rooms. Where practice rooms or ensemble rehearsal halls line both sides of a corridor, room entryways should be off-set so that no two doors are directly across from each other.

Sometimes it is necessary to stack rehearsal, teaching or practice rooms one above another. In these instances some form of floating floor and resilient ceiling construction is essential. In certain instances, for example when a dance studio is located over an instrumental rehearsal room, some form of total box-in-box design might be required.

MECHANICAL SYSTEM NOISE CONTROL

Several strategies can be employed to control noise from heating, ventilating and air conditioning (HVAC) systems. These include specifying low air velocities, reducing fan noise with in-line silencers and sound absorbing duct lining, and providing silent supply and return grilles.

Of course the specifics of the design must be analyzed closely. For example, one must be aware that silencers, by restricting air flow, will regenerate noise twenty feet down line from the unit. Should this portion of duct length happen to traverse a critical acoustic space, it will be necessary to encase the duct in several layers of gypsum board to prevent noise from breaking out of the thin sheet metal duct enclosure. Although internal duct lining reduces the energy of sound waves as they pass through the duct, this material has no value as a means of reducing noise break-out through the duct wall.

Some things to remember:

a) Round ducts will reduce noise breakout from a duct. In a recital or rehearsal hall, one can use rectangular ducts to run between the mechanical rooms and entry point to the halls, and then use round ducts in the halls themselves.

b) Sound waves will travel against airflow almost as easily as they travel with it. Therefore, noise reduction techniques must be considered for return air as well as supply air systems.

c) To obtain low sound levels in critical rooms, it is essential that all mechanical equipment, e.g.,

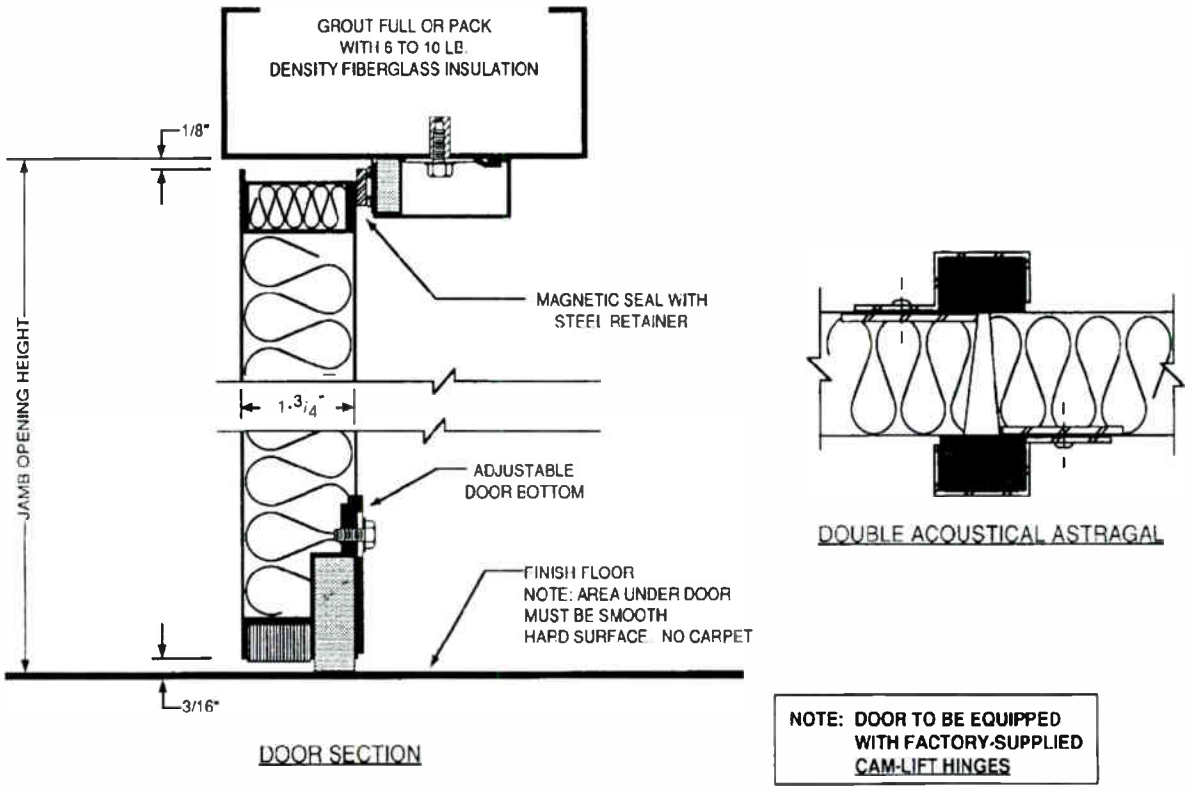


Figure 4. STC 47 acoustic door details.

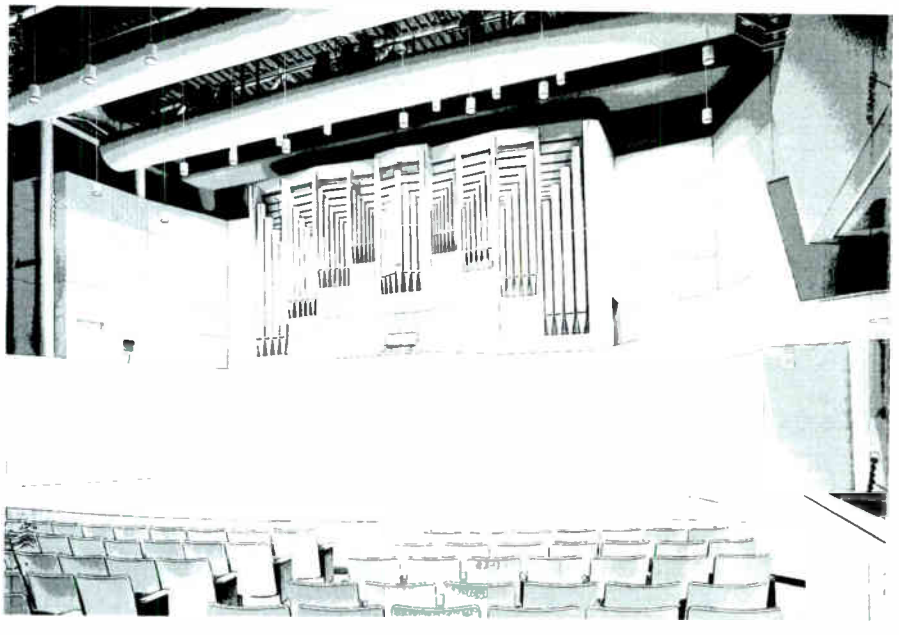
chillers, pumps, fans, etc., be supported on vibration isolation devices. Ducts, pipes and conduits serving this equipment should be attached with flexible connections and suspended on vibration isolators for a distance of at least twenty feet from each machine.

d) It is extremely important that supply and return ducts run in the corridors between teaching suites and practice rooms to prevent *cross talk* between these spaces. Branch ducts containing sound traps can then be tapped from the main duct into each space.

Jaffe Holden Scarbrough's most recently completed project is Cleveland State University's Music and Communication Building. This facility embodies all the technical challenges of designing for an urban setting and some special rewards.

The building, with its varied pyramidal and cylindrical forms and abundant natural light, is home to the University's music and communications departments, each with its own highly technical sound requirements. Equally important, it is a vital link between the campus and the city, where "town and gown" come together for concerts, recitals, and other events. Besides a full complement of 16 teaching studios, 28 practice rooms, two large rehearsal halls, and assorted classrooms and offices, the building houses two major performance halls. Waetjen Hall seats 950 people and is a slender, steel-framed "shoebox" space. Modeled on such grand European

Figure 5. The recently installed Holkamp 26-rank concert organ Waetjen Hall.



concert halls as Vienna's Musikvereinsaal, it accommodates large symphony orchestras, chamber ensembles and solo recitalists as well as convocations, lectures, and dances. Drinko Hall is more intimate, a steeply raked two-level hall designed strictly for music, primarily smaller ensembles and soloists. With 243 fixed seats (plus 60 removable box seats) it still has ample volume to meet varied acoustical demands.

As architect Pieter van Dijk notes, Waetjen and Drinko also fill a special role for Cleveland which, though famed for its musical offerings, still did not have first-class performance spaces for small orchestral and choral productions and larger chamber groups. Now it does. Since the two halls opened in 1990, they have won plaudits for their warm acoustics, with the *Plain Dealer's* music critic, Robert Finn, singling out Waetjen as an "acoustically brilliant place" and praising its "bright and resonant" sound.

With the installation of a large 26-rank Holtkamp concert organ last February, Waetjen received its crowning touch; final acoustic tuning will be completed later this year, making it one of the few U.S. concert halls fully equipped to present the classical organ repertory.

Dr. William Martin, who headed the school's Design Committee, praises the acoustics of both the new halls. He is also enthusiastic about Jaffe's handling of the rehearsal studios. "Nothing gets through the walls or ceilings," he says; "You can walk right by the rooms and you can hardly hear a thing."

With competition for students running at an all time high, it is important for every conservatory to have state of the art facilities to match the high caliber of faculty needed to recruit the best, brightest and most talented students. db

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!**

The World of Post-Production for Radio, TV and Film.

SMPTE in Canada Show issue.

• GUIDE: Signal Processing Equipment, Part II, (noise gates, noise reduction, limiters, compressors), Work Stations.

JOHN BARILLA

THE ELECTRONIC COTTAGE

The Art Of Editing: Part I—Sex, Lies and Audio Tape

● One of the great lies in the world of audio is that analog tape has outlived its usefulness as a mixdown medium. Particularly, on the level of a budget studio, analog still has a very important place. It's not the sexiest of all mediums with its hulking reels of tape and it doesn't have the charm of on-screen computerized digital editing. But, it does have one stellar virtue: it is economically accessible to even the humblest electronic cottage, and if you become a competent editor, you can (practically speaking) do all the things you can do with a digital editor—at a mere fraction of the cost.

DAT?

The trend in home studios lately has been to mixdown to DAT. This of course, gives one the quietness of the digital medium and makes the small studio sound competitive in the audiophile sphere. That's all well and good, but what do you do if you have to re-sequence the order of tunes on a DAT? Buy another DAT or rent one for the day? What if you want to add or delete or replace a section of a song? Unless you have a digital editing system (which is a major investment), you are up the proverbial creek without a paddle. The flexibility and reasonable cost of an analog reel-to-reel still seems to be a valid option, particularly when it is coupled with a good noise reduction system. The digital pundits can protest if they want to, but for pop music I still like the sound of analog. There is something magical that happens when you slam a mix nice and hard to analog tape. I still use DAT, but it's mostly as an archival medium—something to back up my analog tapes, perhaps with a little extra processing added on the way down.

Now this article is really not about sex, except to argue that in terms of cost-effectiveness, analog tape can still be quite a turn-on. And it's not about lies, except to dispel the myth that DAT is the only way to go. That's a lie. Analog can still be pretty sexy—if you know something about editing. And that, of course is the real subject of this discourse.

You know what's interesting about this whole subject of analog tape editing is how infrequently anyone ever broaches the subject in print. In that way, it's almost like sex was in the Victorian age: folks did it, but they didn't talk about it. Maybe today it's not quite *chichi* enough to look good in a magazine. (You don't have those nice on-screen waveform diagrams to spiff up the text). Perhaps another reason is that it's a difficult subject to talk about without looking over someone's shoulder and personally experiencing the awful screeches of tape being manually "scrubbed" across the machine's head. There undoubtedly is a factor of hand/ear coordination that is really ineffable, so most writers eschew dealing with the matter in print. Still, I contend (if we assume an intelligent, heads-up reader who is willing to experiment on their own for a few hours) there is much that can be transmitted. So let's give it a shot.

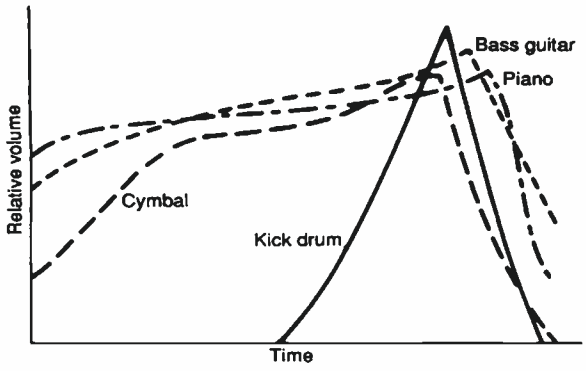
TOOLS,DEFINITIONS AND CONCEPTS

First, let's stand on some common ground. For the purposes of this discussion, let's assume we are using ¼ n. tape and running speed is 15 inches per second. You'll need a good quality splicing block (not one of those doo-hickeys that close on the tape like a guillotine), a sharp non-magnetized single-edged razor blade, and some professional splicing tape (Scotch or Ampex please—not Radio Shack). The splicing tape will probably be labeled as 7/32 instead of ¼ in. because it's designed to be just a hair smaller than your audio tape so it is easier to line up parallel to the tape. If you don't want to get an official editing tape dispenser (they can be pretty expensive), just hot-rod an old plastic Scotch Tape dispenser by pulling it apart at the seam and inserting the splicing tape. The splicing block will also be a hair undersized so that the audio tape will hold tight while you are cutting it. You should mount the block with Velcro, as close as possible to the heads without getting in the way of any controls.

Before you begin to do any critical edits, it is well to get the sheer eye/hand coordination together by practicing on some scrap tape. Insert a piece of audio tape in the edit block by lining it up over the groove and pressing it down until it locks in place. Notice that there are two angles at which you may cut: a 90 degree angle and a 45 degree angle. The 45 degree angle is what you'll use almost always. Why? I think there are probably two major reasons: one is the strength of the splice is increased when the stress is distributed over a longer seam, and two, is that the angle cut makes most edits sound smoother. This is so because the left side of the edit starts at a slightly different place than the right side. It actually provides a bit of a cross fade between the left and right channels which helps to mask minor imperfections in the edit point.

When you cut, insert the point of the razor in the far side of the splice block and pull quickly and smoothly towards you through the 45 degree channel. Splices should have a nice smooth edge. When placing splicing tape over the two pieces of audio tape you wish to join, chop a piece of splicing tape about ¾ in. long and stick it lightly on a corner of your razor blade. It's a lot easier to line up the splicing tape over the audio tape when it's hanging from the edge of the blade. Once it's lined up, use your other hand to press it down onto the audio tape. To make a better bond, smooth the spliced area over a few times with the edge of your thumbnail until most of the air bubbles are removed. If you should need to disassemble an edit point, simply turn the tape over (to the oxide side) and bend the tape along the 45 degree line. Then with a fingernail or edge of the razor blade, carefully loosen one of the "pointy" ends of the angled splice and peel it back; then remove the splicing tape completely and start again. If you can do that much without too much hassle, you are ready to do some editing with recorded tape.

Figure 1. A schematic representation of sound transients at the edit point.



GET READY TO ROCK

Make sure you don't start your experiments with a master tape. If splicing a critical point in a master tape is your goal and you don't as yet have a lot of experience, it is better to make several dubs of the passage in question and practice on these until you've got the exact edit point down pat. The technique you will use to find the edit point is called "scrubbing" or "rocking" tape. To do this you will have to find the lever on your tape deck that lowers the tape lifters (the two narrow cylindrical pieces of metal that lift the tape away from the heads on fast forward and rewind). When you've released this lever (or button) so that the tape is flush against the heads (the way it is in playback) you are ready to rock. To do this, simply play the tape to the neighborhood of the area where you intend to edit and stop the tape. (Try to stop it as close to the edit point as possible. For example, if you intend to edit on the first beat of a measure, play the tape a little before the edit point and start counting beats in tempo. Exactly on the first beat of the measure in question stop the tape, and you will be very close.

Now place the fingertips of your left hand on the perimeter of the left reel and the fingertips of your right hand on the perimeter of the right reel. Keeping a slight tension on the tape move the tape first backward, then forward, then backward, then forward again and again while listening carefully to the sounds. What you hear will be a strange, growling soundscape which seemingly bears little resemblance to the beautiful music you recorded; yet a definite one-to-one correlation does exist between these surrealistic sounds and the music on tape.

YOUR TASK IS TO FIND IT!

The process is something like detective work where we search for a fingerprint on the smoking gun and try to find the real-life culprit to whom it belongs. I know it sounds very esoteric, but it is not at all as hard as it seems. After you have rocked the same two inches of tape over and over again, backwards and forwards, a certain familiarity with the mysterious blips of sound emerges.

The important concept to keep in mind is that you have to approach it scientifically in all respects, applying known information and theoretical assumptions, con-

structing hypotheses, testing them, and drawing conclusions.

(You remember this stuff from 9th grade science class, don't you? Even if you don't, the process is all very innate to the human thought process and if you just become conscious of it you can do it!)

LET'S WALK THROUGH THIS A LITTLE FURTHER

Say, for example the known information is that on the first beat of the measure in question there are several instruments that all hit at the same time: the kick drum, a cymbal, the bass guitar, and a piano. Therefore, we can expect the first beat of the measure to be louder than the points immediately before it or after it, so when you rock tape, this quality of increased loudness should also hold true. So, you are looking for a group of sounds that is more prominent than the rest. This is probably the most important part of editing: choosing a point that is, in fact, identifiable from the rest of the music in a well defined way. (Usually this is pretty easy to do, but sometimes because of the nature of the music or the density of the mix, it is more difficult. We will deal with these knotty problems later. For now, we will tackle the most frequently encountered scenario which is actually quite simple). The point of it all is that whenever possible, try to make life easy for yourself by choosing an edit point that contains sonic information which immediately stands out from the rest of the mush. Percussive sounds—those with strong transients (sounds that come quickly and leave quickly) are the best candidates.

In the above-mentioned stew of instruments (kick drum, cymbal, bass guitar and piano), all have pretty strong attack transients, but unlike the other instruments which are probably sustaining a note for a beat or two, or perhaps decaying gradually, the kick drum not only has a quick attack transient, but it also decays quickly. So, the kick drum will probably be audible as an easily identifiable "blip" which is there, and then gone. (See *Figure 1* for a schematic representation). This will probably be your most exact reference point at which to cut your tape. Now, try to find the kick drum by rocking the tape. Remember, that the frequency content will change depending on the velocity and torque at which you are rocking the tape. If you do it slower than normal tape speed the sound will drop in frequency, if you do it quicker, the sound will increase in frequency. So, the blip you hear may not sound like a kick drum at all, but the characteristic fast attack and decay will manifest itself anyway. When you rock the tape forward you will hear a click that appears and then quickly merges into the other sounds as it decays in volume. When you rock it backwards you will hear a slightly longer buildup in sound that ends abruptly by disappearing. Rock it back and forth until you are relatively sure you have placed the tape at the very beginning of the transient, and mark the tape with a white china marker (grease pencil) right at the center of the playback head. You have now constructed your hypothesis. You are contending, that based on the available data—what you can hear at normal play speed and the mysterious sounds you hear on tape while rocking—that this mark represents the start of the transient on the kick drum. The proof will be hitting the playbutton and hearing whether the tape starts at the right portion of the beat. If it seems a little early or late, rock the tape again and create a modified hypothesis. Make another mark, either before or after the previous one and play the tape from this point. Let's say, for example, the first mark appears to be a hair too early, and the second one, (a millimeter or so to the left of it) appears to be a hair too late. Well, you've certainly narrowed down the field! Now listen carefully to the information between the two marks and zero in on the attack transient. Make another mark (put a cross through it so you don't get confused with the other marks) and play it from that point. Voila! You should be right on the money. Now rock the pattern again and again and watch the correct mark pass over the heads. Note the exact pattern of sound when you rock the tape forward from the mark and backward from the mark. Place the mark on the splicing block with the edge of your mark even with the highest point at the top of the 45 degree channel, and make a cut.

