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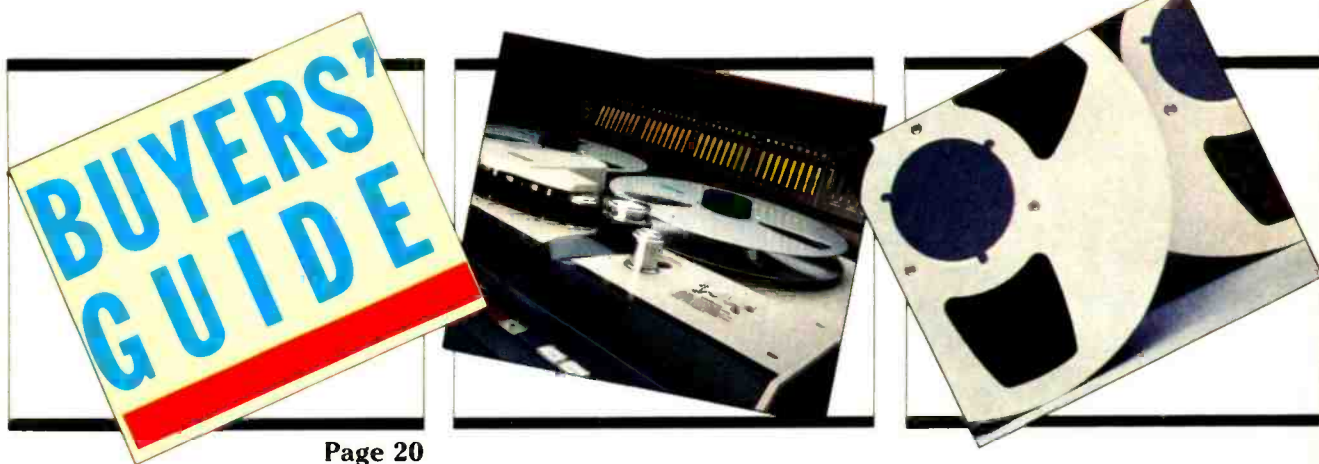
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Contents

Recording

ENGINEER/PRODUCER

December 1987 Volume 18 Number 12



Page 20

1st Annual Buyers' Guide

RE/P's first annual Buyers' Guide provides three separate categories including the Product Directory, Manufacturers' Directory and the Dealers/Distributors Directory.

Product Directory 20

Manufacturers' Directory 43

Dealers/Distributors Directory 63

Other Features

State of the Industry:

Future Trends and Observations

Editor Michael Fay explores some of the new directions that recording facilities and the pro audio industry will take in the future.

By Michael Fay 96

Selecting Accounting Software for Audio Facilities

Select accounting software packages carefully for efficiency and maximum control of your facility's money.

By Robert Carr 82

Hands On: Yamaha DMP-7 Digital Mixing Processor

By Paul D. Lehrman 86

Digital Audio Recording for TV Programming

Digital post-production facilities are now a reality with digital recording, editing and processing equipment.

By Peter Roos 90

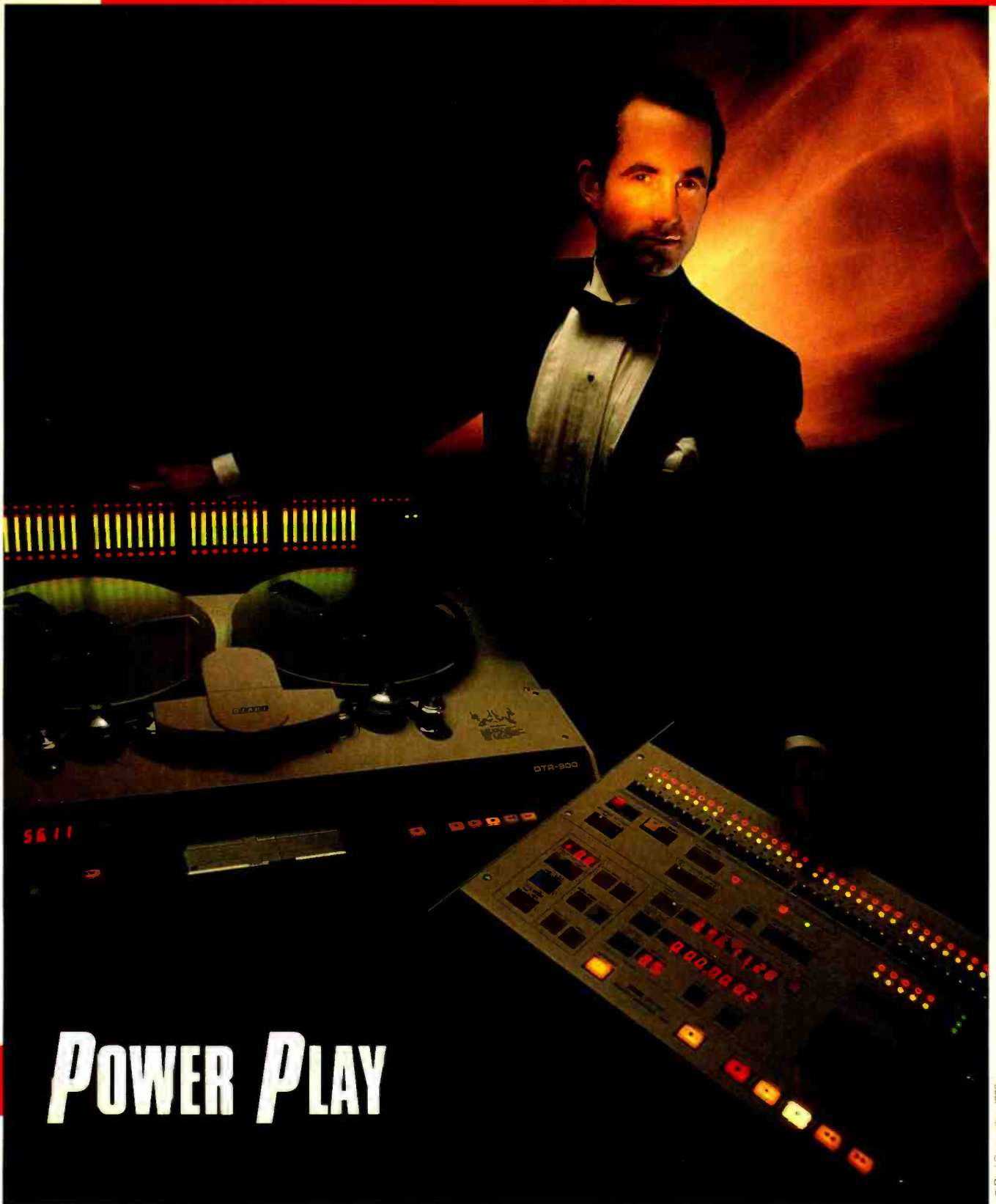
Departments

Editorial	4
News	6-8
Letters	10
Managing MIDI	12
Sound on the Road	14
SPARS On-Line	16
Film Sound Today	18
New Products	98-101
Classified	103
Advertiser's Index	104

On the Cover:

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Take the Show On the Road?

New York is an exciting and stimulating city, and a vibrant part of the professional audio industry. Los Angeles is considered the recording capital of the world. But, the perception that only two cities in the United States are capable of hosting the annual AES convention should be re-evaluated.

A primary reason for hosting the show in these locations is the size of the local audio workforces. There are sufficient numbers of engineers and other production people living in these areas to ensure a large attendance.

But at the same time, the AES is catering to the people in these markets and they are ignoring a great number in others. It would be of great benefit to our industry if the autumn show could rotate through an expanded list of sites, bringing it closer to all professionals.

All professionals need current information on the industry's latest products. They crave information on new products, not only because they are considering a purchase, but also because it helps them stay in touch with the industry.

By limiting the hands-on exposure of new products, ideas and technologies to a privileged few, we are restricting the productivity of thousands of other creative individuals. Let's broaden this exposure and find new ways to allow more professionals to participate in these informative exhibitions.

It is time to find a way to take the fall AES conference show on the road. Here is a possible format.