Now quickly, with that pattern of sound in mind, remove the source reel and put on the reel with the new passage you want to insert. Attach the two reels of tape together with splicing tape and listen for the exact same characteristics. At this point, you may be so familiar with the sound that one mark will be all it takes. If you are sure of your analysis, then cut the tape in the same place, remove the unneeded portion and attach the new material. (Always keep the removed tape on hand for a while in case you made a mistake and need to re-attach it and cut again). If your cuts are good, the edit should sound flawless.

Okay, you did it on the dubbed copy of your master. You know it can be done, and your confidence level is built up. Now you can go back to your original master tape and conform it to the edit decision you just made. Obviously, when you get proficient at editing you won't have to make a dub and practice first. You probably won't need to make several marks to zero in on your edit point either, but for now, it's better to be safe than sorry!

We'll pick this discussion up again in the next issue of **db**. Then, we'll walk through several different scenarios of varying difficulty until you have all the techniques you need to edit like a pro. In the meanwhile, keep practicing. That's the best way to learn the art of editing. db

Buyer's Guide

Microphone (including Wireless) Microphones, Recording Tape and Tape Accessories

On the pages that follow you will find a Guide to Microphones in chart form. This is followed by a Guide to Wireless Mics in paragraph form. This is, in turn, followed by paragraph-form Guides to Recording Tape and Tape Accessories. Manufacturers' addresses conclude the Guides.

As always, be aware that we attempt to contact every manufacturer, but not all are cooperative or prompt enough for our necessary deadlines.

Model	Type	Pat-tern	Freq-uency in dB	Imp-ed-ance	Sens itivity	SPL %dist	Dim LDW	Wgt oz	Finish	Con-nect-ion	Price	Features
AUDIO-TECHNICA US See our ad on page 6												
ATM63HE		dyn card	hyper	50-18k		600	48 150 0.87	9.3	grey	XLR	$190.00	High output and extended response.
ATM61HE		dyn card	hyper	50-18k		600	55 1.98 0.87	9.7	grey	XLR	$250.00	High gain before feedback, extended response and reduced coloration off axis.
ATM41HE		dyn card	hyper	50-17k		600	55 2.12 0.87	t0.3 10.3	grey	XLR	$208.00	High output with low handling noise. Clear even when used ultra close.
AT4051	cond	card	20-20k	250	35	143	6.10 0.83	4.2	black	XLR	$610.00	Internally direct coupled, uniform polar pattern at all frequencies.
AT4031	elect	card	30-20k	200	46	145 1	6.28 .083	4.9	black	XLR	$330.00	High output and very high SPL handling, uniform polar patterns at all frequencies.
AT4033/ SM	elect	card	30-20k	100	28	140 1	6.73 2.10	14.5	black	XLR	$699.00	The element is suspended in the center of the acoustically-transparent grille, near perfect 90 deg off-axis response
AT822	elect	X/Y stereo	30.20k	200	44	125 1	7.76 2.44	5.8	grey	minis	$299.00	Uniform polar response vs. frequency for realism and spacial impact.
AT825	elect	X/Y stereo	30-20k	200	46	126 1	8.43 2.44	8.5	grey	2-XLR	$399.99	Full mono compatibilty,Switchable low cut, two-way power.
BEYER DYNAMIC,INC												
M424	dyn	hyper card	40-16k 2	200	52	144 1	3 0.64	6	black alum	XLR	$149.95	Miniature, high SPL without distortion.
M420	dyn	hyper card	100-15k 2	200	58	140 1	4 0.64	6.2	black alum	XLR	$249.95	As above.
MC740	cond	5 pos	40-20k 2	150	40	144 1	8.5 2	8.2	black alum	XLR	$1,524.95	3 position rolloff, 10dB pad, large diaphragm.
MC740	cond	multi	40-20k 3	150	46	144 1	8 3.5	10	black alum	XLR	$1,524.95	3 pos. rolloff,switchable 10 dB atten.
TG-X 180	dyn	hyper card	40-16k 3	290	54	140 1	6 2.5	4.5	black anad.	XLR	$179.00	Small, high output.
TG-X 280	dyn	hyper card	30-16k 3	290	54	140 1	6 2.5	4.5	black anad.	XLR	$229.00	Vocal instrument applications.
TG-X 480	dyn	hyper card	40-18k 3	280	50	140 1	8 3	6	black anad.	XLR	$289.00	Vocal mic with pronounced proximity effect.
TG-X 580	dyn	hyper card	30-18k 3	280	50	140 1	8 3	6	black anad.	XLR	$349.95	Fast transients and extended frequency response.
BRUEL AND KJAER, TGI NORTH AMERICA												
4011	cond	card	40-20k 2	180	40	110 0.5	6.75 .75	5.8	black chrm	XLR	$1,800.00	Transformerless,phantom powered.Switchable 0,20dB attenuator. Flat response both on and off-axis.
4003	cond	omni	10-20k 2	30	24	135 1.0	6.5 .63	5.3	black chrm	4pin XLR	$1,660.00	Dynamic range from 15 to 154dB SPL(A)typical. Uses 2812 power supply.
4006	cond	omni	20-20k	30	36	135 1.0	6.5 .63	5.3	black chrm	XLR	$1,660.00	Dynamic range from 15 to 143dB SPL(A)typical. Uses 2812 power supply.
4007	cond	omni	20-40k 2	30	50	148 1.0	6.5 .63	5.3	black chrm	XLR	$1,660.00	Dynamic range from 24 to 155dB SPL(A)typical. Phantom powered.
CROWN INTERNATIONAL												
PZM-30 D	elec cond	hemi	25-20k 6	240	65	150 3	5 6	6.5	black alum.	XLR	$349.00	Switchable flat or rising high freq resp.
PZM-6-D	elec cond	hemi	20-20k 3	240	67	150 3	6 5	6.5	slvr alum	XLR	$349.00	As above.
SASS-P Mk II	elec	omni/ uni	20-20k 3	240 x2		150 1	11.5 5.7	17	black/ grey	XLR	$899.00	Stereo PZM mic
PCC-170	cond	super card	50-20k 3	150	30.5	130 1	4.8 3.4	6	black	XLR	$295.00	Directional boundary mic, available with program-mable memrane switch and adjustable gate.
CM-31	cond card	super 3	40-20k	150	35 1	130 0.5	1.4	4	black	XLR	$240.00	Miniature mic, for choir, orchestra, stage suspension.
LM-300	cond	super card	80-15k 3	150	42	130 1	1.4 0.5	5	black	XLR	$247.00	17-in.goosneck, lecturn mic. available as LM-300L—. 22-in and LM-301—19-in. with 5/8-in threaded mounting.
ELECTRO-VOICE, INC. (A MARK IV COMPANY)												
N/D 408A	dyn	card	60-22	150	51		2.75 2.85	6.7	blk	XLR	$258.00	Pivoting instrument mic with special element for wide fre-uency response and high output.
N/D 457A	dyn	card	55-21	150	51		7.12 2.05	7.05	blk	XLR	$256.00	Hand-held vocal mic with hypercardioid pattern for very high gain before feedback.

Model	Type	Pat-tern	Freq-uency in dB	Imp-ed-ance	Sens-itivity	SPL %dist	Dim L	Dim D	Dim W	Wgt oz	Finish	Con-nect-ion	Price	Features
N/D 757A	dyn	card	50-22	150	51		7.12	2.05		7.7	blk	XLR	$330.00	Hand-held vocal mic with extended frequency response, switch-able low-frequency roll-off filter and special element.
N/D 857A	dyn	super	50-22	150	50		7.40	2.05		7.9	blk	XLR	$450.00	Acoustical path corrector provides increased sens. and a uniform polar pattern.
N/D 357A	dyn	card	55-20	150	53		7.12	2.05		7.05	blk	XLR	$206.00	Works well with both live and studio applications.
N/D 257A	dyn	card	65-19	150	53		7.12	2.05		7.05	blk	XLR	$152.00	Offers 3 dB more output than others in its class.
N/D 308A	dyn	card	65-19	150	53		2.75	2.85		6.7	blk	XLR steel	$222.00	Ideal for kick drum and other percussion applications as well as guitar amps.
HM ELECTRONICS,INC														
HM58	dyn	card	80-14k	600	75		6.6	2.0		10	silver abs	XLR	$29.00	Designed for high quality professional applications.
RM77	elec cond	uni	150-15k	800	72		7.5	2.0		11	grey zinc	XLR	$29.00	Built-in pseudo-reverb with variable control.
MTG (GOTHAM TECHNOLOGY GROUP)														
UM925	cond	3 pat	40-18k	200		120 0.5	7.5			15	black	XLR	$1,995.00	3 patterns utilizing large dual membrane capsule,vacuum tube electronics, black or nickle finish
UM705	cond	3 pat	40-18k	200		123	8.7	0.5 1.7		10 1	black	XLR	$1,150.00	3 patterns, utilizing large dual membrane capsule m7, solid-state electronics, black or nickle finish.
UM70	cond	3 pat	40-18k	200		125 0.5	8.7	1 1.7		10	black	XLR	$995.00	As UM705 above.
M715	cond	card	40-18k	200		123 0.5	8.7	1 1.7		10	black	XLR	$895.00	As UM705 above but single pattern.
SMS200	cond	card	40-20k	150		134 0.5	6.5	0.8		4.5	black	XLR	$595.00	Small single membrane capsule with ceramic electrode, interchangeable capsule, black or nickle finish.
SMS210	cond	super card	40-20k	150		134 0.5	6.5	0.8		4.5	black	XLR	$625.00	As SMS200 above.
SMS270	cond	omni	20-20k	150		138 0.5	6.5	0.8		4.5	black	XLR	$575.00	As SMS200 above except flat response in the difuse field.
MILAB														
VIP-50	cond	var pat		200		112 1	6.5	2		14	black alum	XLR	$1,495.00	Switchable pad, HP filters, large dual membrane capsule.
DC-96B	cond	card	20-20k	200		118 1	5.7	1		7	black alum	XLR	$795.00	Lage dual membrane capsule.
VM-44	cond	card	20-20k	200		128 1	5	1		4.6	black alum	XLR	$615.00	Switchable pad.
LSR 2000		cond	card	20-20k		200 1		1		133	7.25	XLR	$675.00	Switchable pad.
MP-30	cond	omni	40-20k	200		110 1	1	3		2.3		XLR	$385.00	PZM style, Crown licence.
NEUMANN														
TLM-170	cond	multi	20-20k	50	41.9	150 0.5	6.0	2.4		22	black	XLR	$2,295.00	Multi-pattern mic employs FET100 technology
RSM-1915	cond	shot gun	20-20k	50	32.8	134 0.5	8.4	1.2		6.0	matt	XLR	$3,695.00	Transformerless M-S/X-Y stereo shotgun mic with active matrix.
KM100 SERIES	cond	multi	20-20k	50	38.4	148 0.5	3.6	0.8		2.8	black	XLR	$795.00 -$995	Capsule and output stage can be separated to allow interconnection of accessories.
U 87 Ai	cond	3 pat	20-20k	200	31.9	117 0.5	7.9	2.2		17.6	black	XLR	$2,375.00	Multi pattern studio mic with 1o dB atten, low-freq rolloff, pattern selection.
U 89i	cond	5 pat	20-20k	150	41.9	134 0.5	7.3	1.8		14.1	black	XLR	$2,195.00	Multi-pattern mic handles high SPLs, bass rolloff.
SM 69 FET	cond	5 pat	20-20k	200	34.4	110 0.5	10.2	1.9		16.4	black	DIN 12	$4,080.00	Dual capsule stereo M/S and X/Y can be rotated to vary steeo effect.
KMR 81i	cond	shot gun	20-20k	150	34.9	128 0.5	8.9	0.8		5.1	black	XLR	$1,275.00	M/S stereo shotgun includes MTX 191 matrix, high-pass filter.
KMR 82i	cond	shot gun	20-20k	150	34.9	128 0.5	15.5	0.8		8.8	black	XLR	$1,895.00	Shogun has high directional efficiency, hig and low freq. rolloff switches, includes a windscreen.
PEAVEY ELECTRONICS														
PVM520 TN	dyn	card	45-19k 1	400 1.95	52	145 alum.	4.8			10	black	XLR	$299.99	Yoke mount with three swivel points.
PVM580	dyn	hyper	60-16k	400	52	140	5.75			9.25	black	XLR	$219.99	Titanium laminated diaphragm.

Model	Type	Pat-tern	Freq-uency in dB	Imp-ed-ance	Sens-itivity	SPL %dist	Dim L	Dim W	Wgt oz	Finish	Con-nect-ion	Price	Features
TN		card	3			1	1.87			zinc			
PVM535N		dyn	card 3	40-16k		400 1	52 1.87		140	5.87 zinc	XLR	$219.99	New lightweight diaphragm.
PVM38	dyn	card	60-15k 3	400	56	140 1	5.75 1.87		14	grey	XLR	$199.99	

SENNHEISER ELECTRONIC CORPORATION

MD431	dyn	super	40-16k	200	57	120 1.0	7.88 1.25		8.8	black alum	XLR	$479.00	High gain-before-feedback, handles high SPL. Triple-layered steel mesh grill. Magnetic reed on/off switch.
MKE -4032	elect cond	super	70-20k	200	46 1.0	140 1.9	8.1		7.5	black alum	XLR	$639.00	12-48 V phantom or AA battery operation. Built-in blast filter, shock mount. Rugged, handles high SPL.
MKE-2	elect cond	omni	40-20k	200 1000	46	126 1.0	0.43 0.23		0.1	black	XLR	$285.00	Two impedance options, fleshtone color option. Small, ultra light for broadcast, church and theatre in wireless system.
MD422	dyn	card	30-17k	200	54	175 1.0	8 1.5		13.6	black	XLR	$565.00	Versatile, durable. Handles high SPL. Five position roll-off provides equalization up to 1000Hz.
MD 518	dyn	card	50-16k	200	58	120 1	7 1.25		6.5	black	XLR	$229.00	Handheld mic, high SPLs, smooth pickup.
MD 530	dyn	super card	40-16k	350	57.1		7.1 1.7		9.9	black	XLR	$395.00	Small size, can be used as clip-on mic for instruments
MKE 300	elect	super	150-16k	200	35.9		9.1		2.1	black	3.5 mm	$225.00	Ideal for camcorders, integrated windscreen,.

SONY PRO-AUDIO

C-48	cond	multi	30-16k	150	39	128 1.0	2.2 9.1		20	satin nickel	XLR	$1050.00	Selectable patterns,10 dB pad,lo-cut switch, 9 V battery or phantom power. Vibration-proof structure.
C-535P	cond	card	30-16k	200	40	138 1.0	0.8 6.1		4.9	black alum	XLR	$495.00	Slim-line design with 10 dB pad. Rejects SCR, TV and other electronic noise. Excellent transient response.
ECM-MS5	cond	elec card	stereo	70-20k		150 1.0	40 8.4		1.9	alum	XLR	$1250.00	Three capsule design for M-S recording. Built-in M-S matrix field-rugged construction. 12-48 V phantom powered.
F-730	dyn	card	50-11k	300	60		1.7 6.5		8.8	black alum	XLR	$120.00	For vocal recording, offers extra punch in low range.

SHURE BROTHERS, INC. See our ad on Cover IV

BETA58	dyn	super card	50-16k	150 290	71.5		6.38 2		9.3	slvr blue	XLR	$266.00	Three-stage directional tuning network,advanced shock isolation system,humbucking coil,rugged steel grille.
BETA57	dyn	super card	50-16k	150 290	71		6.18 1.5		9.2	slvr blue	XLR XLR	$258.00	same as the BETA 58 but designed for musical instrument mic'ing,features smooth wide response.
VP88	stereo cond	multi	40-20k	150 100	66	129 1	11.43 1.56		14.7	black alum.	5-pin XLR	$995.00	MS stereo, mono compatible,built-in left-right stereo matrix adjustable side level switch, internal or phantom power.
SM81LC	cond	card	20-20k	150 85	40	146 1.0	8.3 0.9		8	black	XLR	$422.00	Ruler flat response, phantom power only.
SM91A	cond	hemi	20-20k	150 90	45	144 0.1	0.6 3.7 5.0		9.3	black cast steel	XLR	$310.00	Low profile boundary effect mic. External pre-amp with 12 dB per octave roll-off switch. Accepts battery ot phantom power.
SM98A	cond	card	40-20k	150	54	153 0.1	1.2 0.5		0.4	black brass	XLR	$275.00	Full-range response in miniature unit. Many optional mounting accessories.
SM57LC	dyn	card	40-15k	150	75		6.22 1.25		10	grey	XLR	$141.25	The standard for percussion and instrument mic'ing.

YAMAHA MUSIC CORPORATION

MH100	elec	card	10-10k	1.6k	70						phone jack	$49.00	Headset and microphone in one unit. Uses lightweight pads that are easy on ears even with extended use.
MZ101	dyn	card	40-17k	250	76		6.2 0.9			mett brown	XLR	$135.00	Noted for its clean mid-range and high-end. Poly-laminate diaphragm. Unique 3-point suspension. Gold-plate connectors.
MZ102BE		dyn	card	40-18k		250	76 0.9		6.2	mett brown	XLR	$190.00	Deep,lower mid-range quality. Beryllium diaphragm for tight response. Die-cast zinc body. Gold-plated connectors.
MZ103BE		dyn	card	40-18k		250	76 0.9		6.1	mett grey	XLR	$235.00	Wide range resistance to off-axis sound. Beryllium diaphragm, 3-point suspension and gold plated connectors.
MZ104	dyn	card	30-17k	250	77		7.0 1.4			mett brown	XLR	$145.00	Good instrument mic. Good bass response. Lowered sensitivity to avoid hig SPL overload.Gold-plated connectors.
MZ105 BE	dyn	card	40-18k	250	77		6.0 1.4			mett brown	XLR	$200.00	Designed to avoid unwanted bass buildup with close mic'ing. Beryllium diaphragm. Gold-plated connectors.
MZ106S	dyn	card	40-18k	250	77		7.2 2.0			mett grey	XLR	$140.00	Ideal for vocal use. On/off switch with switch lock for lock-On. Two-layer laminated polyester film diaphragm.
MZ205BE		dyn	card	40-18k		250	77 1.3		.3	mett grey	XLR	$295.00	Vocal microphone with right-angle XLR connector, Beryllium diaphragm. 3-point suspension. Gold-plated connectors.