Starting in the fall of 1989, the convention could rotate through the following cities: Nashville, San Diego, Chicago, San Francisco, Boston, Los Angeles and New York, with Seattle, Las Vegas, Dallas, Denver, Philadelphia or Washington, DC as possible alternatives.

1989: Nashville, TN, has almost 200 recording studios and is one of the world's most vital production communities. There would be no lack of interest there and the city would draw from the Mid-Atlantic and Southeastern regions of the country. 1990: San Diego will have its new convention center open. It's close enough to Los Angeles and Orange County to effectively cover Southern California. A significant draw from Phoenix, San Francisco and Mexico could also be expected. 1991: Chicago is another productive region and would draw from Minneapolis, Detroit, Cleveland, Cincinnati and other cities in the Midwest. 1992: Besides the local areas, San Francisco would be attractive to those in the Pacific Northwest as well

as Southern California, Nevada and Utah. 1993: The show could go to Boston, Philadelphia or Washington, DC, as all are close enough to draw from New York. For 1994 and 1995, we would return to Los Angeles and New York.

This proposed schedule can broaden user awareness and involvement, and promote goodwill within the "middle market" segment of the industry.

Most pro audio manufacturers are reaching for the middle of the market and above. If Los Angeles and New York are considered to be the top, does that mean that there are no other major recording centers? And what about producers and engineers who don't work in these other recording centers but whose work is nonetheless valuable? Who remains are working professionals in smaller cities who constitute the "middle market" majority. By limiting the show to the two major East and West Coast recording centers, the Audio Engineering Society implies to qualified professionals in other areas that their work and/or money is not significant. I doubt that's the impression the AES or the manufacturers are trying to give, but it could be the message that's being received.

In order for our industry to flourish, we must be unified through effective communication and diverse representation. There's an entire country between New York and Los Angeles. For the sake of the industry, the AES needs to discover it.

I welcome your comments and suggestions. Let the AES and the manufacturers know how you feel about taking the show on the road.



Michael Fay
Editor



TRUTH...

OR
CONSEQUENCES.

If you haven't heard JBL's new generation of Studio Monitors, you haven't heard the "truth" about your sound.

TRUTH: A lot of monitors "color" their sound. They don't deliver truly flat response. Their technology is full of compromises. Their components are from a variety of sources, and not designed to precisely integrate with each other.

CONSEQUENCES: Bad mixes. Re-mixes. Having to "trash" an entire session. Or worst of all, no mixes because clients simply don't come back.

TRUTH: JBL eliminates these consequences by achieving a new "truth" in sound: JBL's remarkable new 4400 Series. The design, size, and materials have been specifically tailored to each monitor's function. For example, the 2-way 4406 6" Monitor is ideally designed for console or close-in listening. While the 2-way 8" 4408 is ideal for broadcast applications. The 3-way 10" 4410 Monitor captures maximum spatial detail at greater listening distances. And the 3-way 12" 4412 Monitor is mounted with a tight-cluster arrangement for close-in monitoring.

CONSEQUENCES: "Universal" monitors, those not specifically designed for a precise application or environment, invariably compromise technology, with inferior sound the result.

TRUTH: JBL's 4400 Series Studio Monitors achieve a new "truth" in sound with

an extended high frequency response that remains effortlessly smooth through the critical 3,000 to 20,000 Hz range. And even extends beyond audibility to 27 kHz, reducing phase shift within the audible band for a more open and natural sound. The 4400 Series' incomparable high end clarity is the result of JBL's use of pure titanium for its unique ribbed-dome tweeter and diamond surround, capable of withstanding forces surpassing a phenomenal 1000 G's.

CONSEQUENCES: When pushed hard, most tweeters simply fail. Transient detail blurs, and the material itself deforms and breaks down. Other materials can't take the stress, and crack under pressure.

TRUTH: The Frequency Dividing Network in each 4400 Series monitor allows optimum transitions between drivers in both amplitude and phase. The precisely calibrated reference controls let you adjust for personal preferences, room variations, and specific equalization.

CONSEQUENCES: When the interaction between drivers is not carefully orchestrated, the results can be edgy, indistinctive, or simply "false" sound.

TRUTH: All 4400 Studio Monitors feature JBL's exclusive Symmetrical Field Geometry magnetic structure, which dramatically reduces second harmonic

distortion, and is key in producing the 4400's deep, powerful, clean bass.

CONSEQUENCES: Conventional magnetic structures utilize non-symmetrical magnetic fields, which add significantly to distortion due to a nonlinear pull on the voice coil.

TRUTH: 4400 Series monitors also feature special low diffraction grill frame designs, which reduce time delay distortion. Extra-large voice coils and ultra-rigid cast frames result in both heavy professional use.

CONSEQUENCES: For reasons of economics, monitors will often use stamped rather than cast frames, resulting in both mechanical distortion and power compression.

TRUTH: The JBL 4400 Studio Monitor Series captures the full dynamic range, extended high frequency, and precise character of your sound as no other monitors in the business. Experience the 4400 Series Studio Monitors at your JBL dealer's today.

CONSEQUENCES: You'll never know the "truth" until you do.



JBL Professional
8500 Balboa Boulevard
Northridge, CA 91329

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News

AES elects 1987-88 officers

The Audio Engineering Society has announced its officers for 1987-88. Daniel Graveraux was elected to serve as president. He has been serving as AES president since July, when he was elected to fill the term of Richard Heyser, who died in March.

Other elected officers are: Stanley Lipshitz, president-elect; Randall Hoffner, Thomas Behrens, Richard Cabot, Roger Furness and Lawrence Fincham, regional vice presidents; Diana Deutsch, William T. Shelton and Frank Anthony Griffiths, governors; John J. Bubbers, secretary; and Arthur E. Gruber, treasurer.

NED forms technology agreement, retains software consultant

New England Digital has entered into a joint technology agreement with Analogic, a designer and marketer of analog-to-digital converters, signal processing equipment and medical products.

Under the agreement, the companies

will develop a new generation of high-speed A/D converters and signal processing products to be used in NED's Synclavier.

NED has also retained Shelly Palmer to be a software consultant to develop and refine software for commercial production, and film and video post-production applications. Palmer is founder and president of Shelton Leigh Palmer and Co., and Creative Audio Recording Services.

Tape companies use APRS labeling system

British divisions of Ampex and BASF are implementing a standardized labeling system for audio master tapes devised by APRS, the U.K. recording studio organization.

The system uses self-adhesive color-coded tape box labels using standardized designations, designed to clearly mark a master tape and avoid misidentifying.

BASF United Kingdom is supplying a kit of labels free with every delivery of

audio mastering tape and will offer the kits in other countries upon request. Ampex Great Britain has been supplying kits free to APRS members.

Business notes

RLS Acoustics has relocated to 300 Brannan St., Suite 610, San Francisco, CA 94107; 415-541-0818.

Vaughn Communications has acquired AVC Systems, a vendor of pro audio and broadcast equipment and systems.

Neve has announced the following console sales: Apollo Theatre, New York, V series; Mamorsky, Zimmerman, Hamm & Forest recording studio, New York, model 8232; Record Plant, New York, Digital Transfer Console; Soundwave, Washington, DC, model 8232; Eleven Eleven Sound, Nashville, TN, V48; Crosstown Recorders, Memphis, TN, model 8232; KLRU, Austin, TX, V series for use on "Austin City Limits"; CBS, Los Ange-

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Sales offices: see page 104

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RECORDING ENGINEER/PRODUCER is edited to relate recording science to recording art to recording equipment, as these subjects, and their relationship to one another, may be of value and interest to those working in the field of commercially marketable recordings and live audio presentation. The editorial content includes: descriptions of sound recording techniques, uses of sound recording equipment, audio environment design, audio equipment maintenance, new products.

CORRESPONDENCE

Advertising and Subscription:
9221 Quivira
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913-888-4664
Telex: 42:4156 Intertec OLPK
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Editorial:
Suite 220
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les, V series for use in its new teleproduction site; Westlake Studios, Los Angeles, V series; Baby O Recording, V60; Cherokee Recording, Hollywood, V60; and Garden Rake Productions, Sherman Oaks, CA, V48.

SPARS names director, elects new officers

Shirley Kaye has been named executive director of the Society of Professional Audio Recording Services. Kaye has been a member of SPARS since 1972 and is a former regional vice-president and treasurer.

The former owner of Coconuts Recording Company in Miami, Kaye replaces Gary Helmers, who resigned last summer.

The appointment was announced at the AES Convention in New York, where the society's officers for 1988 were elected at a general membership meeting.

The new officers are Nick Colleran, chairman of the board; Guy Costa, president; Bruce Merley, first vice president; Dick Trump, regional vice president/treasurer; Dwight Cook, regional vice president/secretary; and Johnny Rosen, Charles Benanty, David Porter, Tom Jung, Charles Comelli, Pete Caldwell and Tom Kobayashi, regional vice presidents.

In addition, the SPARS national office has relocated to 4200 10th Ave. North, Suite 2, Lake Worth, FL 33461; 305-641-6648.

JBL supports Pink Floyd on studio and stage

The new Pink Floyd album, "A Momentary Lapse of Reason" and the "1987-1988 World Tour" feature the use of JBL loudspeakers. At Can Am Studios in Los Angeles, JBL 4435 Bi-Radial studio monitors were used in the mixing of overdubs, and on stage for the tour JBL Concert Series loudspeakers are being used for the individual instrument systems.

Two separate keyboard systems were designed around the JBL 4828 Bi-Radial stage monitoring system and the 4851 3-way loudspeaker system. The bass guitar setup incorporates the 4850 2-way loudspeaker system and the 4842 subwoofer system. Both keyboard and bass setups use JBL/UREI 5235 electronic crossovers and JBL/UREI 6260 and 6290 power amplifiers, with Concert Series input/output connector panels and cabling.

Centro completes relocation

Centro Corporation has completed its relocation from San Diego and is now located at 369 Billy Mitchell Road, Salt Lake City, UT 84116; 801-537-7779.

Stewart opens headquarters

Stewart Electronics has opened its new facility at 11460 Sunrise Gold Circle, Suite B, Rancho Cordova, CA 95760. The company's phone number is still 916-635-3011.

JBL sponsors

1987 Audio Engineering Conference

The conference for JBL sound contractors, independent consultants and representatives was presented late September, in Woodland Hills, CA.

Ron Means, president of JBL Professional announced the Harman/JBL collaboration and new product developments. Ken Lopez, vice president of sales presented a glimpse of new products that will soon be available from JBL/UREI and Soundcraft Electronics.

Other guest speakers included: Rollins Brook, Don and Carolyn Davis, Ken Fause, Mark Gander, David Kaye, David Klepper and Torben Jacobsen.

Also included during the 2-day seminar were "hands-on" workshops on sound mixing, enclosure design, video setup and TEF and RASTI techniques.

Agreement announced for standardization of

serial communications protocols

Six companies have agreed to standardize serial communications protocols for machine control in the audio production and post-production industries.

The agreement, between TimeLine, Solid State Logic, New England Digital, CMX, Triconcept and Alpha Audio, is the first step in developing simplified computerized machine control systems using serial protocol. This was developed by TimeLine for its Lynx System Supervisor and is based on the ES Bus standard.

The standardized protocol will allow manufacturers to implement machine control functions more easily without developing custom command and control systems for each type of device.

The agreement was announced at the AES Convention in New York. Following Beta testing, TimeLine will publish the command and control protocols.

Discovery Systems opens East Coast offices

Discovery Systems has opened additional offices in New York and Raleigh, NC, for compact disc audio mastering and replication services. The addresses of the offices are 437 Madison Ave., New York, NY 10022, 212-888-2220; and 4601 Six Forks Road, Suite 518B, Raleigh, NC 27609; 919-881-0066.

Lexicon opens West Coast office

Lexicon has opened a West Coast regional sales office at 11965 Venice Blvd., Suite 407, Los Angeles, CA 90066, for sales and backup support. The company says it plans to eventually develop a service facility within the office.

Milab names U.S. distributor

Milab Microphones has named EXP as its U.S. distributor of Milab's microphone line. The company is located at 11288 Ventura Blvd., Suite 304, Studio City, CA 91604; 818-843-1830.

Corrections

In the AES preview in the October issue, AKG Acoustics was omitted from a category in the Product Directory. The company manufactures microphone accessories, booms and stands, studio and PA microphones, and wireless and RF microphones.

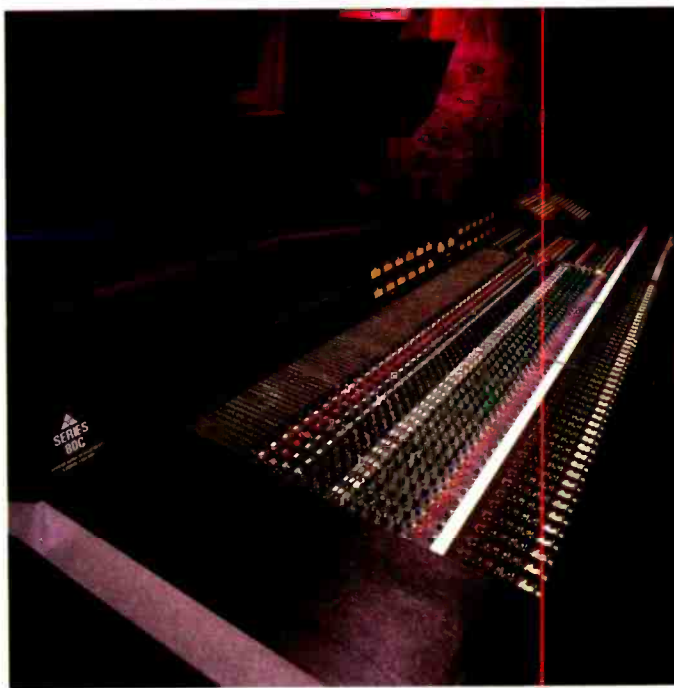
Also, because of erroneous information supplied by the AES, Focusrite was incorrectly listed as Zimbelman.

The August 1987 issue featured the article "An Engineer's Guide to Studio and Live-Performance Microphones." Due to a production error, Figures 1 and 2 are reversed. Also in Table 1, the Microphone Selection Chart, please note if the requirement is "extended lows," the recommended microphone characteristic should be "omnidirectional condenser, or dynamic with extended low-frequency response." REP

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*Pictured: 48 x 24 x 15 Series 80C (100 inputs for mixing)
Photo courtesy of Westlake Audio

Mic evaluations

From: William Sommerwerck, *Mechanicsburg, PA*

Thanks for Lowell Cross' interesting article on microphone evaluations in the August 1987 issue. May I add a few corrections and additions?

The JVC Q-Biphonic (nee, Quad-Biphonic) system does encode for height, at least when making dummy-head recordings. The encoding is inherent in the shape of the pinna and the arrival time differences between the ears. If you have the (Stereo Review) binaural record, which includes sounds moving above and below the listener, you can confirm that the brain interprets these directional cues reasonably well.

There is another source of microphone coloration that Mr. Cross does not discuss. One of the fundamental problems with conventional stereo recordings is that the ambience is mixed with the direct sound and comes from the wrong direction in playback. Those ambience components that fall in the fusion region are masked by the direct sound, but are still present to comb and create audible coloration.

This suggests that figure-eight mics, which suppress side sounds much more than cardioids, will have less coloration. Indeed, this seems to be the case. Using my PML RC-4v mics, I find that single-point recordings made with the figure-eight pattern are crisper, livelier, more immediate and less colored than those made at the cardioid setting.

I also like the Blumlein setup for another reason. As an amateur recordist limited to live performances, I rarely have the opportunity to ask the performers to rearrange themselves to suit my concept of good imaging or the best balance. By rotating the mics a bit, I can get a better spread of sound, or tame an overly loud instrument, without messing up the overall image.

Mic Pre Listening Test

From Deane Jensen, *president Jensen Transformers, N. Hollywood, CA*

An important and relevant result of the "Mic Pre Listening Test" in your October 1987 issue was omitted. Denny Jaeger, who graciously offered his \$2 million studio for the tests, chose the Jensen Twin Servo 990 mic pre, built by Boulder, for his own studio.