Wireless Microphones

Audio-Technica See our ad on page 6

ATW-1031 Wireless Microphone System

Includes a model ATW-T31 UniPak body-worn transmitter with individual controls for adjusting the sensitivity of the microphone and musical instrument inputs. Available with a wide range of Audio-Technica microphones, including: ATM73cW head-worn, AT831cW cardioid lavalier and ATM35cW miniature instrument microphone.

PRO 88W Wireless Microphone System is equipped with a flexible detachable antenna and a choice of 2 different transmitter and receiver frequencies on each system. The small and inconspicuous PRO 88 wireless system will mount on the light shoe of camcorders or on the back of a camera itself with a velcro attachment. Eight VHF channels are available for interference-free operation in virtually any location.

ATM63HE is a dynamic hypercardioid high output capsule design with extended frequency response 50-18k, impedance 600 Ohms, sensitivity 48, dimensions: 6.61-in. length, 1.50 hd. dia., 1.26-0.87 body dia., wt. 9.3 oz., grey matte aluminum finish, XLR connector.

Price: $190.00.

ATM61HE is a dynamic hypercardioid mic with extended response and reduced coloration of off-axis sounds. Offers excellent gain before feedback and good stage presence and wide-range uniform polar patterns. Frequency response 50-18k, impedance 600 Ohms, sensitivity 55, dimensions: length 7.05-in., 1.98 hd. diameter, 1.26-0.87 body diameter, wt. 9.7 oz., grey matte aluminum finish, XLR connector.

Price: $250.00.

ATM41HE is a dynamic hypercardioid mic, high output with low handling noise. Clear even when used ultra-close. Frequency response 50-17k, impedance 600 Ohms, sensitivity 55, dimensions: length 6.91-in., 2.12 diameter, 1.20-0.87 body diameter, wt. 10.3 oz., grey matte aluminum finish, XLR connector.

Price: $208.00.

AT4051 is a direct coupled design to provide a direct signal path from the condenser element diaphragm to the output. Uniform polar patter at all frequencies. Frequency response 20-20k, impedance 250 Ohms, sensitivity 35, sound pressure level 143 at 1% distortion, dimensions: 6.10-in., 0.83 diameter, wt. 4.2 oz., black brass finish, XLR connector.

Price: $610.00.

AT4031 is an elect. cardioid mic with low self-noise, high output and and a very high SPL handling capacity. Remarkably uniform polar pattern at all frequencies. Frequency response 30-20k, impedance 200 Ohms, sensitivity 46, sound pressure level 145 at 1% distortion, dimensions 6.28-in., 0.83 dia., wt. 4.9 oz., black brass finish, XLR connector.

Price: $330.00.

AT4033/SM is elect. cardioid. The element is suspended in the center of the acoustically transparent grille- a factor in the microphone's near perfect 90 degrees off-axis response. Frequency response 30-20k, impedance 100 Ohms, sensitivity 28, sound pressure level 140 at 1% distortion, dimensions: length 6.73-in., 2.10-in. dia., weight 14.5 oz., black matte finish, XLR connector.

Price: $699.00.

AT822 is elect. X/Y stereo. Polar response vs. frequency is uniform, providing the spatial impact and realism of a live sound field. Frequency response 30-20k, impedance 200 Ohms, sensitivity 44, sound pressure level 125 at 1% distortion, dimensions: length 7.76-in., 2.44-in. head w., 0.83-in. body dia., weight 5.8 oz., grey matte aluminum finish, 2 mono mini/1 stereo mini.

Price: $299.00.

AT825 is elect. X/Y stereo condenser with full mono compatibility. Switchable low-cut filter, two way power. Two standard XLR output connectors. Frequency response 30-20k, impedance 200 Ohms, sensitivity 46, sound pressure level 126 at 1% distortion, dimensions: length 8.43-in., 2.44-in. head width, 0.83-in. body diam., weight 8.5 oz., grey matte aluminum finish.

Price: $399.00.

Beyer Dynamic, Inc.

SEM 700 is a condenser UHF wireless system with variable gain 450-980MGZ and supercardioid pattern.

Custom quote varies by number of channels.

S170P is a condenser VHF diversity body-pack wireless system with omni or cardioid patterns.

Price: $1499.95.

TS 190 is a condenser VHF diversity body-pack wireless system with omni or cardioid patterns.

Price: $1799.95.

TS 900 is a condenser UHF body-pack wireless system with omni or cardioid patterns.

Custom quote varies by # of channels.

S170H is a dynamic VHF wireless mic with noiseless mute, r k mount receivers with TGX 480 head. It has a hypercardioid pattern, frequency response 40-18 k, impedance 290ohms, sensitivity 50, sound pressure level 140 at 1% distortion, dimensions inlength 8-in. width 2.5-in., weight 9.5 ounces, black aluminum finish, wireless connector.

Price: $1499.95.

SDM 186 is a dynamic TGX 480 head VHF diversity wireless mic, interchangeable heads, variable gains, LED metering, rack mount receviers, hypercardioid pattern, frequency response 40-18k, impedance 290ohms, sensitivity 50, sound pressure level 140 at 1% distortion, length 8.5-in. width 2.5-in., 9.7 ounces, black aluminum finish, wireless connector.

Price: $1499.95.

SEM 186 is a condenser MC0 81 head VHF diversity wireless mic, interchangeable heads, variable gain, LED metering, rack mount receivers, supercardioid pattern, frequency response 50-18k, impedance 190ohms, sensitivity 50, sound pressure level 138 at 1% distortion, length 8.5-in. width 2.5-in., weight 9.7 ounces, black aluminum finish, wireless connector.

Price: $1499.95.

SDM 700 is a dynamic TGX 480 head UHF diversity wireless mic, interchangeable heads, variable gain 450-980 MgHz, hypercardioid pattern, frequency response 40-18k, impedance 290ohms, sensitivity 50, sound pressure level 140 at 1% distortion, length 8.5-in. width 2.5-in., weight 9.7 ounces, black aluminum finish, wireless connector.

Price: custom quote by # of channels.

Electro-Voice

The **MS-2000A dual-receiver** diversity systems are available with handheld, bodypack, and professional guitar transmitters. Precisely engineered audio and rf circuits and exclusive DNX companding result in a signal-to-noise ratio of 105 dB for silent operation—eliminating "noise tails" or compander "breathing." **The MR-2000A rack-mountable receiver** has both quarter-inch and balanced XLR outputs, switchable mic/line and with 30dB of level adjustment. A switchable internal power supply permits use anywhere in the world.

The **MT-2000A handheld transmitter** features the world-class N/D7578 N/DYM head for full, rich vocals with virtually no handling noise. Transmitter controls include on/off and audio mute switches and an audio level adjustment of 30 dB. Two LED's indicate on/off and battery status.

The **MB-2000A bodypack** has a TA4M 4-pin mini-XLR connector to accept a variety of lavalier microphones, including EV's premium C0100 omni and CS200 uni condenser mics. Separate on/off and mute switches, and 30 dB of audio level adjustment, give the user precise control. The multi-function LED indicates power on/off, battery condition, and overload distortion.

The **GT-1000 professional guitar transmitter** was designed specifically for stringed instruments, and two years of use by major touring acts have lead to it being considered the best-sounding guitar/bass wireless available—giving the sound and "feel" of a cable. The rugged bodypack features separate power on/off and mute switches, and 12 dB of level adjustment to match the pickup's output. The quarter-inch to mini-XLR cable is detachable. The GT-1000 transmitter is used with the GR-2000A receiver, a variation on the MR-2000A.

HM Electronics

System 50 Body-pac Wireless Mic System

Includes: RX520 Receiver and TX550 Transmitter

The System 50 offers a switching diversity receiver and comes standard with a mic-mute switch and low-battery indicator.
Price: $733.25.

System 55 Handheld Wireless Mic System

Includes: RX520 Receiver and TX555 Transmitter

The System 55 offer excellent audio quality, a switching diversity receiver, locking mic-mute switch and a low-battery indicator.

Price: $743.25

System 515 Body-pac Wireless Mic System

Includes: RX522 Receiver and TX550 Transmitter

Intended for cost-effective professional applications; for portable or fixed installations; rack-mountable; lightweight; operates on AC or DC power and includes noise reduction circuitry.

Price: $525.50

System 525 Handheld Wireless Mic System

Includes: RX522 Receiver and TX555 Transmitter

Intended for cost-effective professional applications; for portable or fixed installations; rack mountable; lightweight; operates on AC or DC power and includes noise reduction circuitry.

Price: $599.50.

Nady Systems, Inc.

Nady RW-1

Nady's most affordable professional rack-mounting VHF system. Features True Diversity reception, balanced and unbalanced output, front or rear mount antennas and Nady's new Surface Mount Technology (SMT transmitters. Choose handheld or lavalier mic.

Prices start at $609.95.

Nady 401

The Nady 401 features four independent VHF receivers in one rack mount component, with any combination of Nady's new, all-metal HT-10 handheld transmitters or Nady LT-10 lavalier transmitters. More than 200-feet operating range, 120 dB dynamic range.

Prices start at $1399.95.

Nady 650

The mid-priced VHF rack-mount system with sophisticated filtering—up to ten 650 systems can operate in the same location simultaneously. Features True Diversity, balanced/unbalanced output, 120 dB dynamic range and Nady's new SMT transmitters, Handheld or lavalier mic.

Prices start at $699.95.

Nady 750

The Nady 750 features two independent VHF True Diversity receivers in one rack mount component, with balanced and unbalanced output for each, plus any combination of two Nady SMT lavalier or handheld microphone transmitters.

Prices start at $1299.95

Nady 2000

Nady's new top-of-the-line system features hiss mute circuitry to maintain audio quality at the limit of the 2000's operating range, state-of-the-art handheld and lavalier transmitters, ultra-sophisticated filtering for up to 20 system simultaneous operation, bass boost and much more.

Prices start at $1599.95.

Nady 301 UHF

The ultra-affordable UHF wireless system, with four user-switchable UHF operating channels on the receiver and transmitters—Nady's SMT lavalier bodypack, or new HT-10 handheld mic. Features True Diversity, frequency synthesis and 120 dB dynamic range.

Prices start at $829.95.

Nady RW-3 UHF

A professional rack mount True Diversity system with four frequency synthesized, user-switchable UHF operating channels on the transmitters as well as the receiver. Also features balanced and unbalanced output and front or rear mount antennas.

Prices start at $999.95.

Nady 950 UHF

Nady's top of the line UHF system, with ten user-switchable channels on the receiver and transmitters. Features True Diversity, 120 dB dynamic range, bass boost, balanced/unbalanced output. Mics feature all-metal construction.

Prices start at $2499.95.

Sennheiser

VHF 1H

SKM4031-90 handheld microphone transmitter, EK2012-90 miniature receiver on VHF carrier frequency for ENG/EFP applications.

Price: $3245.00.

VHF 1B

SK2012-90 body pack transmitter with MKE2-2-R RD lavalier microphone and EK2012-90 miniature receiver on VHF carrier frequency for ENG/EFP applications.

Price: $3920.00.

VHF 2H

SKM4031-90 handheld microphone transmitter, EM2003-90 diversity receiver with ground plane antennae on VHF carrier frequency.

Price: $3651.00.

VHF 2B

SK2012-90 body pack transmitter with MKE2-2-R RD lavalier microphone, EM2003-90 diversity receiver with ground plane antennae on VHF carrier frequency.

Price: $4326.00.

UHF 2H

SKM4031-TV body pack transmitter with MKE2-2-R RD lavalier microphone and EM2003-TV diversity receiver on UHF carrier frequency.

Price: $5835.00.

UHF 2B

SK2012-TV body pack transmitter with MKE2-2-R RD lavalier microphone and EM2003-TV diversity receiver on UHF carrier frequency.

Price: $6615.00.

UHF 2EH

SKM4031-TV handheld microphone transmitter and battery operated EM2003-TV diversity receiver on UHF carrier frequency, supplied in canvas carrying bag.

Price: $6525.00.

UHF 2EB

SK2012-TV body pack transmitter with MKE2-2-R RD lavalier microphone and EM2003-90 diversity receiver operating on UHF carrier frequency, supplied in canvas carrying bag.

Price: $7305.00.

Shure Brothers Incorporated See our ad on Cover IV

WM98 The world's finest miniature wireless musical instrument microphone. Extremely uniform cardioid pick-up pattern and a wide-range frequency response. The WM98 is a miniature condenser microphone, frequency response is 40-20,000, impedance 1200, sensitivity is -74dB, maximum SPL 144dB, length is 1 1/4 and width is 15/32 with a weight of 0.4 ounces. The finish is a Matte Black enamel, connector Tini 4-pin.

Price: $235.00.

WL84 Miniature, lavalier electret condenser microphone with a supercardioid pickup pattern. Designed for high-quality wireless applications involving speech. The WL84 has a supercardioid pattern, with a frequency response of 50-16,000. Impedance is 1200, with a -68dB sensitivity. Maximum SPL is 138dB, length is 1 1/32 and width is 7/16 with a weight of 0.21 ounces. The finish is Silver Blue enamel, connector Tini 4-pin.

Price: $190.00.

WL83 Miniature, lavalier electret condenser microphone with a supercardioid pickup pattern. Designed for high-quality wireless applications involving speech. It is omnidirectional with frequency response of 50-16,000, impedance 1200, sensitivity -65.5dB. Maximum SPL is 136dB, length is 3/4 and width is 7/16 with weight of 0.21 ounces. The finish is Matte Black enamel, connector Tini 4-pin.

Price: $165.00.

WCM16 Head-worn electret condenser microphone intended for wireless use by performers, musicians, and lecturers requiring high quality voice pickup. It has hyper cardioid polar pattern, frequency response 50-18,000, impedance 1200, sensitivity -75dB, maximum SPL 150 dB, dimensions are length 3/4 and width 7/16 with weight of 1.27 ounces. The finish is Matte Black enamel, connector Tini 4-pin.

Price: $315.00.

839W Miniature, lavalier electret condenser microphone with an omnidirectional pickup pattern. Designed for use with Shure Wireless microphone systems. Frequency response 50-16,000, impedance 1200, sensitivity -64.5dB, maximum SPL 135 dB, length 3/4, width 7/16, weight 0.21 ounces, Platinum beige finish, connector Tini 4-pin.

Price: $89.25.

L2/58 All the performance and features of the Classic SM58 in a wireless.

L2/Beta58 All the performance and features of the Beta58 in a wireless. Excellent for vocal applications, particularly those involving high sound pressure levels requiring high volume monitoring.

L2/96 Excellent quality condenser microphone offered in a wireless version. Flat response with a slight presence rise and low-end roll-off make it perfect for demaning vocal applications.

Sony Pro Audio

C-800

Large Diaphragm tube condenser microphone intended for musical instrument applications. Ideal for very critical recording and can handle high input SPL. Cardioid and omni patterns, Frequency Response 20 Hz-18 kHz, Impedance 250 Ohms, Sensitivity -46 dB/PA, Sound Pressure Level 150 dB SPL, Dimensions: 0 2 1/4 x 7 3/4-in.,

Wt. 11 lbs 4oz., Black aluminum finish, XLR connector.

Price: $4400.00.

C-800G

Large dual diaphragm tube condenser microphone intended for vocal applications. Incorporates the worlds first tube cooling system in a microphone. The ultimate in transducer technology. Cardioid/Omni patterns, Frequency Response 20Hz-18kHz, Impedance 100 Ohms, Sensitivity -33dB/PA, Sound Pressure Level 134 dBSPL, Dimensions: 0 2 ¼ x 7 ⅝-in. x 9 ½, Wt. 1 lb. 14 oz., Black Aluminum finish, XLR connector.

Price: $5600.00.

C-48

Large dual diaphragm FET condenser microphone intended for various applications. Features multi-pattern selectivity as ell as 48 V phantom & 9 V battery operation. Cardioid/Bi/Omni patterns, Frequency Response 30 Hz-16 kHz, Impedance 150 Ohms, Sensitivity -38.8dBm, Sound pressure level 138 dBDPL, Dimensions: 2 ¼ x 9 ⅛-in. x 1 ⅝-in., Wt. 1 lb. 4 oz., Silver aluminum finish, XLR connector.

Price: $1085.00.

C-535P

Small diaphragm FET condenser microphone intended for musica linstrument applications. Features a 10 dB pad and high quality gold spattered diaphragm. Cardioid pattern, Frequency Response 30Hz-16kHz, Impedance 200 Ohms, Sensitivity -40.0 dBm, Sound Pressure level 148 dB SPL, Dimensions: 27/32 x 6 ⅛-in., Wt. 4.9 oz., Black Aluminum finish, XLR connector.

Price: $525.00.

C-536P

Small diaphragm FET condenser microphone intended for musical instrument applications. Features a 10 dB pad and high quality gold spattered diaphragm. Right angle pick-up pattern. Cardioid pattern, Frequency Response 30Hz-16kHz, Impedance 200 Ohms, Sensitivity -40.0 dBm, Sound pressure level 148 dBSPL, Dimensions: 27/32 x 6 ⅛-in., Wt. 5.3 oz., Black Aluminum finish, XLR connector.

Price: $145.00.

ECM-23F2

Budget minded small diaphragm electret condenser microphone intended for various applications. Features "AA" battery operation and supplied windscreen and cable. Cardioid pattern, Frequency Response 20 Hz-20 kHz, Impedance 200 Ohms, Sensitivity -47.0 dBm, Sound pressure level 134 dB SPL, Dimensions: 1 ⅛ x 7 ½, Wt. 7.6 oz., Grey aluminum finish, XLR connector.

Price: $205.00.

ECM-MS5

Three capsule electret condenser MS stereo microphone intended for a variety of stereo applications including sampling, music recording and video production. Features built-in matrix. Cardioid stereo M-S pattern, Frequency Response 70 Hz-20 kHz, Impedance 150 Ohms, Sensitivity -37.0 dBm, Sound Pressure Level 130 dB SPL, Dimensions: 1 ⅞ x 8 3/8-in., Wt. 7.6 oz, Grey aluminum finish, XLR connector.

Price: $1260.00.

F-730

General purpose dynamic microphone intended for hand-held vocal applications. Features include built-in on/off switch, integrated pop filter and replaceable capsule. Cardioid pattern, Frequency Response 50 Hz-11 kHz, Impedance 300 Ohms, Sensitivity -59.8 dBm, Dimensions: 0 1 ¾ x 6 ⅝-in., Wt. 8.8 oz., Black finish, XLR connector.

Price: $145.00.

Vega, a Mark IV Company

AX-20 VHF band wireless microphone system. Dual receiver, true diversity wireless microphone system features special noise sensing squelch circuitry for false signal control. Sensitive and selective receiver enables 25 systems to operate in one area. Transmitter/receiver system with accessories $1349.00.

"600 Series" UHF wireless system. 494-704 MHz, 150 milliwatts RF power output. Dual receiver, true diversity. 2000 feet of range and 108 db signal-to-noise ratio. Full line of accessories including directional antennas and antenna splitters.

Price: $4500.00.

Q PLUS wireless intercom system for backstage sound and lighting crew operation. Six full duplex, hands-free belt pack units can operate in one area simultaneously. 1000 feet of range and broadcast quality audio between base station which can interface to a wired intercom and program audio feed.

Price: $10,000.00.