This is the same Denny Jaeger who was the first to convert his two Sony 3324 24-track digital tape machines to

the Apogee linear-phase filters for sonic clarity. He was also one of the original consultants who helped pioneer the development of the Synclavier II, and currently owns one of the four largest Synclavier systems in the world—a man who really "puts his money where his mouth is," or is it "where his ears are." So, which mic pre really won the test?

Digitally recorded tape

From John Lord, *Santa Monica, CA*

In his column in the July issue, Gary Helmers repeats a common misconception about digital audio:

"Because a digitally recorded tape contains only numbers, the microprocessors can easily distinguish between the recorded signal and the inherent tape noise. Consequently, digital soundtracks can be bounced, theoretically at least, through an infinite number of generations, with the last sounding just as lean as the original."

Mr. Helmer's second sentence is false for a variety of reasons. Errors *do* occur in the recording and reproduction of the bits that make up the digital signal, thus changing the "numbers." The Second Law of Thermodynamics has not been repealed for audio engineers.

Unlike analog, however, in digital audio there is the possibility of correcting some errors. There are various ways of doing this, but all involve recording extra information on the track.

A brute force method would be to record three parallel digital tracks. Compare them in playback; if there is any discrepancy, pick the version that occurs on two of the tracks. (Notice that an error that appeared simultaneously on the playback of two of the tracks would be accepted as the correct data.) This brute force method would be a waste of tape. Computer scientists long ago figured out much more elegant and efficient ways of catching errors, built around various forms of error-correction code. The code makes it possible for the computer to check one section of the recording against another.

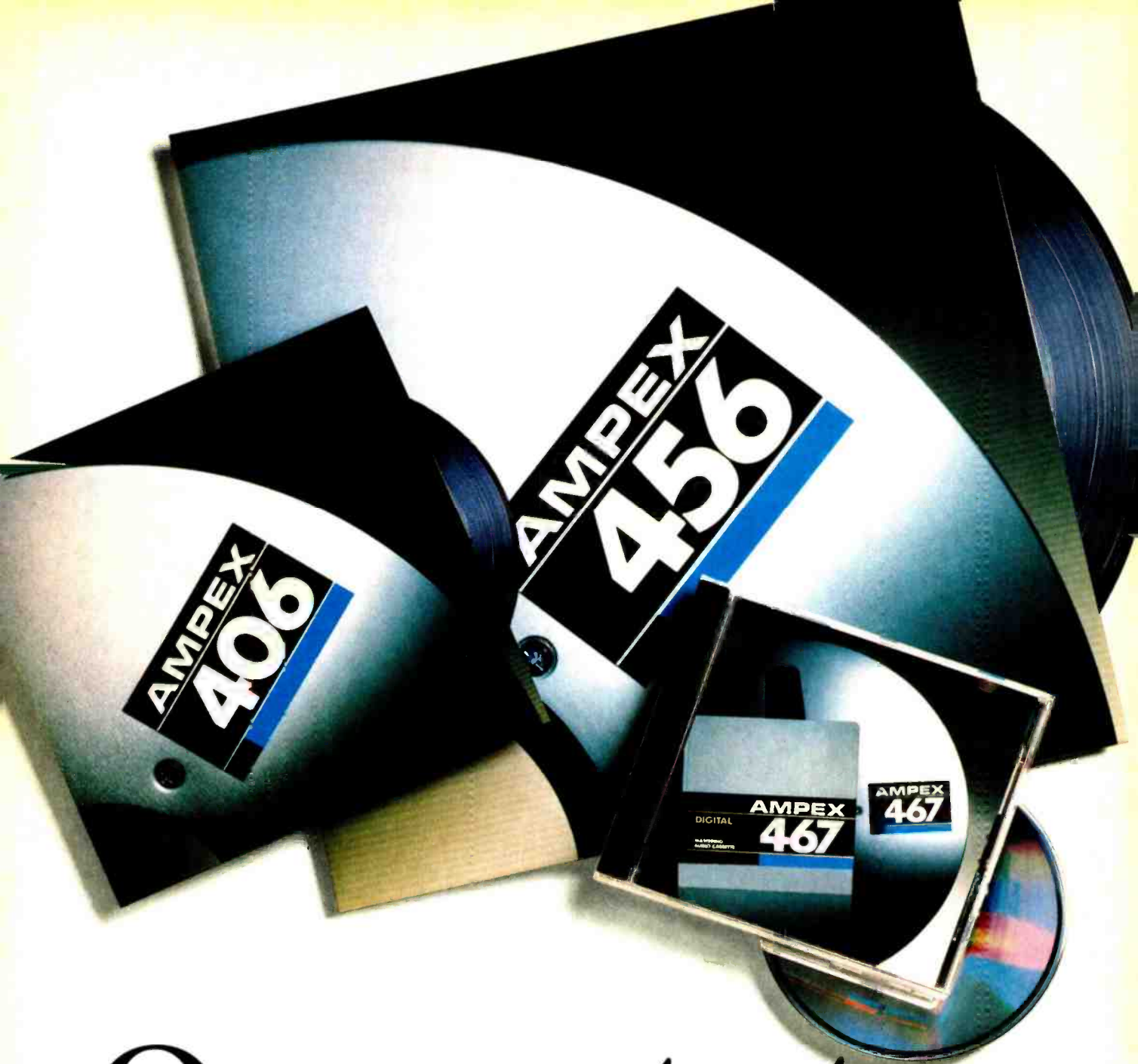
Error correction can be made as good as we want, but we cannot make it perfect. For example, some simple codes can correct an error in which one among eight consecutive bits has been altered, but it cannot catch the rarer error in which two consecutive bits have altered. The more errors an error correction code can catch (i.e., the rarer the type of

errors an error correction code can catch), the more additional information will be needed to be recorded on the track. It's a compromise involving not only space on the track but also computation time, and the law of diminishing returns applies. So, for example, the error correction code used on audio CDs does not catch as many errors as the more extensive error correction code used on CD-ROMs, because an isolated mistake in musical material is not very noticeable and playing time is a major consideration, whereas on a CD-ROM a number error in a database can have serious consequences. For obvious reasons, extensive error checking is used in applications that handle such things as bank balances. In comparison, error checking in digital audio is nothing to brag about.

An analogy may clarify the difference between bouncing analog and bouncing digital sound. Analog recording is like copying a page of text on a Xerox machine. The first copy looks pretty good. Copy that copy, and it's not quite as good. The serifs on the letters start to drop out, and random dark points appear in the white area (noise). By the time you get the hundredth copy, about all that would be visible would be a pattern of dark horizontal lines. (Notice that in photocopying and copying audiotapes, the high frequencies go first.)

Digital recording is like giving the page to a monk to copy. The first copy is pretty good, maybe one misspelling. The second monk notices the misspelling (he knows what it should be from the context, like an error correcting code) and corrects it. But by the time we get to the hundredth monk's copy, an uncorrected error would have appeared and the text is corrupted. Notice, though, that the white of the paper is still white (i.e., no tape hiss) and the letters are still perfectly formed. They just don't mean what they used to.

For these reasons, if a digital recording were bounced through an infinite number of generations, the last would be pure noise, theoretically at least. It would not be music but gibberish, gibberish perfectly free of tape hiss. Fortunately, none of us will ever have to deal with an infinite number of generations, and since the error-correcting schemes being used have been chosen with an eye on the typical number of generations used and the limitations of the human ear, digital is a blessing to those who deal in fourth- or fifth-generation material.



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Managing MIDI

By Paul D. Lehrman

Because I don't get to play much music outside of my own studio these days, I'm pleased when someone asks me to do some live performing. Recently, the organizers of several conventions and meetings in the Northeast, all of which happened to be scheduled at about the same time, asked me to write and perform some pieces using computers and MIDI equipment.

At one of those meetings, I even volunteered to run a workshop on the latest in MIDI techniques, the afternoon before my performance. My original title for the workshop was rather imposing and formal sounding, but at the last minute, I decided I really *did* want people to come, so I changed it to "Fun with MIDI."

However, when I was setting up for the workshop, a piece of equipment in my MIDI setup broke down, and I couldn't for the life of me figure out which one, or why. "Fun with MIDI" quickly descended into "MIDI Hell."