Open Reel and Cassette/R-DAT Recorders and Accessories

FOSTEX CORPORATION OF AMERICA

The **R8** is an 8-channel/8-track reel-to-reel recorder. It is a 2-head machine running ¼ in. tape at 15 in./sec. with a frequency response of 40 Hz to 18 kHz, a flutter rate of 0.06 percent and a S/N ratio of 78 dB. THD is 1 percent at 1 kHz.

Price: $2,800.00

The **E2** is a 2-channel/2-track recorder. It is a 3-head machine running ¼ in. tape at 15 in./sec. with a frequency respone of 30 Hz to 20 kHz, a flutter rate of 0.05 percent, and a S/N ratio of 74 dB. THD is 1 percent at 1 kHz.

Price: $3,795.00

E8 is an 8 channel/8 track reel-to-reel recorder. It is a 2-head machine runniing ¼ in. tape at 15 in./sec. with a frequency response of 40 Hz to 18 kHz, a flutter ratio of 0.05 percent, and a S/N ratio of 80 dB. THD is 1 percent at 1 kHz.

Price: $4,495.00

G-16S is a 16 channel/16 track reel-to-reel recorder. It is a 2-head machine running ½ in. tap at 15 in./sec. with a frequency respone of 40 Hz to 18 kHz, a flutter rate of 0.05 percent WTD and a S/N ratio of 80 dB with built-in Dolby S NR. THD is 1 percent at 1 kHz.

Price: $8,500.00

G-24S is a 24-channel/24-track reel-to-reel recorder. It is a 2-head machine running 1 in. tape at 15 in./sec. with a frequency respone of 40-18 kHz, a flutter ratio of 0.05 percent, WTD, and a S/N ratio of 80 dB with built-in Dolby S NR. THD is 1 percent at 1 kHz.

Price: $14,500.00

The **X-26** is a 6-channel/4-track mixer/recorder. It is a 2-head machine running at 1-⅞ in./sec. with a frequency response of 40 Hz to 12.5 kHz, a flutter rate of 0.15 percent, and a S/N ratio of 58 dB (A-weighted).

Price: $449.00

DAT Recorders

D20 is a 2-channel/2-track DAT recorder. It is a 4-head machine running at 8.15 mm/s with a frequency response of 20 Hz to 20 kHz and a S/N ratio of 90 dB. THD is 0.05 percent at 1 kHz.

Price: $8,000.00

JRF MAGNETIC SCIENCES See our ad on page 4

T-Bar head adjustable mount has conventional bottom mount head assemblies converted to a top mount T-Bar which offers azimuth and wrap adjustments. The T-Bar mount will reduce mechanical head alignment time.

Price: (includes installation and head reconditioning) $250.00 to $450.00

PLX magnetic heads are available for tape machines such as Teac ½ in. 80-8, 1 in. 85-16; Otari ½ in. (4 and 8 track) MX5050, ½ in. (4 track) MTR10/12; Ampex 350, 440 ¼ in. (mono and 2 track) and MM1100/1200 (24 track); Studer A80 and A800 (24 track); Mincom M56 and M79 (16 and 24 track); MCI/Sony ½ in. (2 track) 2 in. (24 track).

Price: available upon request

Time-code retro-fit kits are available for many ¼ in. tape machines. Features include center track time code record and playback capability; adjustable to zero sub frame accuracy; FM playback; optional FM and mono pilot playback (MK 1 Kit) available; fully functional at 7 ½, 15, 30 in./sec.

Price: ranges from $1,795.00 to $3,200.00

MITSUBISHI DIGITAL PRO AUDIO

The **X-86HS** has four heads, is DC servo controlled with a pinch roller drive with constant tension servo system; line input impedance of 10k ohms; line output impedance suitable for 200-600 ohm load; frequency response of 20 Hz to 40 kHz; dynamic range over 90 dB; and wow and flutter. Additional options available.

Price: available upon request

The **X-86** and **X-86C** are two-channel ready; have four heads; are DC servo controlled; has pinch roller drive with constant tension servo system; line input impedance 10k ohms; line output impedance suitable for 200 ohm load; frequency response of 20 Hz to 20 kHz; dynamic range over 90 dB; and wow and flutter. Additional options available.

Price: available upon request

The X-880 has 32 channels; is DC servo controlled; has a closed loop servo, pinch rollerless capstan drive system; line input impedance of 10k ohms; line output impedance suitable for 200 ohm load; frequency response of 20 Hz to 20 kHz; dynamic range of over 90 dB; and wow and flutter. Additional options available.

Price: available upon request

Otari

MX-50 II is a ¼ 2-channel analog Recorder/Reproducer: Quartz PLL direct drive capstan and 2 Induction reel motors; Choice of 15/7.5 ips or 7.5/3.75 speed combinations; 10.5-in. Reels; % W/F @ 15 ips; 30 Hz-20 kHz 2dB @ 15 ips; Input: Transformerless active Balanced 10 kOhm, Output: Transformerless active single ended 5 Ohm; s/n 70 dB (IEC) unwtd ref 1040 nWb/m; Monitor speaker; VEM (voice editing module is among many options available. Professional User Price $2725.00

MX-5050 B-III is a ¼ 2-channel half-track or quarter-track three-head designed analog Recorder/Reproducer; DC quartz PLL capstan and 2 induction reel motors; 10.5-in. Reels; % W/F @ 15 ips; 40 Hz-20 kHz 2 dB @ 15 ips; s/n unwtd (IEC) 72 dB ref 1040 nWb/m @ 15 ips; 3 speeds 15/7.5 ips or 7.5/3.75; 20% vari-speed; Built-in mini-locator; Gapless, seamless, punch-in/out; Transformerless +4 dBu balanced inputs/outputs; Otari parallel interface for external machine control; Rugged and reliable machine with many available options. Professional User Price from $3459.00

MX-55 is a ¼ 2-channel Upright /Console analog Recorder/Reproducer, available in 6 models: DC quartz PLL capstan and 2 induction reel motors; 10.5-in. Reels; W/F % @ 30 ips; 30 Hz-20 kHz 2 dB @ 15 ips; s/n unwtd (IEC) 72 dB ref 1040 nWb/m @ 15 ips; 3 speeds pairs available 3.75/7.5, 7.5/15, or 15/30 ips; Built-in mini-locator; Gapless, seamless, punch-in/out; balanced Transformerless inputs/outputs; Mic/Line mixing; 10.5-in. Reels; 2-ch with time-code track and VEM (voice ediging mode) are among the many options available for this machine. Professional User Price $4509.00 - $7135.00 depending on model.

MX-5050 MK-IV-2/4/8 ¼-in. 2-channel; ½-in. 4-channel; ½-in. 8-channel console analog Recorders/Reproducers: DC quartz PLL Capstan and 2 induction reel motors; 10.5-in. Reels; % W/F @ 15 ips; 40 Hz-20 kHz, 2 dB @ 15 ips; s/n unwtd (IEC) 69 dB ref 1040 nWb/m; 15/7.5 ips or 7.5/3.75 speed combinations; Gapless, seamless, punch-in/out; Balanced transformerless inputs/outputs; 20% vari-speed; Mic/Line mixing; Audiolocators, Remote Controllers, and Synchronizers are among the many options available for these machines. Professional User Price from $4509.00 - $6609.00.

MTR-15 is a high performance ¼-in. 2-channel; ¼-in. 2-channel with TC and ½-in. 2-channel Desk Top/Rack Mount or Console version analog Recorder/Reproducer with 12.5" reel capacity; % W/F @ 30 ips; 40 Hz-28 kHz 2 dB @ 30 ips; s/n unwtd IEC 73 dB ref 1040 nWb/m; Multiple Auto-alignment capability and storage of record and reproduce electronics; 30, 15, 7.5, 3.75 ips speeds; Cue wheel for Shuttle/Jog operation; Selectable bal/unbal inputs/outputs; Remote Controllers, Autolocators, Chase Synchronizers, Serial and Parallel Interface are among the many options available for this machine. Professional User Price from $9715.00 - $13,304.00.

MX-80 is a 2-in. 24-track analog Recorder/Reproducer with Remote Controller: DC quartz PLL capstan and 2 servo ⅓ HP reel motors; Microprocessor controlled constant tension transport, noiseless and gapless record punch-in, punch-out capability at any speed; 30/15 ips or 15/7.5 speed pairs; 50% vari-speed; Transformerless balanced inputs/outputs; <0.04% W/F @ 30 ips; 30 Hz-20 kHz 2dB @ 15 ips; s/n unwtd 68 dB @ 30 ips ref 1040 nWb/m; Tach or TC based Autolocators are optionally available. Professional User Price $31,950.00.

MTR-90III 2-in. 24-channel Master Analog Recorder/Reproducer with Session Controller: Pinchrollerless transport for quick and accurate tape response as well as servo-locked forward and reverse play; DC quartz PLL capstan with two ½ HP DC reel motors; 7 to 14-in. Reels; <0.04% W/F @ 30 ips ref 1040 nWb/m; Transformerless balanced input/outputs; 20% vari-speed; Serial I/Q interface (RS-232); Gapless and seamless punch-ins/outs; Many options. Professional User Price $42,950.00.

MTR-100A is a 2-in. 24-channel High Performance Analog Recorder/Reproducer with Session controller: Microprocessor controlled, pichrollerless transport utilizing quartz PLL DC capstan and PWM DC servo reel motors; Automatic Alignment of Rec/Rep electronics; <0.04% W/F @ 30 ips; 30 Hz-22 kHz 2dB @ 30 ips; s/n unwtd (AES) 70 dB @ 30 ips ref 1040 nWb/m; Wind speed 2 to 474 ips; Autolocators with or without TC and Chase synchronizers are among the options available for this machine. Professional User Price $59,950.00.

DTR-900II 1-in. 32-channel PD format Digital Master Tape Recorder/Reproducer with Remote Control/Locator featuring a 32-channel meter display: Featuring 2 separate analog and Aux digital tracks plus a SMPTE/EBU TC data track; Transformerless balanced Inputs/Outputs; 20 Hz-18 kHz 0.5 dB; s/n (Din) 90 dB; 3 Sampling Freq; Adjustable Crossfade; Digital Ping-Pong; 12.5% Pitch control; Otari's proprietary pichrollerless Transport provides positive tape control with gentle tape handling. Chase synchronizers and Remotes are among many options available for this machine. Professional User Price $150,000.00.

R-DAT Recorders

DTR-7 2-channel DAT Recorder/Reproducer: Closed Loop Tension Servo tape transport; Transformerless balanced +4 dBu/-16dBu analog inputs and outputs in addition to both AES/EBU and S/PDIF digital audio interfaces; 1-bit Delta Sigma A/D converters and 1-bit Pulse D/A converters assure accuracy; Frequency Response 20Hz-20kHz 0.5 db; s/n X DB (DIN) Sampling monitor enables input monitoring through the converters; Precise dB indication of margin-to-peak levels is displayed for optimum recording level settings; Other features: EIAJ/DAT format assures compatibility; Selectable 48/44.1/32 kHz sampling frequencies; 32 kHz long play

mode; Start ID, Auto ID Edit and Auto Renumber functions; 20 segment bar graph meters with peak hold; Wireless remote control and 3U-size rack mount adapters included.

Professional User Price: $1695.00.

DTR-90N 2-channel 4 head Professional Digital Audio Tape Recorder/Reproducer which conforms to the established EIAJ/DAT Conference Format: It is ideally suited for editing in post production, broadcasting, mastering and production facilities. Performance spec are: 20 Hz-20kHz 0.05 dBu; s/n Z dB (DIN); THD @ @ 1 kHz max level; Crosstalk U dB @ 1 kHz; Other features are: Punch In/Out (individually or collectively); After Monitoring; +4 dBu Balanced Analog inputs/outputs; AES/EBU and S/PDIF digital I/O's; Jog/Shuttle wheel; 12.5% vari-speed; RS 422 serial remote control port; Selectable 48/44.1/44.056/32 kHz sampling frequencies. In addition to the optional internal Chase Synchronizer, Time-Code reader/generator, Quick Start memory and Edit memory, is the reamarkable R-DAT Editor (CB-149) that when interfaced with two DTR-90's forms a powerful editing and compilation system.

Professional User Price from $8495.00.

SAKI Magnetics, Inc.

Sony and Ampex 1-in. C Format Ferrite Audio Record/Playback Head

The SAKI head is a premium quality factory-equivalent replacement for use in the Sony BVH's and Ampex VPR VTR's providing superior sound, smoother tape handling increased head life. The SAKI head is made of hot-presses, glass-bonded ferrite, not metal. Because ferrite is much denser than metal, the SAKI head is polished smoother to protect priceless master tapes. And because ferritre is much harder, it lasts up to 10 times longer than metal. Tha SAKI head is made in the USA and is mechanically and electrically interchangeable and meets or exceeds all factory specifications. 100% customer satisfaction guaranteed.

Price: $695.00.

Professional Studios Series

SAKI Magnetics for 25 years has been the premier tape head manufacturer in the United States with over 90,000 heads installed in major record lables,studios, video post houses, TV and Radio stations world wide.

Studer (24 trk $3445.00) (2 trk 1/4-in. $445.00) (2 trk ½-in. $595.00)

Studer (A8O QC $695.00) (710/720/721 QC $535.00)

OTARI (24 trk $2500.00) AMPEX ATR (2 trk ¼ $445.00)

AMPEX (2 trk ½ $625.00)

Sony Pro Audio

APR-24 is a 24-channel analog recorder utilizing 2 in. tape. It features amorphous steel heads and "DC constant tension design." Frequency response at 30 in./sec. is 48 Hz—25 kHz (+0.75/-3.0 dB). S/N is 70 dB at 30 in./sec. and 66 dB at 15 in./sec. includes remote control with stand.

Price: $45,500.00

APR-5000 is a 2-channel analog recorder which can be purchased in various configurations (including an IEC center-track time-code version). The 5002W version features a 50 Hz-28 kHz (+0.75/-3.0 dB) frequency response and a S/N ratio of 65 dB. Other versions feature 9-pin serial interface.

Prices: from $8,875.00 to $11,950.00

TASCAM, TEAC Corporation Of America See ad on Cover II

Cassette

The **102** stereo cassette recorder has two heads, two motors with Dolby HX Pro; wow & flutter: 0.45 percent; frequency response of 25 Hz to 18 kHz; Unwtd. S/N ratio of less than 80 dB with Dolby C.

Price: $299.00

The **103** stereo cassette recorder has three heads, two motors with Dolby HX Pro; wow & flutter: 0.045 percent; frequency response of 20 Hz to 20 kHz; Unwtd. S/N ratio of less than 80 dB with Dolby C.

Price: $499.00

The **202WR** dual stereo cassette recorder each has two heads, two motors with Dolby HX Pro; wow & flutter: 0.06 percent; frequency response of 30 Hz to 18 kHz; Unwtd. S/N ratio of less than 79 dB with Dolby C.

Price: $499.00

The **112/112B** stereo cassette recorder has three heads, two motors with Dolby HX Pro. B versio offers XLR in/out wow & flutter: 0.04 percent; frequency response of 25 Hz to 18 kHz; THD @ 400Hz of 1 percent; Unwtd. S/N ratio of less than 78 dB with Dolby C.

Price: $679.00

The **112R** auto reverse stereo cassette recorder has four heads, two motors; wow & flutter: 0.03 percent; frequency response of 25 Hz to 19 kHz; THD @ 400 Hz of 1 percent; Unwtd. S/N ratio of less than 80m dB with Dolby C.

Price: $329.00

The **122 MKII** stereo cassette recorder with ¼ in. mic inputs has three heads; three motors; wow & flutter: 0.04 percent; frequency response of 25 Hz to 19 kHz; THD @ 400 Hz of 1 percent; Unwtd. S/N ratio of less than 78 dB with Dolby C.

Price: $1,099.00

The **238** 8-track cassette recorder has a speed of 3 3/4 in./sec.. It has wow & flutter, 0.04 percent; frequency response of 30 Hz to 16 kHz; THD @ 400 Hz of 0.8 percent IHF. S/N ratio of less than 93 dB with dbx.

Price: $1,799.00

DAT

The **DA-30** DAT Recorder with AES/EBU and consumer digital I/O performs to the following specifications: wow & flutter: 0.001 percent; frequency response: 1 Hz to 22 kHz; Unwtd. S/N ratio of less than 94 dB.

Price: $1,499.00

Yamaha Corporation Of America

The **DTR2** includes four sets of Input/Output connections; digital I/O (coaxial and optical), RCA-type phono unbalanced analog connections and balanced XLR (+4 dB) connectors. A front-panel switch selects analog or digital inputs. Another front panel switch selects either 44.1 kHz or 48 kHz sampling frequency.

Price: $1,495.00

The **YPDR601** CD Recorder allows a full TOC to be written to disc either before or after recording; allows recording of audio data to disc to be interrrupted using standard pauses functions; direct input/output connections can be either analog or digital. Analog connections are made via balanced XLRs, while digital connections can be made via AES/EBU, or SDIF-2 data formats.

Price: not available

The **ATR-80/24** and **32** 2 in. track recorders have three heads; three motors; wow & flutter: 0.05 percent @ 30 in./sec.; frequency response of 45 Hz to 25 kHz; THD @ 1 kHz of 0.5 percent; Unwtd. S/N ratio of less than 67 dB.

Price: $34,999.00

The **ATR-60/16** 1 in. 16 track recorder has three heads; three motors; wow & flutter: 0.08 percent @ 30 in./sec.; frequency response of 40 Hz to 22 kHz; THD @ 1 kHz of 0.8 percent. A wtd. S/N ratio of less than 71 dB.

Price: $15,999.00

The **MSR-24** 1 in. 24 track recorder has two heads; three motors; wow & flutter: 0.06 percent @ 15 in./sec.; frequency response of 40 Hz to 20 kHz; THD @ 1 kHz of 0.8 percent; A wtd. S/N ratio of less than 65 dB.

Price: $12,499.00

The **MSR-16** ½ in. 16 track recorder has two heads; three motors; wow & flutter: 0.06 percent @ 15 in./sec.; frequency response of 40 Hz to 20 kHz; THD @ 1 kHz of 0.8 percent; A wtd. S/N ratio of less than 65 dB.

Price: $7,499.00

The **TSR-8** ½ in. 8 track recorder has two heads; three motors; wow & flutter: 0.08 percent @ 15 in./sec.; frequency response of 40 Hz to 20 kHz; THD @ 1 kHz of 0.8 percent; A wtd. S/N ratio of less than 68dB.

Price: $3,499.00

The **BR-20** and **BR-20T** ¼ in. two track recorder has three heads; three motors; wow & flutter: 0.06 percent @ 15 in./sec.; frequency response of 35 Hz to 22 kHz; THD @ 1 kHz of 0.8 percent. A wtd. S/N ratio of less than 72 dB.

Prices: $2,999.00 and 3,999.00 respectively.

The **DA-800** ½ in. 24 track DASH recorder has three heads; three motors; wow & flutter: unmeasurable; frequency response of 20 Hz to 20 kHz; THD @ 1 kHz of 0.05 percent.

Price: $99,000.00

The **ATR-60/2T** ¼ in. 2 track recorder with center track TC has three heads; three motors; wow & flutter: 0.05 percent @ 15 in./sec.; frequency response of 40 Hz to 22 kHz; THD @ 1 kHz of 0.6 percent; A wtd. S/N ratio of less than 72 dB.

Price: $6,999.00

Polyline Corporation

PolyQuick, a division of Polyline Corp., is a distributor of both audio and video production and packaging supplies. Following is a partial list of professional supplies in stock for immediate shipment.

Open Reel Audio:

blank audio tape, empty reels/boxes, editing supplies.

Audio Cassettes:

blank-loaded audio cassettes, labels, cassette boxes, albums.

R-DAT:

Many brand names and lengths to choose from.

CD Packaging:

Jewel cases, albums, mailers.

Studer Revox America, Inc.

R-DAT

D780 R-DAT is a 2-channel, 2-head recorder with 4 motors. Wind speed is 400 times playback speed. Hall-Commutated capstan motor, Frequency response is 20Hz-20kHz, rack mountable, dimensions: 19in. X 5.25-in. X 15/4-in., weight: 23 lbs.

Price: $7400.00.

CD Recorder

D740 CD Recorder-Converter technology: Bitstream in differential mode, Sampling Frequency: 44.1 kHz; Digital inputs/outputs: Optical, Cinch and XLR; Analog inputs: Cinch and XLR; Frequency Response: (record & playback: % (20 Hz-20kHz ±0.2 dB, Total Harmonic Distortion + Noise: (record & playback): <0.008% (20-20kHz) <0.005% (1 kHz), (playback only): <0.006% (20 Hz-20 kHz), Phase Linearity: (record & playback): <F128M3 degrees(20 Hz-20kHz), (playback only): 1 degree (20 Hz-20 kHz), channel Separation: (record & playback):80 dB(20 Hz-20kHz), >90 dB (1 kHz), Channel Balance: (record & Playback): <0.2 dB (output line), Input dBm, (UNCAL): max. increase of the input sensitivity -10 dB, Output Line: +15 dBm 0.1 dB (at 0 dB, RI = 10 k/Ohm), internal adjustment range 0, +24 dBm, Parallel Remote: 25-pin remote control socket with fader start, dimensions: 19-in. rack mount verison or table top version (16 ½-in. X 5 ¼-in. X 13 ¾-in.).

Price: $11,500.00.

Cassette Recorder

A721 Cassette Recorder- 2-channel, 4 motors, 3 heads, speed: 1 7/8-in. per second, DC direct drive spooling motors, distortion less than 1.0%, frequency response: 20Hz-20kHz 3 dB, line input: balnaced and floating, minimum 10 kOhm, LCD, THD% less than 1.0% at 0 VU, >72 dB 19-in. rack mount, 23 lbs.

Price: $3300.00.

Open Reel Recorders

PR99 MKIII- ¼-in. 2-channel, 3 motors, 2 channels, AC servo capstan, 3 heads, 10.5-in. max. reel size, W & F less than 0.1% DIN 45507, distortion 1%, S/N (A weighted) 66 dB, response 30 Hz-22 kHz, 3 dB, dimensions 19-in. x 15.75-in. x 8-in.

Price: $3495.00.

A807- ¼-in. 2-channel or ½-in. 4-channel, 3 motor, servo controlled DC capstan, 3 heads, 10.5-in. max reel size, W & F less than 0.05% (DIN 45507), distortion less than 1% (ref. +510 nWb/m), S/N 66 dB (NAB unweighted ref. =510 nWb/m), response 30 Hz-20 kHz 2 dB, optional: balanced mic., SMPTE center track time code, dimensions 24-in. x 22.5-in. x 44.5-in..

Price: ¼-in. 2 track in console $7700.00.

A812- ¼-in. 2-channel, 3 motor, servo DC capstan, 3 heads, 12.5-in. max. reel size, W & F less than 0.04% (DIN 45507), distortion less than 1% (ref. = 510 nWb/m, S/N 70 dB (NAB unweighted ref. = 510 nWb/m), response 3-Hz-20kHz 2 dB, optional SMTPE center track time code, dimensions 25-in. x 26-in. 44.5-in.

Price: 1/4-in. 2-track $13,200.00.

A820- 2-track recorder ¼-in. & ½-in., 3 motor, servo DC capstan, 3 heads, 14-in. max. reel size, W & F less than 0.03% (DIN 45507), distortion less than 1% (ref. 510 nWb/m), S/N 70 dB (ref. = 510 nWb/m), response 30 Hz-20kHz 2 dB, optional SMPTE center track time code. 1/4-in. 2-track.

Price: $17,900.00.

A827-MCH- 2-in. 24-channel, 3 motor, servo DC capstan, 3 heads, 14-in. max. reel size, W & F less than 0.03% (DIN 45507), distortion less than 1% (ref. 510 nWb/m), S/N 70 dB (ref. = 510 nWb/m), response 30 Hz-20kHz 2 dB, dimensions—30.5-in. x 29.5-in. x 57-in.

Price: $44900.00,

A820-MCH- 2-in. 24-channel, 3 motor, servo DC capstan, 3heads, 14-in. max reel size, W & F less than 0.03% (DIN 45507), distortion less than 1% (ref. 510 nWb/m), S/N 70 dB (ref. = 510 nWb/m), response 30 Hz-20kHz 2 dB, automatic alignment, internal noise reduction, dimensions- 30.5-in. x 29.5-in. x 57-in.

Price: $67,000.00.

Uher of America

Open-Reel Recorders

4000 Report Monitor AV- Portable Open-Reel, 2 Track Monaural, 4 Speeds: 15/16. 1-7/8. 3-3/4. 7-½ IPS, 3 heads, 5-in. Reel, 1 Channel, Belt Drive, 1 VU Meter, Frequency Response 20-25, 000 Hz., Wow & Flutter less than 0.2%, Signal/Noise 64 dB, Mic Inputs- 200 Ohms, LED funciton indicators, Switchable ALC, dimensions: 11 x 3-½ x 9 inches, Weight 8 lbs.

Sugg. List Price: $1927.00

4200 Report Monitor- Portable Open-Reel, 2 Track Stereo, 4 Speeds: 15/16. 1-7/8, 3-3/4, 7-½ IPS, 3 Heads, 5-in. Reel, 1 Channle, Belt Drive, 2 VU Meters, Frequency Response 20-25,000 Hz., Wow & Flutter less than 0.2%, Signal/Noise 64 dB, Mic Inputs- 200 Ohms, LED functions indicators, Switchable ALC, Dimensions: 11 x 3-½ x 9 inches, Weight 9 lbs.

Sugg. List Price: $2066.00.

4400 Report Monitor- Portable Open-Reel, 4 Track Stereo, 4 Speeds: 15/16, 1-7/8, 3-3/4, 7-1/2 IPS, 3 Heads, 5-in. Reel, 2 Channels, Belt Drive, 2 VU Meters, Frequency Response 20-25,000 Hz. Wow & Flutter less than 0.2%, Signal/Noise 62 dB, Mic Inputs- Dimensions: 11 x 3-1/2 x 9 inches, Weight 8 lbs.

Sugg. List Price: $2066.00.

6000 Report Universal- Portable Open-Reel, 2 Track Monaural, 4 Speeds: 3-3/4, 1-/8, 15/16, 15/32 IPS, 3 Heads, 5-in Reel, 1 Channel, Solenoid Controlled, Belt Drive, 1 VU Meter, Built-In Voice Activation System, Memory Pulse Facility, Wow & Flutter less than 0.2%, Signal/Noise 62 dB, Dimensions: 11 x 3-1/2 x 9-in., Weight 8 lbs.

Sugg. List- $2513.00.

Cassette Recorders

CR 1600- Portable Stereo Cassette, 4 Track Stereo, Electronic Drive Control for Auto-reverse Operation in Record or Playback Mode, 2 Speeds: 15/16,1-7/8 IPS, 3 Heads, 2 Channel, 2 VU Meter, Dolby B, Switchable ALC, Solenoid Controlled, Fully Remote Controlled, Built-in Voice Activation System, Memory Pulse Facility, Record Time- 6 hrs., Frequency Response- 20-19,000 Hz., Wow & Flutter less than 0.2%, Signal/Noise 64 dB, Dimensions: 9 x 2 x 7-in., Weight 7 lbs.

Sugg. List- $2080.00.

CR 1601- Portable Cassette, 4 Track Monaural, 3 speeds: 15/32, 15/16, 1-7/8 IPS, 3 Heads, 2-channel, 1 VU Meter, Switchable ALC, Solenoid Controlled, Fully Remote Controlled, Built-in Voice Activation System, Memory Pulse Facility, Record Time- 8 hrs., Frequency Response- 20-19,000 Hz., Wow & Flutter less than 0.2%, Signal/Noise 50 dB, Dimensions: 9 x 2 x 7 inches, Weight 7 lbs.

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XEDIT Corporation

Xedit manufactures 32 standard variation of Editall precision tape splicing blcoks encompassing all video from 8mm to one inch, DAT, and of course all Analog and Digital formats. This is a wolrd class line of professional products that is unsurpassed for both quality and scope. All of these blocks are individually precision machined from premium non-magnetic alloy and are then meticulously hand finished to assure that the delicate magnetic tape is held secureley without damage. "Blade Splicing remains one of the most technically and cost effective technologies available to the recording industry."

EDITABS are pre-formed die cut splicing tabs that are available for all tape formats through to one inch. They are in effect the other half of the "Editall Splicing System". They are easy top use and offer the advantage of avoiding finger contamination of the adhesive resulting in permanent splices that are as strong and reliable as the tape itself. Editabs are packaged in sip lock bags of 250 tabs on sheets, or bulk boxes of 1000 tabs; they can also be ordered in rolls of 5000 tabs.

Some items of special interest:

The **S-3D** (1/4) and the **S3.5D** (1/2in.) are deluxe blocks that include a choice of three cutting angles and that are taken through an extra polishing step that provides the trough with a mirror like finish. The **S-3/OT** one of our exact Otari replacement blocks is also finished in this manner.

The **MD-25** is a "hybrid" block encompassing the trademark curved trough holding design with a precisely located, flat splice point, configured exactly like the original Mitsubishi digital block with the added benefit of holding the tape securely for splicing. The MD-25 is an exact replacement for Mitsubishi but may be used with other brands as well.

Also specially designed for Digital splicing are our patented "EC" series of blocks. They are capable of holding the thinnest of tape securely in a flat trough utilizing mechanically operated very small holding edge clamps while allowing full access to the tape for splicing.

The **P-2** is a high quality molded plastic 1/4 bloack inteded for instructional use. The P-2 is frequently provided by schools along with the comprehensive text **TB-2**, on all aspects of tape editing by Editing pioneer Mr. Joel Tall. Special arrangements are offered to schools.

XEDIT also manufactures a high quality, compact drift and flutter meter for all types of service and quality control aplications. The **Model 20-P** is an aluminum instrument measuring 8.87-in. x 6.75-in. x 1.75-in. Wt. 3 lbs.

Price: $600.00

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Montebello, CA 90640

TDK Electronics: Professional Products Division
1411 West 190th Street
Suite 270
Gardena, CA 90248

3M Center
Building 236-1B-06
Saint Paul, MN 55144

UHER of America
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North Hollywood, CA 91605
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9900 Baldwin Place
El Monte, CA 91731

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218-31 97th Avenue
Queens Village, NY 11429

Yamaha Corporation of America
Post Office Box 6600
Buena Park, CA 90622

COLIN PARK, ARX, and GRAEME FRASER, House Engineer

On Tour with the Black Sorrows

In the summer of 1991, top Australian performer Joe Camilleri and his band, the Black Sorrows, undertook an Australian nationwide tour. With two best-selling albums under their belt, the group was set to tour the length and breadth of the country for six months.

THE CHOICE OF A SYSTEM WAS presenting several problems. It had to be compact enough to fit comfortably in a single truck, but flexible and large enough to handle venues ranging from 500 to 5,000 seaters, plus a couple of large ones of 12,000 seats.

House engineer Graeme Fraser auditioned several systems, but finally settled on the new ARX Split System, a 2-box processor controlled system comprising the 212 Mid/High pack, and the 118 Sub Bass cabinet. Easily configurable for any size venue, extra stacks and racks could be rented for the really big shows from the ARX network of dealers around the country.

It was also the first outing for the new 215 processor controlled monitor system, which performed flawlessly throughout the tour, but we'll discuss more about that later. The complete touring package was put together by Melbourne rental firm, Advanced Audio, a company which prides itself on putting together a true 'state of the art' package.

The tour wound up with a final gig at the prestigious Melbourne Concert Hall, located on the banks of Melbourne's picturesque Yarra river on tree lined St Kilda Rd, Melbourne's major thoroughfare for cars and its unique tram style of public transport. In 1985, in conjunction with then Soundmaster Jim McLeod, ARX replaced the old Multi Cell Horn House system, used primarily as a voice system, with a combination of ARX 1812 and 303 Loudspeakers. ARX is therefore very familiar with the facilities and acoustics of the Concert Hall. This House System was combined with the touring system to create an exciting, powerful musical experience for everyone who attended.

The House Staff at the Concert Hall (which forms part of the Victorian Arts Centre Complex) went out of their way to ensure the system installation, and the rigging for flying for the show went without a hitch. Their level of professionalism is well known in both the Australian and International Entertainment Industry.

The System supplied by Advanced Audio had the following specs:

Figure 1. Black Sorrows main engineer and tour manager Graeme Fraser at the FOH console makes fine adjustments to a radio mic channel.

FRONT OF HOUSE

Main Console
Soundtracs M Series 32-8-2 Console

Main Equalizer
ARX EQ60

System Compressors
DBX 160X

Insert Gates
ARX Sixgate

Insert Compressors
ARX Quadcomp

Digital Reverbs
Yamaha Rev 7
Yamaha SPX 90
Roland SRV 2000

Digital Delays
Roland SDE 1000
Deltalab Effectron 1024

FOH Speaker System
ARX 212 Mid/High and ARX 118 LF with CU212 & CU118 Processors

FOH Amplifiers
ARX SS1200VC Amplifiers

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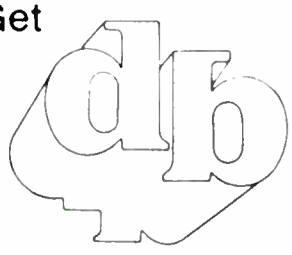

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MONITORS

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Soundcraft Series 500 32-8

Monitor Equalizers
ARX EQ60

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Monitor Loudspeakers
Wedges
ARX 215L

SideFill
ARX 912

Drum Monitor
ARX 912

Monitor Amplifiers
ARX SS1200VC & ARX SS600VC

THE FOH SYSTEM

The Melbourne Concert Hall has three tiers of seating in the classic concert hall design, requiring a system with very even dispersion and coverage to reach all the audience seating areas.

For the Concert Hall show Graeme Fraser and ARX's Colin Park chose a configuration of 5 x ARX 118 Low Frequency units either side on the stage providing the Low Frequency output for the System, with 2 x 212 Mid/High packs either side providing coverage of the Stalls area.

Preservation of sight lines in the stalls area are most important. Therefore the decision was made to stack the System as high as possible. The balcony was then covered by 3 x 212 Mid/High packs either side. These 212's also provided coverage for the lower areas of the dress circle. The middle and rear of the circle were covered by a Left/Right combination of 2 x 912 Full Range units flown just under the roof line of perspex reflective dishes.

The Front of House System was powered throughout by ARX SS1200VC Power Amplifiers being fed from CU 912 Loudspeaker processors for the balcony fills and CU212 & CU118 Loudspeaker processors for the circle and stall fills. These processors feature ARX's ISC (Interactive System Control) Loudspeaker Protection circuitry which references its control signal from the output of the amplifier driving each set of loudspeaker components. It then compares this to an internal model profiling the SOA (safe operating area) of each component and adjusts the output level of the processor to ensure this SOA is not exceeded. Since its introduction in 1986, ISC has proven to be one of the best sounding "Loudspeaker Processor/ Controller" available. It has been extremely popular with rental companies as it prevents the dreaded "the horns all stopped working at once and it wasn't really THAT loud" problem of voice coil burnout and mechanical failure when operating under high SPL conditions.

THE MONITOR SYSTEM

The new 215 Monitor series is based around the industry standard componentry of a 15-in. Low Frequency Driver and a 2-in. Compression driver loaded onto a modified flat front radial flare. Aligned in a multi-profile cabinet the 215 is Bi-Amped via the CU215 loudspeaker processor. ARX chose the Sorrows for the tryout of the new monitor package because of the Band's well known demands for very high SPL high definition monitoring on stage.

When designing the 215, ARX paid close attention to the interaction of the two components through the crossover region. A Linkwitz-Riley 24 dB subtractive filter was used for the crossover filters in the CU215 processor to ensure coherent phase tracking through the roll-on/roll-off region of each driver. The two drivers are also physically aligned to ensure minimal off axis lobing. The two drivers are divided at 1.5KHz to ensure the high power handling and low distortion of the compression driver under high SPL usage.

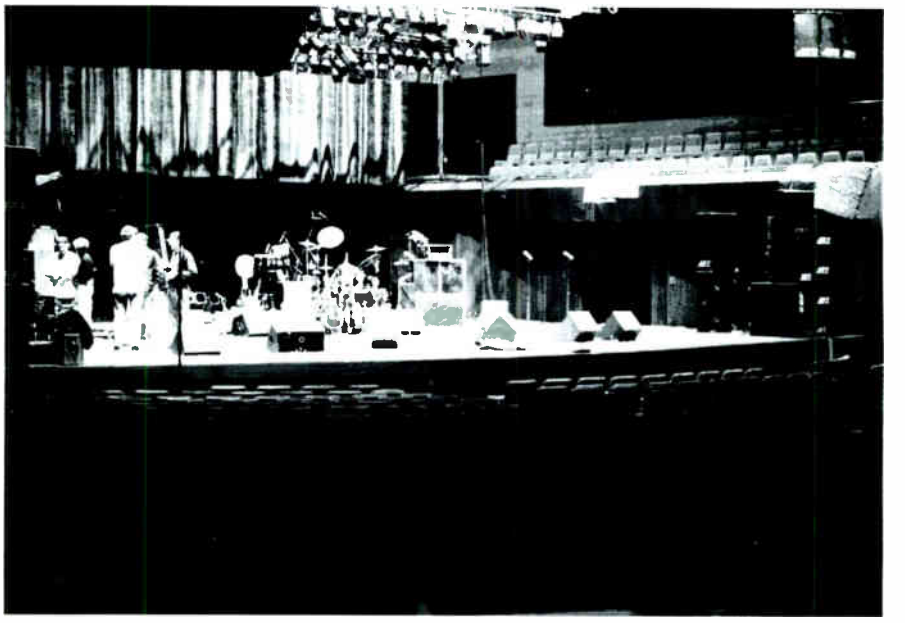
ARX are currently designing and evaluating a new 2 x 12-in. Low Frequency Driver and 2-in. HF compression driver combination which both Advanced Audio and the Sorrows are looking forward to field testing.

Graeme Fraser says: "What I liked about the split system on first hearing it was its exceptional clarity, even at very high SPLs, plus its flexible layout. Its ability to handle any size venue made each gig a breeze to set up. And the band was really happy with the monitors - I didn't have one complaint, except maybe to turn them down occasionally!"