The setup involved two computers, seven synthesizers, two signal processors, three mixers and three input devices, all under MIDI control. The layout of the Ins, Outs, and Thrus was, to put it mildly, complicated. One mistake, and everything would come crashing down, or would lock up, or worse.

Well, I thought I had it wired correctly, but when I started to play my examples for the eager workshop crowd, all sorts of weird garbage came out—notes would shut off mysteriously, or wouldn't shut off at all, huge clusters of notes would sound whenever I'd move a pitch wheel, strings of program changes started occurring on all channels simultaneously, stuff like that.

I fiddled around in front of the crowd for a few minutes, and finally gave up in disgust. For the rest of the hour, all I could do was describe what I was *going* to do, which was hardly the audience-grabber I had hoped to do.

For the next three hours I tried to track down what went wrong, so that I could perform that night—without success. Finally, I went out to dinner.

When I eventually got back home and started pulling everything apart, I discovered the culprit: A ROM chip in an interface box I was using as a merger had failed, and was garbling the MIDI data coming into it. I happened to have a replacement ROM on hand, which I popped in, and

everything worked great.

The experience made me realize more than ever what a pain MIDI can be, both in the studio or on the road. In a personal-use studio like mine, I can avoid the hassles that come with clients' constantly changing requirements, but a commercial studio does not have that luxury.

Before MIDI came along, a studio already had enough to worry about, like balanced lines, ground loops, RFI, hot chassis, voltage drops, video sync buzz, and keeping the power and audio lines away from each other. Now we have to

Treat MIDI with the same respect as you do any signal in your studio.

deal with new kinds of ground loops caused by MIDI cables, MIDI data loops, local control, MIDI Thrus and a host of new kinds of hardware like splitters, mergers and patchbays. For the studio just getting into MIDI it can be a nightmare.

There are several principles that studios can follow to help keep them out of MIDI Hell, however. Some are extensions to conventional good studio practice, while others are unique to the MIDI age.

First of all, keep audio and MIDI wiring separate, the way you do with audio and video. MIDI is high-speed data, running through not particularly well-shielded lines, and under some circumstances, it can indeed leak. Don't run audio and MIDI lines parallel to each other for any length.

Also, you'll avoid lots of confusion if you do your audio and MIDI wiring at separate times: Do all your audio wiring first, check it thoroughly, and *then* do all your MIDI wiring (or vice versa, if that's more convenient). This may sound obvious, but you'd be surprised how often a situation comes up where something is not working right, and everyone starts frantically tracking down audio cable faults, until the tape op discovers that the cable that was supposed to go into the Thru jack on the second synth in the chain somehow ended up in the In jack, and that's why there's no audio from the sampler.

And speaking of chains, try to avoid them. They can cause the dreaded MIDI

delay (although that's not as big a problem as was once thought), but more importantly, they can drive you nuts. If there's a synth at the beginning of a chain, whose MIDI processor goes funky, it will take the whole chain down, and it may take a while for you to realize what happened. Instead, use a star network, in which there is as short and predictable a path as possible between whatever devices generate MIDI data and whatever devices read it.

If you're doing a really complex setup, with multiple ins and outs, mergers and switchers, filters, channelizers, or whatever, get in the habit of setting the units to their proper functions *before* you hook up their MIDI cables. If you don't, you may accidentally set up a MIDI loop, which is like audio feedback, only not as loud, and potentially far more destructive.

Equipment that gets caught in a MIDI loop often will stop responding to *anything*, sometimes the only way to get it to behave is to turn it off. If you're lucky, the next time you turn it on, the unit will work OK, but if you're unlucky, it will have dumped all its memory. What happens to your particular setup when it's confronted with a MIDI loop is not one of those things that's worth finding out.

If you're working with a MIDI switcher or patchbay, make sure that when you change settings on it there is no MIDI data going through it. If you send a note-on to a particular synth module, and then switch it out of the circuit, it will never get a note-off, and will keep sounding until you do something drastic. Similarly, if you're in the middle of a pitchbend sweep and suddenly change your synth routings, you could end up with one synth jumping out of tune while another gets hung up on some pitchbend value with no way to get it down again.

Finally, invest in some way of monitoring your MIDI data stream. You've got cable checkers, digital voltmeters, and oscilloscopes for looking at your audio lines, so why should your MIDI lines deserve any less? There is a wonderful public domain program for the Macintosh called "MIDIScope" that analyzes what's happening on a MIDI line, and there are also a few portable hardware devices now becoming available that do the same.

Treat MIDI with the same respect as you do any signal in your studio. A few bucks here and a few minutes there can go a long way toward keeping you and your studio out of MIDI Hell.

Paul D. Lehrman is RE/P's electronic music consulting editor and is a Boston-based producer, electronic musician and free-lance writer.

REP

5. V Series Enhanced Dynamics



Conway Recording caters to the top record-date clientele in LA's highly competitive studio recording scene. Yet hits are their stock in trade.

Owner Buddy Brundo has assembled outstanding engineering talent and provided them with the equipment necessary to record some of the most demanding performances in the world. Conway has repeatedly chosen Neve recording equipment, most recently the V Series 60 input multitrack console with enhanced dynamics.

"Because of its versatility, the V Series console lets you do a lot more. The built-in compressors and switching are better than ever," says Brundo.

The V Series offers separate releases on the combined noise gate/expander and limiter/compressor to ensure the highest degree of control. More threshold controls make it

possible to "fine tune" to previously unimagined preciseness. Special effects possibilities almost create themselves. Noise and distortion are at their lowest, so sound is pure, crisp and natural. This is, quite simply, the most comprehensive in-line dynamics unit ever.

What all this means is the real world of recording is a flexibility and warmth that have helped make Conway a consistent winner in any musical genre.

"We've had Dionne Warwick in to do *That's What Friends Are For*, as well as Smokey Robinson, Mr. Mister and the Talking Heads, who did a remix of *Wild Life*," adds Brundo. "We've had an unbelievable amount of hits this year, and our clients keep coming back. They know there's something special about the sound that comes out of here."

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Circle (8) on Rapid Facts Card

Sound on the Road

By David Scheirman

Audiences have gathered together in live-performance venues for thousands of years to enjoy the sound of live music. Ancient building engineers skillfully combined a knowledge of materials and mathematics to construct chambers and arenas that could influence an audience's emotional experience of a musical performance in different ways. In seeking to construct performance spaces that would enhance the type of program being presented acoustically, these early architectural sound experimenters laid the foundations for a knowledge of classical acoustics that has come down to us through recent centuries.

Most discussions of live sound for today's popular musical events center on the musical style, or the type of sound reinforcement hardware that is in use for a specific event or touring project. Most tours that use the arena venue circuit to present their musical performances operate with relatively standardized sound system packages that are available from a variety of rental companies. The development of such homogenized portable systems has been imperative over the past two decades because of touring's logistical considerations. The challenge to these sound company system designers was to assemble hardware rigs that were flexible enough to present all styles of music to large audiences in different cities every night.

As rock-and-roll (and its use in such mainstream entertainment artforms as the Ice Capades or Alvin & the Chipmunks on tour) has finally made an impact on the management staffs and financial controllers for major-city entertainment venues, some thought is being given by facility owners to the subject of sound in their respective buildings. In many arenas today, rock (and popular music in general) concert events contribute a larger portion to the annual gross profit totals than do the professional sporting events for which the venues were originally designed. Unfortunately, many of the arenas and auditoriums in use for today's major music events have acoustical characteristics (loosely defined) that are essentially suited to hockey matches or basketball games than to the music of Kenny Rogers, Pat Benatar or Motley Crue...all of whom can contribute a significant amount of income to those same buildings.

While some arenas are notable for acoustics that actually help the live concert ambience instead of hinder it; many touring sound system technicians list such buildings as the Meadowlands Arena in New Jersey; Market Square Arena in Indianapolis; and The Summit in Houston as favorable concert venues. On the other side of the coin, such buildings as the Boston Gardens in Boston; Kiel Auditorium in St. Louis; and the Spectrum in Philadelphia have traditionally presented touring sound crews with major acoustical challenges.