ARX's sales office said, "We could track the system around the country by the amount of phone inquiries that came in. It was the first time a lot of the outlying centres had seen a system of this calibre, and all the dealers and engineers wanted to know more."

And when the tour was over, was everybody happy? Advanced Audio's Rod Watts had the final word, "Happy? Well, they paid the bill." In today's market that just about says it all. db

Figure 2. The concert hall stage from the audience rear showing the main and monitor speaker systems.



SHELLEY HERMAN

Tools Of The Trade

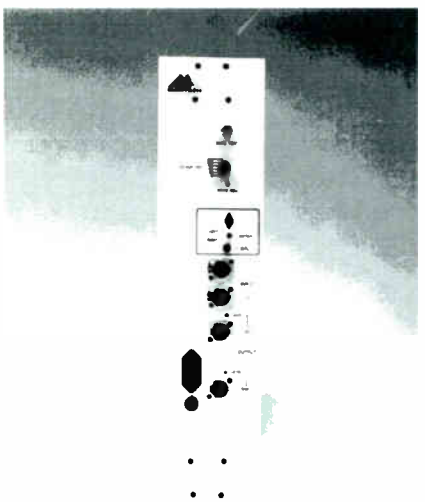
EMT 140 Resurrected

IN THE DAYS BEFORE DIGITAL everything, studio builders were very resourceful in designing methods to get artificial reverberation. We built rooms with cement walls and rotating baffles, pieces of sewer pipe, hallways, attics, and bathrooms that were off limits during sessions. (More than one old recording had the sound of a toilet flushing in the echo.)

The Hammond Instrument Company, in the 1930s, developed a spring reverberation system that was used, sometimes even immersed in oil, in many of their various electronic instruments. This spring system, sometimes called the Gibbs system, was also used in various commercial spring reverb systems made by Fairchild, MicMix, Shure, and others, but brought to its ultimate capability by AKG in their model BX 20. Besides reverberant rooms and spring echoes, various other schemes such as tape loops with multiple playback heads, static discharge devices, a speaker feeding a length of hose with a microphone at the other end, and a whole encyclopedia of electronic tricks have been tried with only limited success. In the 1950s, Dr. W. K. Kuhl of Hamburg, Germany took a 3 ft. X 6 ft. cold drawn steel plate, suspended it in tension, attached transducers, contrived a mechanical damping device, added the necessary electronics to operate the transducers and interface with a console, built it all into a sturdy cabinet, and the EMT 140 was born. At last a reliable, repeatable, reverberation device that even had some range of ad-

Figure 2. An EMT 140. This angled photo of the plate side is from a unit still at use, and currrently being re-built, at Howard M. Schwartz Recording in NYC. It's in a closet and is just too big and heavy to move.

Figure1. The Martech upgrade kit's front panel.



justment (1 to 4 seconds), was available.

Recording and film studios purchased thousands. EMT subsequently brought out a smaller, lighter unit called the 240 Gold Foil, but the 140's popularity continued. Digital reverbs started to gain popularity in the early 1980s. But even then, although the digitals emulated the plates rather accurately, they never achieved an exact simulation of the sound of the EMT 140, so the studios that had the room (they are 7.5 ft. X 4 ft. X 1.5 ft. and weigh in excess of 400 lbs.) kept using the plates. The problem is that a good percentage of the EMT 140's had tube electronics which, unlike good wine or Elizabeth Taylor, does not age gracefully. As components change with age, the internal equalization curves change, the amplifiers and power supplies hum, hiss, pop, and are generally unreliable. Even the later solid state electronics were designed in the 1960's and suffered from much of the bad sound inherent in early transistorized electronics. As a result, many EMT 140's have languished in attics and basements, unwanted and unused, too noisy and unreliable to compete with modern equipment. Well, as Gabriel Heater used to say: "There's good news tonight!"

Martech division of Martinsound, a company that operates a world class recording studio, the company that designed and built the famous Flying Faders automation system now licensed to Neve and found in their consoles, is offering a system to update the EMT 140 to 1990's standards.

Martech's unit mechanically replaces the old EMT amplifier chassis, and as the connectors are on the amplifier panel, they even provide cover panels for the old connector openings. The driver remains the same, however Martech recommends that if the driver voice coil has a brass core, it should be replaced with the newer aluminum unit as the new electronics are equalized for the aluminum cored driver. The old pickups are removed and replaced with smaller lighter proprietary units that have much less effect on the plate, and are smoother and quieter than the old ones. A preamplifier is placed

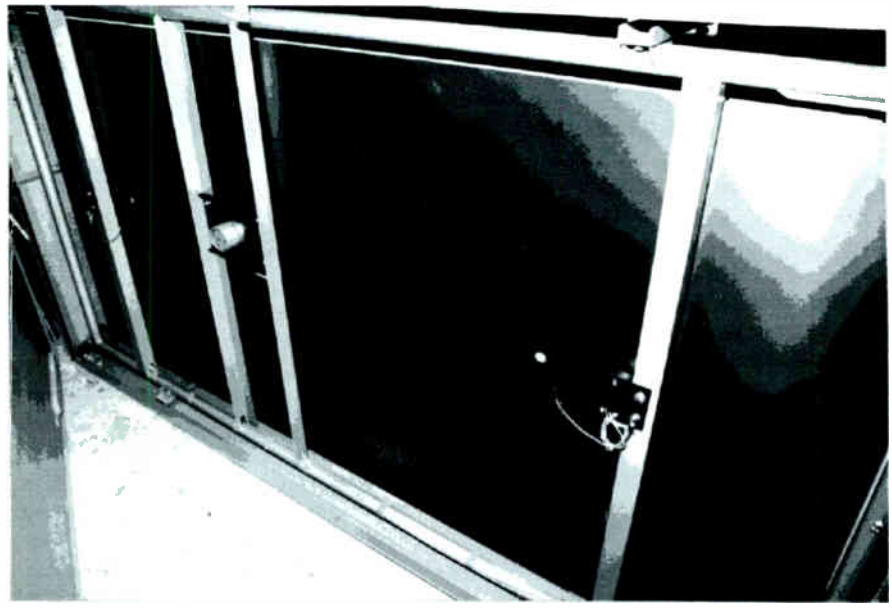


Figure 2. A close view of one of the transducers on the plate of he EMT-140 of Figure 2. Note the large single plate suspended in the unit.

right next to each pickup, the short leads contributing to much quieter operation. The upgrade kit includes two pickups and preamplifiers, to upgrade stereo 140's (140st). If a mono 140 is being upgraded, a new vertical crossbar must be added to provide a mounting for the preamplifier. Martech can supply the new crossbar, replacement suspension clips, aluminum voice coils, and other repair parts. The remote control feature is unaffected by the conversion. The new electronics is the heart of the upgrade.

It offers the usual electronically balanced (with optional transformers) input and output XL connections, a six position LF roll off filter (10; 90; 125; 180; 250; 350Hz), level controls, an LED level indicator that can measure both inputs and outputs, and an internal warble-tone oscillator. The amplifiers are simple, clean circuitry, with equalization designed just for this service. One of the unexpected benefits of this conversion is that it is no longer necessary to "supertune" the plate; carefully adjusting tensions to get just the right sound. With the upgrade, a simple check of all the proper tensions will give excellent results. The specified distortion is less than 0.001%, and the output amplifier is rated at +26dBu.

I listened to the plate all by itself, with different types of music playing through it and I can only repeat what the owner of one of the oldest EMT 140's in the USA said when he heard his updated unit for the first time: "That's what I remember the EMT 140 sounding like." It was *smmooooth*, it was so quiet I couldn't believe it was on. It didn't distort on loud signals like most EMT 140's do. It was neat to hear that plate sound again, only cleaner!

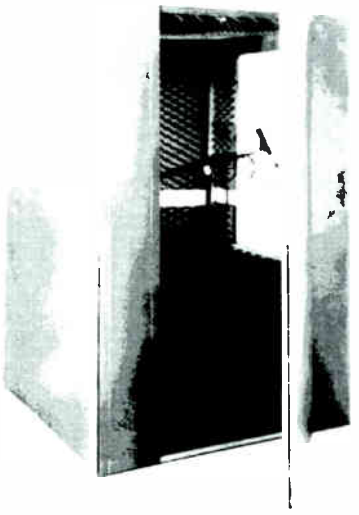
Apparently, the industry agrees: Besides the four units in operation in Martech's studios, Cherokee Recording and Sunset Sound/Sound Factory each have eight units upgraded, Conway Recorders has four, and the remodeled Todd AO/Glen Glenn Radford Scoring Stage has four. Coast Recorders (SF), Mix-o-lydian (NJ), Bill Schnee, and Rudy Van Gelder all have units and are anxious to purchase more.

Martech sells the upgrade kit for $2495.00 or they will sell you a complete upgraded EMT140 for $4500.00. They are currently developing a version for the Echoplate. Martech also has a vibration reducing mount for the EMT 140 that will reduce unwanted sound pickup should the plate be situated near a vibration source.

If you have an EMT 140 around, and love that sound, there's still hope! db

NEW PRODUCTS

ACOUSTICAL BOOTH



● The Alpha Iso-Booth is easy to assemble. The frame system consists of light-weight 1-in. tubular aluminum with twist-lock connectors. The walls attach to the frame with a Velcro fastening system. The standard booth includes one clear, vinyl window; hinged door; floor and roof. Standard booth size is 4.5-in X 4.5-in. X 6.66-in. (Custom sizes are also available.) The outer skin is a weather-resistant reinforced vinyl material with sound transmission coefficient rating (STC 27). The interior is covered with alpha wedge acoustical foam which has a noise reduction coefficient (NRC .8). Typical applications include broadcast booth, location control room, vocal booth, practice room, translation booth and equipment enclosures.
Manufacturer: Acoustical Solutions, Inc.
Price: $2750.00
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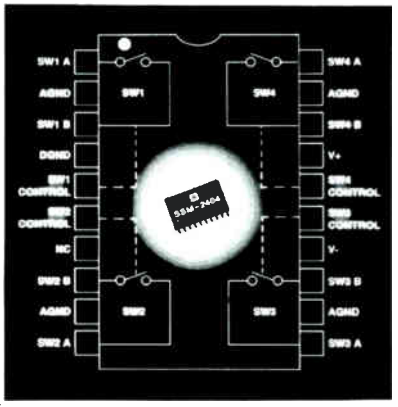
DIGITAL AUDIO SWITCH

● The low-cost SSM-2404 quad audio switch packs four SPST bilateral switches in a single 20-pin plastic or SOIC package. Because its performance characteristics are far superior to those of common CMOS *switches or relays, the SSM-2404* is among the industry's best low-cost-per-switch alternatives for audio signal routing applications. The SSM-2404's maximum 45-Ω (28-Ω typical) ON resistance is at least four times less than that of conventional CMOS switches used for audio. Total harmonic distortion (THD) from 2-Vrms, 1 kHz signals under 10 kΩ load is just 0.0065%. OFF isolation and crosstalk under identical conditions is a low -100 dB and -94 dB, respectively. Wideband noise density over the full audio bandwidth is 0.6 μV peak-to-peak.



The SSM-2404 is adaptable for use in all types of professional equipment. With the addition of only one logic inverter, the SSM-2404 can be connected as a DPDT switch that routes stereo signals to or from two sources or destinations. Guaranteed break-before-make switching ensures that all four switches open before any one switch reaches the ON state, critical in mixing consoles and other multi-channel applications.

Operation from either a single +12 to +24 V or dual ±5.5 to ±12 V power supplies permits its use in low-power, battery-operated, automotive, and multimedia audio gear. conventional TTL logic levels allow remote, computer, or microprocessor control of the SSM-2404's operation, and optional current-mode switching extends its signal-handling range. With 35 pC of charge injection, click-free audio switching is possible.

The SSM2404 is an excellent replacement for relays and combines the advantages of analog switching with superior audio performance. Its current consumption is a fraction of that required by relays. Housed in a 20-pin plastic DIP or SOIC package, the SSM2404 guarantees specified operation over the extended industrial temperature range of -40 to ±85 degrees C. For more technical information contact the Analog Devices Literature Center, 70 Shawmut Road, Canton, MA 02021; or fax requests to (617) 821-4273.
Manufacturer: Analog Devices
Price: in 100s is $3.45, with delivery from stock.
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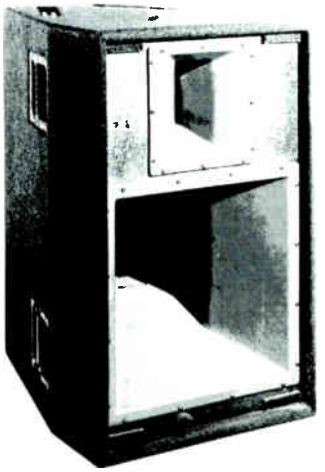
MID-HI SPEAKER



● The MTH-2/64, a mid-/high-frequency manifold speaker system

featuring multiple drivers summed directly into 60° X 40° degrees fiberglass horns, all contained in a compact, trapezoidal package. MT-2A systems, designed for touring and fixed installations, are smaller versions of EV's popular MT-4 concert systems employing Manidfold Technology. MT-2A systems offer extremely rugged construction to survive the rigors of the road as well as EV's unique twp-point flying system, which is already installed. Their dimensions and trapezoidal shape allow the construction of very tight arrays. The MTH-2/64 reproduces mid-bass frequencies (160-1600 Hz) with two DL10X 10-inch drivers manifold directly into a new 60° X 40° fiberglass horn. The square-mouth horn is designed to provide uniform control and natural sound, and is independent of the drivers, allowing quick, convenient reorientation of the horn to either a vertical or horizontal configuration. High frequencies (16kHz-20kHz) are reproduced by two modified DH1A compression drivers that are manifolded and mounted on a modified HP64 60 X 40 constant-directivity horn. This horn, with an integral fiberglass and zinc construction, eliminates unwanted vibrations and, ultimately, corrects the very high-frequency dispersion problems of conventional 2-inch-throat horns. As with the midbass section, the horn is structurally independent of drivers, again to allow for convenient reorientation.

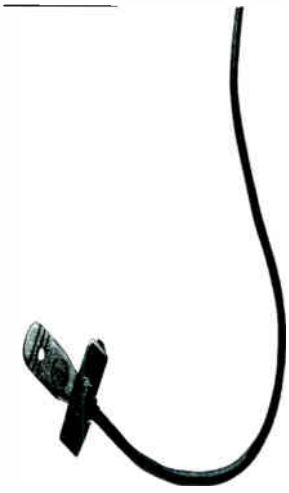
The MTH-2/64 can be used alone or with the MTL-2A or MTL-4A low-frequency systems for extended low-end response. The MTL-2A is designed to complement the MTH-2/64 and MTH-2/94. It also produces a fully integrated full-range system, with all MT-2 cabinets dimensionally identical and having matching hardware. Used in a horizontal orientation, MT-2 systems are the same width and depth as MT-4's, and are also flying hardware compatible. All MT-2A cabinets are covered in black Ozite Super TNT carpet, the most rugged available, and come with a black nylon cloth grille screen.

Manufacturer: Electro-Voice

Price: MTH-2/64 $4475.00

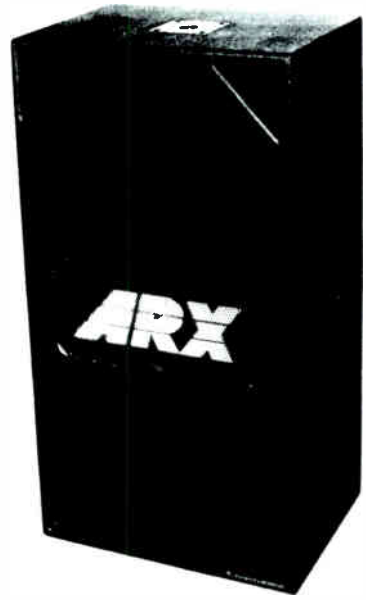
Circle 52 on Reader Service Card

MINI MIC



● The new MT830R Sub-Miniature Omnidirectional Condenser Microphone, is an ideal tool for theatre, broadcast, and sound reinforcement application requiring a super-small, high quality, body-worn lavalier. Extremely tiny and unobtrusive, the inconspicuous MT830R can be worn as a standard lavalier. A foam wind screen is provided for other applications. The MT830R delivers very high output for an excellent signal-to-noise ratio and has a flat frequency response from 20 Hz - 20 kHz.
Manufacturer: Audio-Technica U.S., Inc.
Price:$375.00
Circle 54 on Reader Service Card

COMPACT SUBWOOFER



● This is a new compact high SPL Sub Woofer for the company's PowerMax series of Loudspeakers. The PowerSub sub woofer features two ARX LFB12 High Excursion Very Low Frequency Drivers in a dual vented chamber arrangement.

The PowerSub features a speaker stand insert for pole mounting, XLR inputs, and is designed to operate via a power amplifier from the Sub output of the PowerPro Loudspeaker System processor.
Manufacturer: ARX Systems
Price: to be announced
Circle 55 on Reader Service Card

HARMONIZER

● A limited edition H3500 Dynamic Ultra-Harmonizer is now introduced. Along with Eventide pitch shifting and an entirely new group of dynamic effects, the H3500's full set of audio production tools includes sampling, delays, rich flanges and choruses, reverbs, the Instant Phasor, even sound effects. The H3500's 18 digital processing algorithms include two new algorithms—Mod Factory 1 and Mod Factory 2. The two Mod Factories are responsible for the H3500's unprecedented array of DFX dynamic effects, which range from straight forward compression to "ducked" delays (echoes that appear only during the pauses between phrases), BPM (beat-per-minute) calibrated delay and loops, even touch-sensitive choruses and reverbs that respond dynamically to audio input level and musical "touch". The intuitive Mod Factory interface allows the user to create a wide variety of innovative effects using independent software-patchable modules.

A full range of brand new factory presets focus the H3500's processing power on drums, guitars and general studio recording situations. Extensive use of proprietary Eventide "Soft Knobs" makes it easy to customize the presets for individual applications. The H3500 is configured with either 11.8 seconds of stereo 16 bit 44.1 kHz sampling(23.7 seconds mono) or 47.5 seconds of stereo sampling(95 seconds in mono), Both versions include the latest sampling software from

Eventide, which offers unique capabilities like pitch change without changing playback length or playback time change without changing pitch. Sample memory can also be addressed via the delay loop presets in Mod Factory mode.
Manufacturer: Eventide Inc.
Price: DFX—$3,995.00; DFXE—$4,495.00
Circle 56 on Reader Service Card

FULL-RANGE SPEAKERS

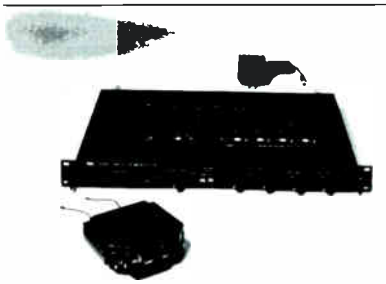
● The new BX Series includes 12 and 15 inch cone drivers rated to handle up to 600 watts (average continuous pink noise). These drivers have unique three leg cast aluminum frames, fiber composite cones for increased rigidity and reduced mass, and 2.5, 3 and 4 inch, edge wound, reinforced Kapton voice coils which tolerate extremely high temperatures. Also, the magnet structure has been improved using Finite Element Computer Analysis to put more magnetic force into the voice coil. The company recommends alignments in its literature to accommodate box builders, by providing internal volume and vent dimensions.
Manufacturer: Celestion Industries
Price: from $175.00 to $268.00
Circle 57 on Reader Service Card

NEW MICS

● The BetaGreen line includes 3 dynamic and 2 condenser microphones to handle a wide range of home recording and live performance applications. All models feature an on-off switch and an unbreakable stand adapter, as well as a cardioid pickup pattern. The BG 1.0 is suited to a variety of applications in live music, sound reinforcement, and home recording. It can be set for either low or high impedance operation. The BG 2.0 takes advantage of the latest neodymium magnet technology. This provides the high output needed to add punch and excitement to your performance.

The BG 3.0 presents a dynamic transducer design. It is designed to stand up to the high demands of serious gigs and showcase performances. It combines the high output of neodymium technology with a specially-designed internal shock mount that greatly reduces the rumble caused by mic handling or stand vibration. The BG 4.0 utilizes an advanced condenser transducer design. It is the ideal choice for instrument recording and sampling in the home studio environment. The BG 5.0 uses a condenser transducer design. It is designed for laying down vocal tracks in the home studio environment. Its electret condenser design provides high sensitivity and low noise for producing quality demo tapes.
Manufacturer: Shure Brothers Incorporated
Prices: dynamic models range from $60.00 to $130.00; both condenser models are $220.00.
Circle 58 on Reader Service Card

WIRELESS SYSTEMS



● This expands the Pro Audio line with the addition of the Series 800, a UHF Wireless Intercom which sets new performance standards for wireless communications. It has all the sound quality and reliability of a cabled system, but with freedom of movement and instant set up. *With three* base stations coupled together, up to twelve belt-pacs can operate in full-duplex. An unlimited number of belt-pacs can operate in push-to-talk mode. The series 800 provides maximum flexibility to satisfy the most demanding communication needs. *This wireless in*tercom can be used alone or interfaced with hardwired systems and telephone lines. *The exten*ded interference free area (up to 2000 ft. from belt-pac to belt-pac) is only one of the outstanding features of the Series 800. In addition, it is user-friendly; modular in design to facilitate upgrading at any time; ultra-rugged to withstand the most rigorous applications; and operates with rechargeable batteries to increase savings. The Series 800 consists of a rack-mountable base station, RW800, and a belt-pac COMMUNICATOR, BH800. A variety of accessories are available to complement the Series 800.
Manufacturer: HM Electronics, Inc.
Price: $3,200.00
Circle 59 on Reader Service Card

QUAD MICROPHONE

● The CQ-1 is the first 4-channel, Left-Center-Right-Surround microphone. It was developed in conjunction with NHK, the revolutionary Shotgun-Surround CQ-1. The CQ-1 was designed as a highly accurate, 4-channel directional microphone for use in HDTV and film production. The compact, shotgun-style design incorporates a new rectangular, vertically placed diaphragm similar to the one developed for the popular Sanken COS-11 lavalier microphone. The unique vertical placement provides

absolute coincident registration of the Left-Center-Right response and the greatest sensitivity in a compact housing. All diaphragms utilize PPS (polyphenelene sulfide) for optimum resistance to humidity, as well as temperature stability. Equally well-suited for standard shotgun applications, the forward directionality of the CQ-1's L-C-R channels assures precise center focus regardless of listener location. As in motion pictures, HDTV requires a precise center image, primarily for the integrity of dialogue. To accomplish this, the CQ-1 has greater directionality in the Center channel, using six supercardioid capsules divided into appropriate frequency ranges. The Left and Right channels each utilize six hypercardioid capsules, and for Surround pickup, the CQ-1 has one cardioid capsule facing back, on the same axis as the L-C-R capsules. For easy mounting on camcorders or film cameras, the CQ-1 is extremely compact. Measuring only 22.5mm in diameter, the microphone is available in two lengths, 363mm and 513mm.
Manufacturer: Sanken
Price: to be announced.
Circle 60 on Reader Service Card

GOOSENECKS

● This company has released three new Rubber-neck models. Rubber-Neck, the "No-Creak" gooseneck, is now available with XLR connectors (X Series) pre-wired for existing XLR mounts, (L Series) threaded for podium use with locking XLR, and (H Series) hollow center with male to female threading. The "X" series is internally wired male to female XLR. The "L" series has a locking XLR on the microphone end and is threaded on the opposite end for mounting to podiums and other speaking formats such as drive-in banks, drive-in restaurants, etc. and "H" series for threading microphones to an end and running wire through the center. Standard sizes on the "X" series are 12-in. and 18-in. Standard sizes on the "L" series are 11-in. and 17-in. Standard sizes on the "H" series are 10-in., 16-in. and 20-in.. Rubber-Neck is still offered in the solid core (S series) version to accept any microphone clip. All Rubber-Neck products feature No-creak, No-glare, smooth black surface, and stable positioning. Custom sizes and configurations are available on request.
Manufacturer: Ac-cetera, Inc.
Price: ranges from $1595.00 to $4,095.00.
Circle 61 on Reader Service Card

PA WIDERANGE SPEAKER

● Atlas/Soundolier announces the new dual-cone Model C5 8-in. conventional loudspeaker suitable for voice transmission, music, and signal reproduction in commercial, industrial, and institutional applications. At no increase in price, the C5 now includes a whizzer cone and offers an improved extended frequency response range. The new 15-watt Model C5 replaces both the older C5 conventional and C5W dual-cone models. The extended frequency response range is 30 Hz-18 kHz (without transformer), while the effective range of the new C5 is 55 Hz-17 kHz. Unit is available with seven factory- installed line matching transformer options to meet a variety of project requirements. All other specifications mirror those of the previous C5W: 5 oz. ceramic magnet; voice coil impedance of 8 ohms and diameter of 1 inch; flux density of 9200 Gauss; sensitivity of 96 dB (SPL @ 4-ft., 1 watt input); and dispersion angle of 100 (-6 dB, 2 kHz octave band).
Manufacturer: Atlas / Soundolier
Price:$17.56

Circle 62 on Reader Service Card

DIGITAL BATTERY PORTABLE

● Nagra-Kudelski has introduced the Nagra-D—a portable, battery-powered, 4-channel digital tape machine for location recording. Solidly engineered, the Nagra-D will set new standards in professional, high performance field recording—offering fifty-eight minutes of uninterrupted 4-channel, or one hour fifty-six minutes of 2-channel operation on standard 5-in. reel of ¼in. digital tape, recording 4 X 24 bits. Both lightweight and rugged, the Nagra-D offers consistent trouble-free operation in hostile environments which can exact a toll on less durable digital formats (maximum two hours per battery), specifically, portable DAT recorders. Nagra-Kudelski has in fact, dismissed the DAT format's narrow track width as incapable of performing consistently under the rigors of remote location recording. Choosing instead, a ¼-in. open reel tape format, Nagra-Kudelski's Nagra-D provides larger track width (decreased possibility of signal degradation due to tracking errors) and easy access to the tape transport for head cleaning and maintenance. the open reel format also allows tape editing in the field. LCRS mixing and contemporary digital video formats are designating discrete 4-channel audio an industry standard. The Nagra-D is the only digital field recorder configured with four discrete inputs/channels. The Nagra-D offers 24-bit, high resolution recording with playback at 18 bits (and can be changed to 20 bits when lower consumption A/D converters become available), providing superior signal-to-noise, dynamic range and headroom, compared to the 16-bit DAT format. An additional 4 bits per channel are

dedicated to command data presented at the AES/EBU digital I/O (hence, 4 X 24 bit recording). Helical scan rotary heads and open reel design contribute to the reliability of the Nagra-D, its ability to capture wide bandwidth digital audio signals, and avoid self-demagnetization. Three longitudinal tracks supplement the four helical scanned digital audio channels as follows:

A Control Track logs recorded markers indicating the start point of each helical scan. The purpose of these markers is to enable the servo system to synchronize the position of the scanner heads with respect to the position of the helical scan on the tape. The Time Code Track has full SMPTE/EBU time code information for both video and cinema applications. A Cue Track can receive a mix of all four digital channels, record commentary information via external cue microphone, or encode Drop-out Files Management data/EEC (Error Correction Code). 3.89 in/sec. tape speed for 4-channel recording (1.98 in/sec. for 2-channel) results in decreased tape consumption (factor of 4) while the Nagra-D's low longitudinal record/playback speed translates into extremely fast search and shuttle operations.

Concentrically mounted *level* and *fade* pots provide easy operation. While actual channel signals are set with the outer ring, fade commands are executed with the inner ring. The fade control signal is recorded on the tape. This allows for a non-destructive fade out on all four channels. The *Fade* function can be executed or circumvented on playback. All four channel fade knobs can be grouped and controlled by a single fade knob. The Nagra-D is powered by a BetaCam battery pack. This battery allows for two hours of continuous recording.

Manufacturer: Nagra-Kudelski
Price: $25,000.00 with timecode
Circle 64 on Reader Service Card

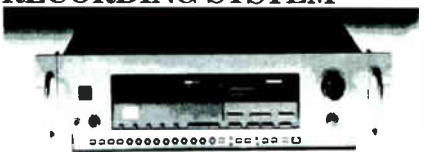
COMPUTER AUDIO RECORDING

● This introduction of Audioport is an external audio adapter for laptop, desktop and notebook PCs. Audioport now gives OEMs, VARs and PC users a low-cost and simple way to add stereo, broadcast quality, digital-audio functions to their

application programs. With Audioport, users can perform real-time, direct-to-disk recording and playback of sampled sound. As easy as plugging in a printer, Audioport does not require the user to open the computer and conveniently connects the parallel printer port of any PC. Audioport is interrupt driven for complete background operation, and does not interfere with the use of the printer. In addition, Audioport does not require the use of an internal slot. This would be of prime importance to users of laptop and notebook computers, where an internal slot might be available. With Audioport, the company has introduced its first external audio product. The company is a leader in the field of digital audio technology for the PC, and now offers over 20 models of digital audio and multimedia add-in boards, with additional products planned. The The company product line is an established name in many fields, particularly in the performance-driven broadcast automation and post-production markets. Audioport is ideally used in applications where portability and space are at a premium, or where remote recording and playback are essential. Applications for Audioport include multimedia presentations, computer-based training, point-of-sale systems, information kiosks, public address systems and exhibits. Audioport is offered in three models, with software-programmable sampling rates ranging from 7.1 kHz to 36.5 kHz. In either stereo or mono operation, with full 12-bit resolution, a dynamic range of 72 dB and anti alias filtering. Audioport accepts input from multiple sources including microphones, CDs and tape players. In addition, unique feed-through inputs offer users mixing capabilities, critical in today's mixed media environment. Included are outputs for headphones, amplifiers or other devices. Input, feed-through and output gains are fully software controllable. Audioport provides industry-standard 4-bit ADOCM file compression algorithms for 3:1 data compression and file storage, and also supports 16-bit PCM, 8-bit PCM and 8-bit VOC files. File and sample formats are defined and controlled with software.

Manufacturer: Antex Electronics Corporation
Price: $495.00.
Circle 65 on Reader Service Card

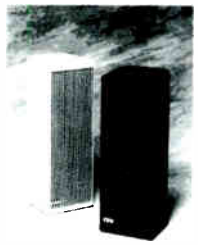
LOW-COST CD RECORDING SYSTEM



● Here is a full-function, stand-alone CD recorder designed to offer exceptionally cost effective CD recording capabilities to commercial recording studios, project studio, mastering houses broadcasters, and serious home recordists. The rack-mountable (3 units) PD-10 automatically generates a temporary Table of Contents (TOC), which allows the recording process to be interrupted and resumed at any time. Also, any unwanted passages (out-takes, false starts, etc.) may be deleted before the recording is "finalized" by filing the permanent Table of Contents. After "finalizing" the disc may be played on any CD player. During recording, the PD-10 accepts PQ subcode data generated by most hard-disc-based professional edit systems. Recordings may be made using any one of a full complement of analog microphone, XLR line, gold-plated RCA line) and digital (electrical or optical inputs. The same connection facilities (except mic) are provided for output, with maximum output level rated at +18 dBm. For optimum record/playback performance, the PD-10 features automatic laser sensitivity calibration and utilizes 1-bit bitstream converters in the differential mode. Typical record/play specifications include signal-to-noise of 89 dB, dynamic range 90 dB, frequency response deviation of ±0.1 dB (20 Hz to 20 kHz), and channel separation of 86 dB.

Manufacturer: Carver Professional
Price: under $8,000.00.
Circle 66 on Reader Service Card

WEATHER RESISTANT SPEAKER

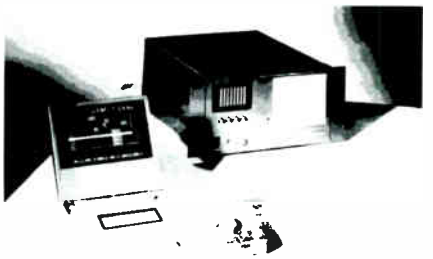


● The PermTec Series of weath r resistant speaker systems are available. Delivering exceptional performance from a surprisingly small enclosure, the speakers come in powered or unpowered versions and in either black or white finish. PermTec weather sealed speakers are ideal for an exceptionally wide range of outdoor applications including theme parks, restaurants, golf courses, cruise ships and amphitheaters. Incorporating proprietary technology, PermTec speakers feature weather sealed enclosures of heavy duty extruded aluminum channel with ABS plastic end caps. These design features, along with a foam backed aluminum grill and powdered coated paint, provide a rugged chassis that will last for years to come. The enclosure design offers the installer speed and flexibility with the incorporation of integral flying and mounting points. Each speaker contains two five-inch cone drivers constructed of die cast aluminum frames and a 40 ounce magnet assembly one inch, edge wound copper voice coil assembly. The high frequencies are handled by a special phenolic horn tweeter. All components feature water resistant materials.

Manufacturer: Professional Audio Systems
Price:
Circle 67 on Reader Service Card

DIGITAL WORKSTATION

● This new digital audio workstation features removable, rewritable magneto-optical disks for both audio and session information storage. A stand-alone design with separate control/edit panel and tracksheet display, it contains everything needed for recording, librarying, editing, playing, sequencing, syncing as master or slave, and controlling external recorders, plus routing,



mixing and envelope control, through either analog or digital ports.

The 408 OMX is both multi-track tape recorder and multipurpose editor. In post-production, these areas of application include telecine, audio-for-video/film, dialog replacement,music production, effects and jingles. In radio broadcasting, the OMX is a very efficient tool for producing commercials and news. The Optical Multi-track Recorder/Editor is available in several hardware configurations, with dedicated software packages to adapt it optimally to a number of different application.

Manufacturer: Augan Instruments

Prices: range from basic system $28,900 to complete system $43,900.
Circle 68 on Reader Service Card

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If you are a manufacturer and want your new product listed in this section, send the release, include the suggested list price and there *must* be a photograph or diagram included.

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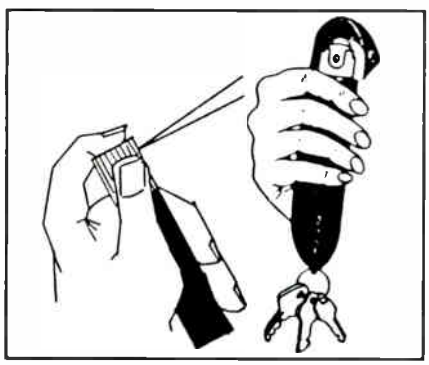

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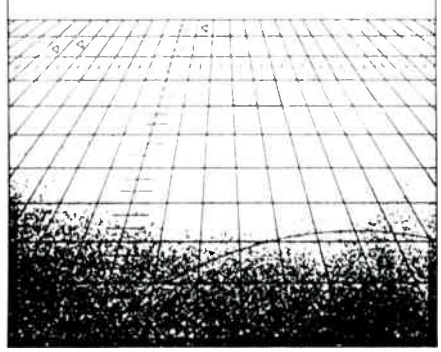

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PEOPLE, PLACES & HAPPENINGS

● **Shure Teleconferencing Systems**, manufacturer of audio conferencing systems and components, provided a group of its teleconferencing products to the **AmeriTech** company for use in their exhibit at the **1992 SuperComm show**, held June 15-18 at McCormick Place in Chicago. Titled "SuperSchool", the Ameritech exhibit simulated the classroom of the future by utiliaing an array of telephone and digital transmission communicatio technologies. Shure Teleconferencing Systems provided the ST6300 Type II teleconference mixer, the ST6004 expansion mixer, and several STM30A and STM26 teleconference microphones to help create an actual interactive classroom enfironment, in which student and teachers could communicate as a group with other classrooms. Shure Teleconferencing Systems Applications Engineers were also on hand to discuss the technical features of the Shure products used in the AmeriTech SuperComm exhibit.

● **Altec Lansing**, which distributes Gauss Loudspeakers, announced the recent installation of Gauss equipment at **Universal Studios in Hollywood, Olympic Stadium in Athens**, and **Unique Recording in New York**. Twelve Gauss 3285 coaxials are installed in Universal's Collapsing Bridge tourist attraction at Universal Studios. In addition, there are four Gauss 4883 18-inch subwoofers in Gauss designed cabinets. "The Gauss coaxials get very loud (124 dB at 1-meter) and work in such a small enclosure (two cubic feet) that they are perfect for this type of application," Ed Carri, system designer at Universal, said. The Olymic Stadium in Athens, Greece, ahs updated its sound system and installed 70 Gauss 4081 compression drivers. The drivers are mounted on five-meter steel columns strategically placed throughout the 80,000-seat stadium. "The technical engineering staff at Olympic Stadium was satisfied by the coverage pattern of the original horn system installed 1982, but dependability and a desire for higher sound levels forced them to look for a better compression driver," Helen Papagiannakaki of Alpha Sound in Greece, said.

● The **University of Miami's College of Engineering and School of Music** have formed a new undergraduate curriculum option for students wishing to study audio engineering. The Department of Electrical and Computer Engineering will administer the degree program providing a Bachelor of Science in Electrical Engineering degree with an emphasis in Audio Engineering- the first degree program of its kind in the United states. This Audio Engineering option combines traditional electrical engineering studies such as circuit theory, electronics, microprocessors, integrated circuits and communication electronics, with audio studies in areas such as acoustics, digital audio, transducers, signal processing, postproduction, and recording. Prerequisite courses in areas such as calculus, differential equations, physics, and chemistry are also included in this curriculum. To create this new option, the Electrical and Computer Engineering department teamed with the Music Engineering Technology program in the School of Music. The Music Engineering Technology program was created sixteen years ago by the School of Music and College of Engineering to merge music and engineering studies, and instruct music students in this interdisciplinary curriculum. This program is now internationally-known as a leader in its field, and has received numerous awards for the quality of its curriculkum, and graduates. It is expected that graduates from the Audio Engineering program, holding a Bachelor of Engineering degree, will similarly earn high esteem in the music industry as equipment design engineers. Students enrolled in the Audio Engineering option will have access to two state of the art facilities on campus. The Gusman Concert Hall contains a professional recording studio with automated console and multitrack recorder. Students using this facility can record live concerts ranging from small jazz groups to symphony orchestra. In addition, the L. Austin Weeks Center for Recording and Performance will be constructed on a site adjoining Gusman Hall. This facility will feature a second professional recoridng studio with a 56 input automated console and m,ultitrack recorder, specifically designed for students to perform tracking and remix sessions. In addition, students will have access to digital audio workstations, digital and analog signal processing equipment, audio test equipment, and a variety of computer platforms in both the School of Music and the College of Engineering.