Many venue management executives

Concert-goers are becoming used to hearing better-quality concert audio than in recent years.

are realizing that the 'sound of music' in their buildings is a significant issue that deserves long-term consideration, and some are acting on that new awareness with a dedicated program of acoustical improvements.

Those performance spaces that end up having ideal acoustics for live contemporary music (whether by design or fortunate accident) are often used as a favorite site by entertainers for live album recordings. Oftentimes, these venues are mid-sized buildings in the theater category that were patterned after the popular Vaudeville houses from the earlier part of this century, such as the Fox Theatre in Atlanta. Professionals attempting to make an arena space more attractive to touring musical groups would be well-advised to undertake a dedicated study of such buildings.

Moving the fine-tuning efforts to the loudspeaker arrays is a more labor-intensive process, and can be considerably more difficult from a logistical perspective. Attempting to custom-tailor a hanging loudspeaker array for use in a particular facility can be very time-consuming. Changing the way that large numbers of speaker cabinets and their supportive chain motors and rigging systems are configured each day, in an attempt to optimize the show's sound for that venue on a daily basis, can be difficult. The results can turn out to be marginal, at best, if the system stacking and hanging is done purely on an experimental basis, without a previously-compiled database to rely on that matches different parts of

the speaker arrays to the various seating areas.

In general, however, the trend is to find *more* sound system rental companies with *more* experienced system operators using systems that are *more* phase-coherent and point-source indexed.

When combined with the trend toward *more* improved building acoustics, it is not difficult to see why concert-goers are becoming used to hearing better-quality concert audio than in recent years.

The darker, more shadowy side of this subject, perhaps, is related to sound system abuse and hearing damage. As sound systems become more powerful and building acoustics become more supportive of live music, the potential exists for sound system operators who lack a sensitivity to health and safety-related issues to inflict permanent hearing damage (for both themselves and their audiences) and to shorten their own soundmixing careers in the process.

Jokes are often told in the entertainment business about the manager of a well-known guitarist who used to urge sound company personnel to 'turn it up until it distorts, or you're fired!' Today's concert sound systems have, for the most part, been designed by engineers who have spent decades attempting to *get rid* of that very distortion sought by such persons as the aforementioned manager. As loudspeaker components are developed that are practically impervious to thermal-damage related failure, and amplifiers are brought to market that are limited in their ability to develop high levels of power only by the amperage available in their dedicated electrical circuit, sound systems begin to be assembled that can be used to produce either feelings of pleasure or pain at the eardrums.

Enthusiastic supporters of this musical style seem to have reached a point where the sound and lighting characteristics of the concert event must simulate open-hearth blast furnaces, or volcanic eruptions. While I don't advocate cultural repression or legally-imposed noise level ceilings at concert events, today's musical climate (in at least one part of the youth cultural spectrum) does present a unique challenge and opportunity to sound system designers and operators. How can the live sound industry both serve up the audio experience these concert-goers expect, *and* preserve each human being's fragile hearing mechanisms at the same time?

David Scheirman is REIP's live performance consulting editor and is president of Concert Sound Consultants, Julian, CA.

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Circle (10) on Rapid Facts Card

SPARS On-Line

By Bruce Merley

During the October AES Convention in New York, SPARS hosted a workshop/seminar that explored what we call "The New Recording Studio Business." Gary Helmers, former executive director of SPARS, led the seminar that also featured a distinguished panel of speakers from personal-use studios, specialty "satellite" operations, service facilities and multi-room recording complexes who offered unique insights into the current changes in the audio industry.

It was evident from the outset that we are seeing dramatic changes in our industry, resulting from new, low-cost technology and the introduction of such equipment as MIDI-related devices, sequencers, samplers and personal computers. All facets of the traditional audio industry—from composing and pre-production to audio-for-video post-production—have felt the impact of this revolution in technology.

Once upon a time, the recording studio was a full-service business offering everything the customer required, from microphones and musicians to lacquer pressings and paper sleeves. As services and applications of recording expanded, more specialized facilities evolved and we saw the emergence of record studios, jingle studios, scoring studios, voice-over rooms and so on. Now we live in an environment where the big shops compete with the specialty studios and both are confronted with the competition from a vast array of high-tech boutique businesses that perform digital wizardry in desktop operations.

Those who are willing to breathe the air of change will thrive on the changes to come.

What direction is our industry taking? The impressive number of fairly inexpensive computer-based devices shown this year at AES would seem to imply that the revolution is just beginning. Soon, a totally digital signal path and processing chain will be within the financial reach of most of the "boutique" studios, and hard disk-based editors are no longer solely in the domain of the audio giants. Now, almost anyone can be a composer, player, mixer, producer and

Bruce Merley is president of Clinton Recording Studios, New York and first vice-president of SPARS.

recording engineer. And we'll all become rich and famous, right? Maybe not.

The success rate in the audio industry is on a par with the rest of the business community. The U.S. Small Business Administration is quick to point out that the odds of success in business haven't improved much over the years. It's the same risk it's always been, demanding sharp business sense and finding the right niche at the right time.

The advent of such devices as the sequencer may have been somewhat over-

The competition includes hi-tech businesses that perform digital wizardry in desktop operations.

looked by the fellows who study the forces that cause us to fail or succeed in business. Nevertheless, "The New Recording Studio Business" (as it was designated at the AES/SPARS workshop) is with us now and will continue to evolve rapidly. Those who try to freeze the image of the recording studio will become custodians of a historical oddity and stand a good chance of going bankrupt in the process. Those who are willing to awaken each morning and breathe the air of change will thrive on the dynamic changes to come.

For those of us who choose to explore this uncertain future, whether for love of music, love of money, or both, we need to uncover the resources and information that can lead us to make informed decisions. What technology should we invest in? How can we successfully market our operations? How can we skillfully use the technology and profit from it? These are the key issues, the ones which are increasingly difficult to resolve in the face of technological change.

Communication with colleagues and understanding their individual situations can provide significant insights for the decisions we all must make. Whether we operate recording studios, personal use studios, pre- or post-production facilities, or any other variation on the audio theme, an understanding of other paths and perceptions can illuminate our individual goals.

Often, when I have consulted SPARS colleagues at a time of decision I have been overwhelmed by the advice and

suggestions. Attempting to evaluate the many viewpoints, motivations and experiences can be exasperating. Nevertheless, history has demonstrated that my projections were considerably more accurate as a result of this sharing process.

We recently changed our name from "The Society of Professional Audio Recording Studios" to "The Society of Professional Audio Recording Services." The name change reflects the expansion and diversification of the audio industry, an evolution in which SPARS is participating. In light of our observations of these changes SPARS is expanding the scope of its programs to better serve both the large facilities and the vital community of smaller, more specialized businesses. And, of course, we continue to provide a sensible dialogue between the manufacturers and the community which invests in the new technology.

SPARS represents a broad range of businesses with many common goals—it's an extraordinary resource that deserves continued attention and support. Membership in the organization is one of today's biggest bargains, but then again, it's like a dictionary. If you don't use it, it's worthless. You can find out more about SPARS, and the ways in which we are serving a changing industry, by calling or writing our new Executive Director, Shirley Kaye, at our new national offices:

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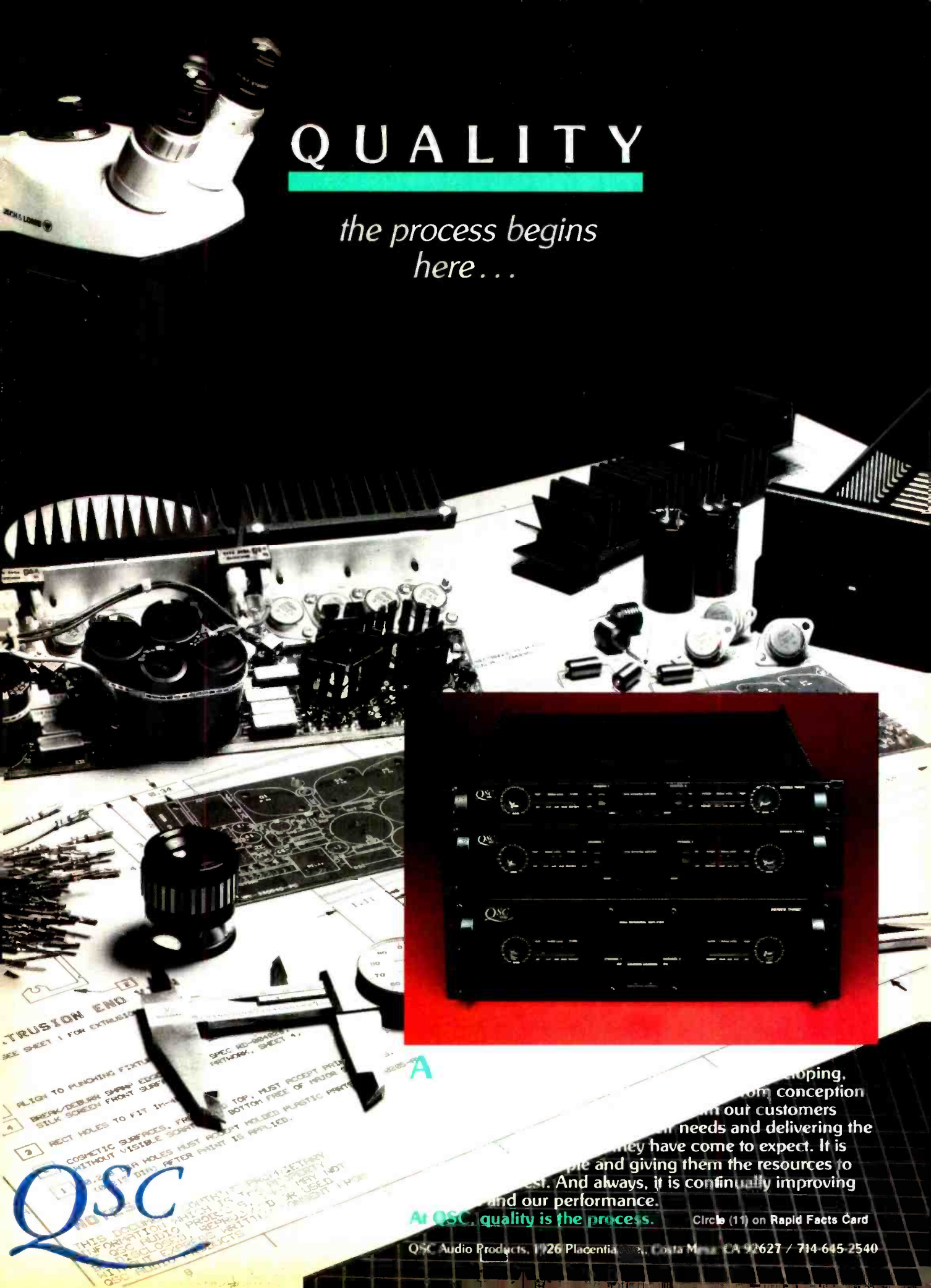
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Film Sound Today

By Larry Blake

In recent years it has become apparent that an extensive, high-quality sound library is the foundation of serious audio post-production for film or video. Every company seems to have a different flow chart from original effects recording to library storage to edited effect. Whatever one's *modus operandi*, it behooves a company to approach the recording, cataloging and storage of sound effects with a great deal of sober thought. What follows are suggestions that might be of some help:

- **Establish technical standards from the outset and stick to them.**

By "standards" I am referring not only to obvious matters such as alignment tapes, but also to microphone and library techniques. (I'll deal with library organization in my January 1988 column; mic'ing was discussed in the July 1987 issue.) The more thought applied in the beginning, the less retracing that has to be done later on to bring the early tapes up to spec.

With regard to technical matters, obtain reproducer alignment tapes when you purchase your first 1/4-inch recorder. Make sure that *your* tape is used to set azimuth and frequency response whenever the machine is serviced. Do the same with *all* your decks and you virtually remove machine alignment from your list of things to check when something doesn't sound right.

The most popular test tapes are composed of separate segments of line-up tones (multifrequency). I don't think this is the most prudent method. First of all, your master tape must be run every time you want to check a machine, although this is slightly helped by purchasing two matched tapes at the same time, storing one as a vault reference.

Instead, I would recommend purchasing full rolls of 1kHz and 10kHz tones for basic level, azimuth and frequency response calibration, along with pink noise or tone sweeps for checking broadband frequency response. You can also add a selected low-frequency tone for keeping an eye on head bumps. Having complete reels of individual signals will allow you to cut off small segments for day-to-day use, comparing them to vault copies.

- **Always be on the alert for neat sounds.**

This can be best expressed by para-

phrasing Murphy's Law: "The nifty squeaky door that you plan to record tomorrow will be oiled today." I would venture to say that the desire to not pass up great sounds is high on the list of reasons that my peers want an R-DAT machine small enough to carry with them all the time.

- **Hire experienced effects recordists.**

Sound effects recording is the most underrated and misunderstood aspect of sound post-production. Right off the bat, many wonder why it is even necessary

The squeaky door you plan to record tomorrow will be oiled today.

to hire an effects recordist when there is such a selection of sounds available on CD, not to mention the hundreds of old effects knocking around any moderate-sized library.

First of all, an experienced recordist will be able to provide you with a custom effect that matches the picture, including the angle and distance between subject and lens (mic). If you need an in, stop, rev, peel out with a '55 Chevy hot rod, *that's* what you get.

While your library grows with first-generation, quality recordings from a variety of subjects, you open yourself up to the serendipity factor. Let's say that you ask the recordist to give you a series of switches for your sci-fi film. While recording the switches on your 1/4-inch deck, he realizes that he can get the sound of gears meshing, needed for another scene, by placing a blank reel partly on the spindle and putting the deck into rewind. Or maybe the recordist just thought that this would be a neat sound, and a few years later someone discovers it in the library. The important thing here, as a friend reminded me, is that effects recordists must be able to think abstractly because very few sounds can be captured as complete, composite effects.

- **Clear vocal slates are essential.**

It is easy to rationalize the lack of a slate by saying, "I didn't have the time," or "the sound is what it is" and can be fully described by a good listen. Among the information that is necessary: subject-mic distance, changes in this take relative to earlier version, and a simply detailed description of what's go-

ing to happen. It is also essential in a multitape series to write on the back of the box the basic contents of each tape, along with the tape number (#1 of 3), date, location, name of recordist, etc. Also, cut the tape off after the last cue when recording on 1/4-inch: it helps the librarian to know exactly how much remains when deciding where to break a sequence.

Most modern libraries are stored on either 1/4-inch tape or PCM-encoded videotape, with either a typewritten or computer-printed log. In short, there's less of a need to be told what the cue is: I just want to *hear* the damn thing.

Cutting on mag is helped by voice slates, whereas laying effects onto a multitrack directly from 1/4-inch requires no need for vocal introductions. Furthermore, one day we will finally edit via computer, with a large sound library on-line or near-line (i.e., stored in a changer). Once a search has been made of the database, and you pick the effect you want, hearing a slate before the sound will be a waste of time.

- **Be prepared.**

While you are establishing your technical standards, you should also organize an accessory bag to go with your recorder. It is frustrating to have to go searching around prior to every session. Among the accessories you should always have with you: gaffer's tape, spare batteries, acoustafoam, cotton swabs, alcohol (in a sturdy glass bottle with dropper), blank tapes, spare empty reel, Swiss Army knife, XLR he-he and she-she sex-change adapters, eye protectors and rugged gloves. If you will be doing a car series, walkie-talkies can help driver and recordist communicate.

When a session is being covered by many recorders, vocal slates with a bullhorn will help doing a bake-off of the different versions. Each cue should be consecutively numbered, with the various mic positions noted on a chart. A multipair XLR-XLR snake is useful in multiple recorder situations when dealing with explosions or live ammunition, when everyone is situated a distance from the mics.

And don't forget to always pack a cheap point-and-shoot camera to visually document your sound expeditions for future generations.

Next month I'll discuss using a computer to organize your library.

REP

Larry Blake is RE/P's film sound consulting editor and works in film sound post-production in Los Angeles. He also writes and publishes books on sound recording.