● **Redco Audio**, the Manufacturer of Custom Audio Cables and Accessories, has moved to a new facility at 300 Long Beach Blvd, STratford, CT 06497. Joining Redco as Sales Manager **is Andy Friend**(formerly with Bi-Tronics). **Bob Berliner**, President of Redco advises that Friend's knowledge of the Cable and Connector business will be an asset to Redco and its customers. Andy will operate form

a NYC office and can be reached by his friends at (718) 830-3574.

● **Wendy Carlos** revolutionized modern music with the release of her first album, ***Switched on Bach,*** in 1968. The LP propelled the Moog synthesizer into the public consciousness, and was the first classical album to go to Platinume, staying on the pop charts for 56 weeks and entering the Top 10. Now, 25 years later, synthesizer pioneer Carlos comes full circle by applying her mastery and computer equipment to create a striking new recording of her early classic. Entitled ***Switched on Bach 2000***, the album is in stores, released by Telarc Records. Carlos is also well known for her score of Stanley Kubrick's film *A Clockwork Orange*, where she introduced camcorders for synthesized singing. Her other landmark recording include: *Sonic Seasonings* (which predated New Age's environmental ambience music by more than 10 years); *Digital Landscapes* (replicating digitally orchestral timbres virtually indistinguishable from their acoustic instrumental counterparts); and *Beauty in the Beast* (showcasing the alternative World Music scales and musicla tunings of Bali, India, Africa and Tibet).

● **Altel Sound Systems** of Pleasantville, NY has supplied the Madison Square Garden Network with three 528 Voice Processors for their "Sports Desk" TV cable program aired in the New York and Eastern areas. The 528's are used, linked for stereo broadcast in the live suite as well as in the voice over suite during off line editing. The 528's will give the sports talent's voice depth and intimacy that Symetrix is renowned for. Larry Dahlstrom of the Madison Square Garden Network chose the 528 because of previous experience with other Symetrix products including A-220 Stero Amplifiers.

● Sound designer/composer, **Frank Serafine** has been contracted for several major media projects including supervision of audio post production fro a two-hour Disney movie special entitled, ***Miracle on Clemens Pond***. The movie, produced by Steve White Productions was written and produced by Chris DeFaria. The project is scheduled to air this summer on NBC. In addition to providing sound design, effects, Foley, ADR and dialogue editing, Frank Serafine will mount the final mix on the film stage at **Serafine Studios** in Venice, CA. Serafine is also reconforming the soundtrack for a revised version of New Line Cinema's blockbuster hit, *Lawnmower Man*, on which he supervised audio post production. The new version for the home video market will be thirty minutes longer than the feature release—offering additional story and character development. Serafine will be designing additional effects sequences and reconforming the final mix for the project, officially entitled, *Lawnmower Man—the Director's Cut*. CBS television has contracted with Serafine for a new entertainment produciton network audio ID. He has scored a 3-second version of an orchestral piece for the project, utilizing a Kursweil 2000, Korg Wavestation, Emu E3, Ensonig VFX, and Proteus 1 & 2 sound modules. An Eventide H3000 harmonizer and Lexicon PCM 70 digital reverb were used as well. The project was mixed on Serafine Studio's Otari 54P console sourced from a Sony APR 24 and an Otari MTR 100 24-track tape machine with Dolby SR. The multitracks were locked to picture with a Timeline Lynx synchronizer. Three 30-second, Serafine-scored Cadico Toy spots have been completed for agency producer, Mike Kitie of Cincinnati's Sive Advertising— a division of Young & Rubicam. The scores and sound effects, co-composed with Lmo Weber for Boom Ball, Slam Basket, and the adult game, *Adverteasing*, currently air on major networks including MTV.

● **Jaffe Acoustics, Inc.**, one of the world's foremost acoustical consultants, has been reorganized as part of a long-range strategic business plan, according to its founder, **Christopher Jaffe**. Dr. Jaffe's two senior colleques, **Mark A. Holden** and **Paul H. Scarbrough**, have been named full partners in the firm, which will be called **Jaffe Holden Scarbrough Acoustics, Inc.** "This step gives rightful recognition to Mark and Paul, whose achievements and leadership are sidely recognized by colleagues and clients," Dr. Jaffe said. "Just as important, it shows good faith to our clients. Some of the projects we are working on now won't be competed until sometime in the early 2000s. By assuring our firm's continuity, we also assure our clients that we will be there to follow through with the same dedication and depth of expertise they expect from us now." Since it was founded in 1959, Jaffe Acoustics has led the field in sensitively applying advanced technology to meet the needs of concert halls,opera houses, hteaters, educaitonal institutions, churches and—especially in the past ten years—such diverse facilities as office buildings, corporate headquarters, audio/visual facilities, legislative chambers, and sports complexes. Among them, the three partners have been responsible for more than 200 major facilities throughout North America, Europe and the Far East. The company's name change is the latest step in a metamorphosis that has been under way for about two and a half years, and which has included implementation of new peer-review, quality assurance, and process and project management systems. During the same period, the firm has greatly broadened its capabilities in the growing audio/visual design field. "Jaffe Holden Scarbrough now can provide an enhanced range of services for all clients especially those in the corporate, commercial, and institutional market," said Mr. scarbrough, who has been the fir's Administrative Director during the transition. "Our architectural clients now have a single, dependable source of technical expertise for both acoustical and A/V design." Does the reorganization mean Dr.

Jaffe is considering retirement? He smiles at the question, and points to a long list of current short- and long-term projects. "Not retirement, but a definite change in focus," he muses. "I will be passing along more management responsibilities to my more youthful colleagues, and I look forward with considerable pleasure to spending much more time at what I love to do most: actual acoustical design work."

● **The Virginia Air and Space Center** in Hampton, VA., includes a surround-sound orientation theatre using **Electro-Voice DeltaMax** controlled speaker systems. Langley Air Force Base, located within minutes of the center, is the sight of NASA space program testing and flight simulation. The orientation theatre provides visitors with AMX-controlled laser-disc video programming that includes footage of Apollo launches and space shuttle footage, as well as NASA's Jet Propulsion Laboratory's animated footage of the surface of Venus. Onyx Engineering, contractor for the theatre, chose DeltaMax because it provided the controlled high-fidelity necessay to accurately reproduce the unique program material. A total of four DeltaMax DML-11221 and two DeltaMax DML-2181 systems are used. The museum's interactive exhibits also feature audio that is mixed down via an EV interface modular console, recently introduced at this uear's NAMM convention. The console offers four group mixing buses that allow the use of up to four group output modules, as well as six auxiliary buses that provide six additional mixes with master level controls.

● **Berwick Street Studios**, in London's West End, is the **first** UK music recording studio to install **Audiomation's UPTOWN 2000** moving fader console automation system in its music orientated remix and sound to picture post production faility. The DDA AMR 24 console in Studio 1 has been fitted with 62 channels of UPTOWN automation, to further enhance the ocmpany's remix work for European, UK and Japanese clients. Studio co-owner, Rod Gammons said, "We wanted a clear advantage over our competition. Since we were very impressed with the quality, flexibility and user friendliness of the Audiomation system, the decision to install was easy. The UPTOWN 2000 moving fader automation will be of major benefit to our existing remis clients and will enable us to dramatically expand our sound to picture clientele." Berwick Street Studios enjoyed considerable worldwide success last uear with clients PM Dawn, Blue Pearl, Lisa Stansfield, Zoe, and Shanice topping the charts in most major territories. Major bookings already secure for the UPTOWN automation facility include Sire REcords (USA) and Ultravox who will use it to record their new album.

● **Audium S.R.L.** of Milan, Italy **will distribute professional loudspeaker systems from Eastern Acoustic Works** of Whitinsville, Massachusetts, USA. "We're proud to have a well established and successful distributor like Audium S.R.L. carrying our products," said EAW president Ken Berger, who announced the appointment. "As in other parts of Europe, P.A. hire companies as well as theaters, theme parks and other installations are relying on improved audio quality to attract customers. EAW manufactures a wide variety of high definition speaker systems that meet those needs. Audio's strong track record with high quality professional equipment makes them a perfect partner for us in the Italian market. Audium S.R.L. will distribute EAW products throughout Italy from its home base in San Maurizio Al Lambro on the outskirts of Milan.

● **Buena Vista Sound Services**, the post production sound facilities at the Walt Disney Studios,has announced the formation of a new unit which will provide film and television sound editorial services. **Fred Judkins** has been named **Sound Editorial Supervisor** heading up the new unit. "The addition of Sound Editorial completes our circle of services and allows us to handle all phases of post produciton sound for our clients, "said Chris Carey, Director of Sound Services. "Now we can say literally, 'Deliver us your dailies and we can deliver a final optical print.'" The first project for the new unit was the recently released "Straight Talk," with Dolly Parton and James Woods. Future plans include offering digital electronic editing and sound design as well as magnetic film editing. Judkins comes to Buena Vista Sound with extensive experience in both sound editing and supervising. His Supervising Sound Editor credits include"Twins," "Adventures in Babysitting," "Troop Beverly Hills," and "Ghostbusters 2." Sound Editing credits encompass "Hook," "Shattered," "American Tail 2," "The Rocketeer," and "Out of Africa." He was an Emmy Winner for ABC Movie of the Week, "The Day After" and four time winner of MPSE (Motion Picture Sound Editors Golden Reel Award for his contributions to "Rescuers Down Under," "Sadat," "Children in the Crossfire," and "The Blue and the Grey."

● The future of audio development is increasingly summed up in three letters: **DSP. Digital signal processing** is the field from which the audio products fo the next century will arise. It is already more cost effective in some cases to implement a particular function using DSP than using analogue signal processing, and signals are increasingly remaining in the digital domain throughout production. DSP is now used widely in all fields of audio development. It is a field which no self-respecting design engineer can afford to ignore today, yet many engineers who cut their teeth on analogue design are becoming increasignly left behind in the digital world. Furthermore, operators and recording engineers should be aware of the potential of DSP in the studio and in broadcasting. Recognising this need for infor-

mation, the **AES** is running a two-day conference from 14-15 September at Kensington Town Hall, London, England which will bring together eighteen experts in the field of DSP for audio under the chairmanship of Rhonda Wilson. There will be something for everyone, from a relatively low technical level to the latest in applications and development. Sessions are included on fundamental issues, filter design and topology, code generation, DSP and psychoacoustics, acoustic enfironment correction and control, pro and consumer applications and audio signal restoration. Announcing the conference, AES UK Vice Chairman, Francis Rumsey, said "No one can afford to ignore digital signal processing these days- it is plainly and simply the future direction of the audio industry, and must be seen as the most important area of development for the nest ten years. As with any form of data processing, what is possible depends only on the processing power available and already we can see the fruits of high speed numer crunching in the form of data compression, cheap digital effects, high-powered workstation and so forth. Soon it will not be cost effective any longer to develop audio solutions using analogue processing, since most of the electronics industry is now dedicated to producing digital components."

● Veteran composer/producer **Kelly Bryarly** has joined the staff **of Music Annex Recording Studios** in Menlo Park, CA. According to Music Annex Studio Manager, Charles Albert, "Kelly's arrival enables Music Annex to offer a complete solution to clients who require music scoring in addition to the audio recording, mixing and production services we already offer. His outstanding compositional, instrumental and orchestration skills give his scores a very fresh sound." Among the things tha makes Bryarly unique are oputstanding instrumental abilities with quitar, bass, five-string banjo, mandolin, cello,keyboards,harmonica, and saxophone. In addition, Kelly is fluent on all the latest MIDI computer programs used for music scoring. Bryarly, who hails originally from Colorado Springs, Colorado has been performing and writing music for over seventeen years. He relocated to California three years ago and has rapidly developed a strong client base. Recent projects include work for Nissan Motors, Chevron Corporation, NASA/Ames, and Taco Bell. He also scores for the highly acclaimed PBS syndicated series, "Wild America".

● **Howard Schwartz Recording**, the first New York post-production facility to install Solid State Logic's ScreenSound digital audio-for-video editing/mixing system, has added a second **ScreenSound as well as a SoundNet digital audio network**. "Since we introduced New York producers to what ScreenSound could do, the product has become an estabolished "buzzword" in the commercial business here. Customers call and ask for it," Howard Schwartz says. The renowned midtown Manhattan, seven-room facility's two ScreenSound operators, Roy Latham and Roy Yokelson, are expecting the second machine to double the amount of music and sound editing work they are already doing. Recent ScreenSound projects at Howard Schwartz Recording include multimedia work for AT&T for the Barcelone Espo in Seville, numerous promos for broadways shows including "Five Guys Named Moe," and "Jelly's Last Jam," as well as a range of television programs, commercials and public service announcements starring Cliff Robertson, Danny Glover, Rick Moranis, and Michael J. Fox. According to Schwartz, the SSL SoundNet was added for additional backup capabilities. "Before we were backing up onto digital multitrack. Now we don't have to wait for the upload and download time, and our clients don't have to wait either. SoundNet is going to make the process much smoother. No more loosing precious production time."

● **Crown** has licensed **IQ System 2000 computer control software** for use by **T.C. Electronic and White Instruments**. The announcement was made by **Gil Nichols,** Crown division leader. The two companies are the first to take advantage of an offer for IQ System licensing announced by Crown at last year's AES convention on New York. However, the company is anticipating many more requests for IQ System licensing in the near future. "The IQ System is the only computer control protocol systme that is cross-compatible with systems already being produced by other manufacturers," says Dr. Clay Barclay, product development manager for the IQ System. "We're bridging the gap between the various standards that currently exist." With IQ licensing, both T.C. Electronic and White Instruments have opened an opportunity for all of their future computer control products to offer all of the various functions provided by IQ software. In addition, they will also be able to incorporate the new IQ DFOS, an artificial intelligence operating system due for introduction in 1993.

● **Jon R. Kelly**, president of **Audio Technica,** the Stow, Ohio audio products firm, has announced promotions of two key personnel. Jacquelynn Hebrock has been appointed director of product development for Audio-Technica's professional and consumer divisions. Ms. Hebrock joined the company in 1986 as product manager. Assuming the position of product manager is **Kenneth Satz**, who has been product specialist since joining the company in 1990. Mr. Satz will act as liaison between marketing, engineering and manufacturing, for both professional and consumer products. Before joining Audio-Technica, Hebrock was a graduate assistant at the University of Akron, where she received her MA in arts management. Previously, she was a marketing representative for a Tandy Corporation/Radio Shack Computer Center in Oklahoma City, a quality control technician and manager for Audio Dynamics Corporation in Connecticut, and marketing services engineer for BSR U.S.A., in New York. Ms. Hebrock received her bachelor of science in sound recording technology from S.U.N.Y. Fredonia, Fredonia, NY. Satz was formerly employed in the Cleveland area as product specialist at Reliance Electric, and senior technical writer at Picker International. Previously, he resided in New Jersey and was an engineer at ITT. Mr. Satz received his bachelor's degree in electrical engineering from Stevens Institute of Technology in Hoboken, New Jersey.

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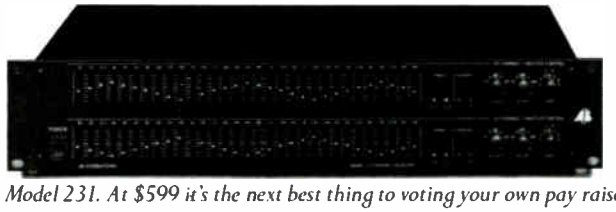

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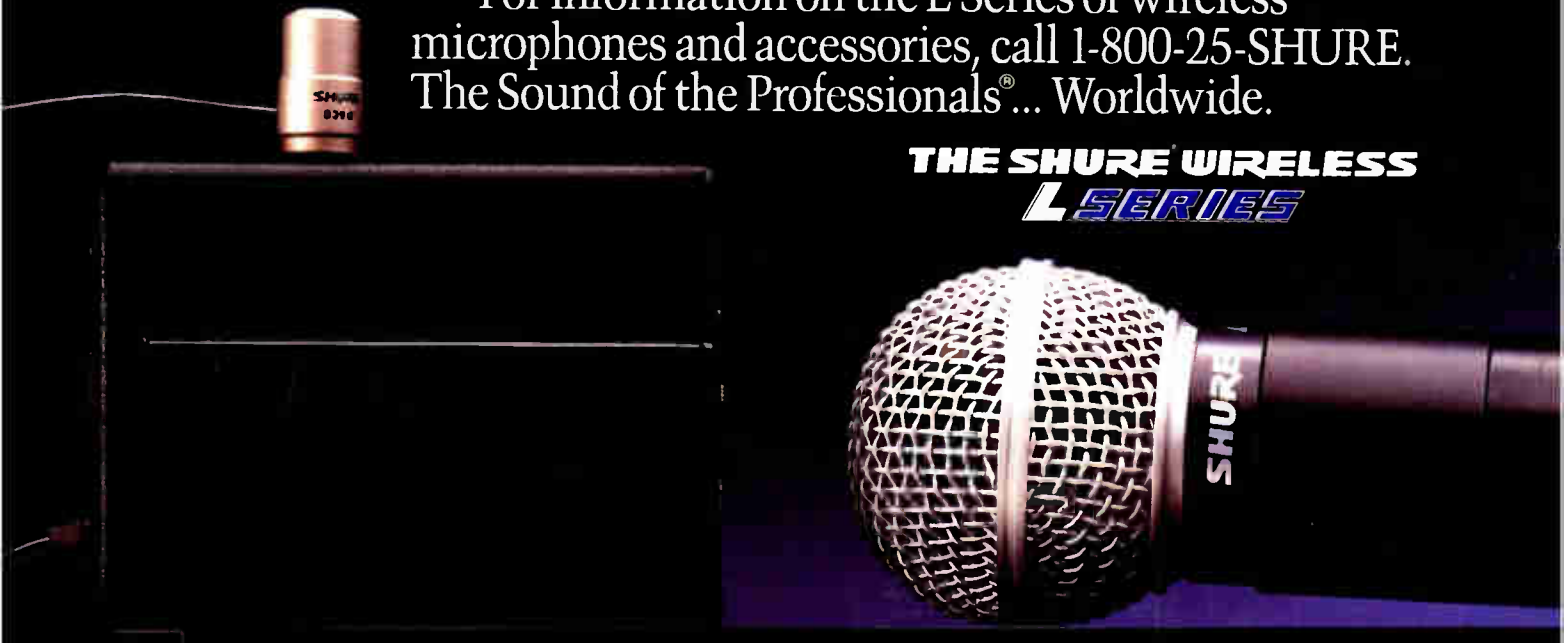

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