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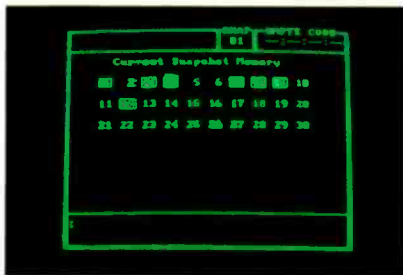
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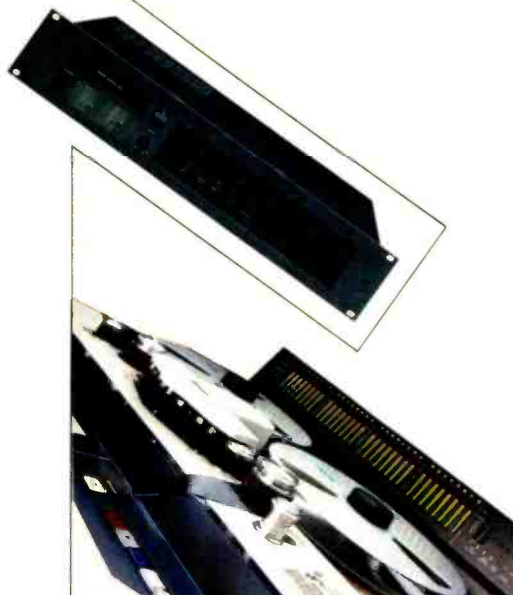
This month, *RE/P* brings you the first annual Buyers' Guide. Three separate categories are featured to provide a complete listing of product categories, manufacturers and dealers/distributors to assist you with the products you need in the pro audio industry.

The Product Directory begins on page 20 and features 68 categories and highlights advertisers' entries in blue, with page numbers for additional information about the product. All manufacturers listed in the Product Directory will also be listed alphabetically in the Manufacturers' Directory, which begins on page 43. The listing includes mailing addresses and telephone numbers. The third directory, the Dealers/Distributors Directory, begins on page 63 and is listed geographically by state. Each listing includes complete addresses, geographical area served and represented products.

The Buyers' Guide was assembled by the *RE/P* staff, who mailed questionnaires to pro audio manufacturers and dealers/distributors. Those companies that returned the questionnaires are listed in the directories. However, some companies and products may not be listed. *RE/P* and Intertec Publishing do not accept responsibility for unreturned questionnaires or for omissions due to incomplete or inaccurate information provided by the companies.

Your company can be included in the 1988 Buyers' Guide by contacting Pat Blanton, directory issues editor, P.O. Box 12901, Overland Park, KS 66212.

- **Product Directory** page 20
- **Manufacturers' Address Directory** page 43
- **Dealer/Distributor Directory** page 63



See Adv. Page

ACOUSTIC DESIGN AND CONSTRUCTION

- Acoustech Corp.
- Acoustic Sciences
- Acoustik Architecture Inc.
- Acoustilog Inc.
- Audio Innovators, Inc. dba Pro Com Systems
- Audio Intervisual Design
- Bertus Productions The Studio
- C&C Consultants
- DeCuir Corp.
- GHL Audio Engineering
- The Joiner Rose Group
- Lakeside Associates
- Menlo Scientific
- Musicians' Service Complex
- Persia Sound Studios
- RPG Diffuser Systems
- Skylabs Inc.
- State of The Art Electronik
- Synergetic Services, Inc.
- Tannoy North America Inc.
- Trax Audio & Music
- UREI
- Westlake Audio** 55

ACOUSTIC TREATMENT MATERIALS

- Acoustic Sciences
- Alpha Audio** 65
- E.A.R.S.
- Menlo Scientific

See Adv. Page

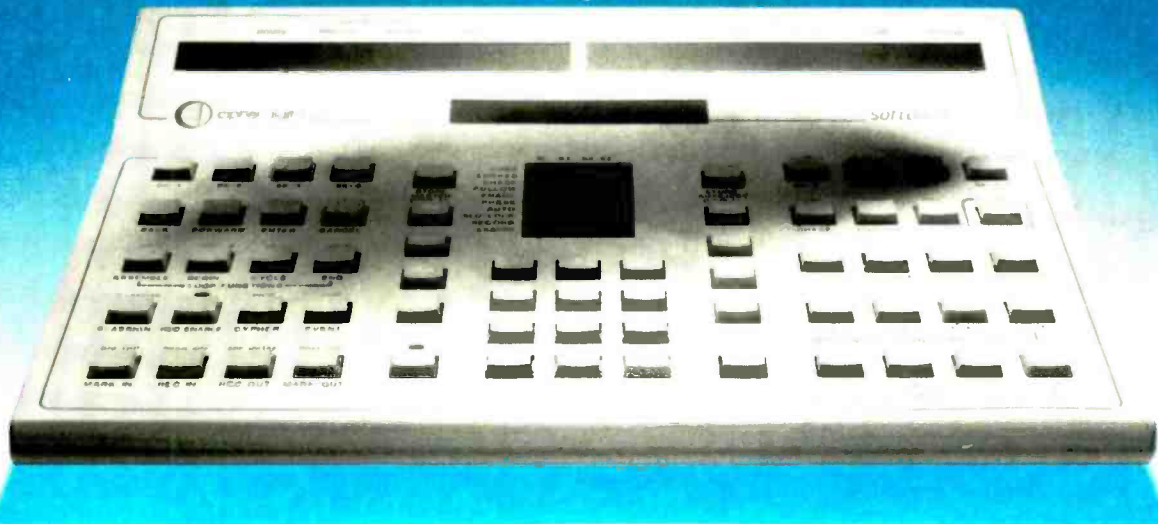
- Nitty Gritty Record Care Products
- Penn Fabrication (NJ) Inc.
- RPG Diffuser Systems
- Trend Textiles
- Velodyne Acoustics

AMPLIFIERS

- Altec Lansing Corp.
- Amplified Music Products Corp.
- AMR (Audio Media Research)
- Analog Systems
- API-Audio Products Inc.
- Ashly Audio
- Audix
- Benchmark Media Systems, Inc.
- BGW Systems Inc.
- Biamp Systems
- Boulder Amplifiers Silver Lake Research
- Broadcast Audio Corp.
- Carver Corp.** 51
- Celestion Industries, Inc. C-Audio
- Cetec Ivie
- Crate
- Crown International Inc.
- Dax Audio Group, Inc.
- dbx, A Div. of BSB N.A. Ltd.
- D&R Electronics** 71
- Electro-Voice** 23.33
- FM Acoustics USA
- Focusrite US Ltd.
- Fostex Corp. of America** 53
- Galaxy Audio
- Gentner Electronics Corp.** 79

See Adv. Page

- Gotham Audio Corp.
- David Hafler Co.
- HEDCO
- Hill Audio
- HM Electronics, Inc.
- Industrial Research Products
- Innovative Electronic Designs
- JBL Professional** 5
- Kitty Hawk
- KMD Sound Electronics
- Korg USA Inc.
- Kustom Music, Inc.
- Lectrosomics Inc.
- Leitch Video of America Inc.
- Lenco, Inc.** 46
- LP Music Group
- McCurdy Radio Industries Ltd.
- Meyer Sound Labs, Inc.
- Mitsubishi Pro Audio Group
- Norton Associates Inc.
- Numark Electronics
- Opamp Labs, Inc.
- Paso Sound Products Inc.
- Peavey Electronics** 31
- ProTech Audio Corp.**
- QSC Audio Products** 17
- Ramsa/Panasonic
- Rane Corp.** 73
- Renkus-Heinz, Inc.
- Roh Div. of Anchor Audio, Inc.
- Roland Corp. US
- Ross Systems Div. of IMC
- RTS Systems, Inc.
- SCS/Sound Code Systems
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	See Adv. Page
Shure Brothers Inc.	
Sony Communications Products Co.	
Soundcraftsmen	
Spectra Sonics/Spectra Sound	
Stanton Magnetics Inc.	95
Steven Electronics	
Straight Wire Audio Inc.	
Studer Revox America	BC
Sunn Pro Sound	
Symetrix Inc.	
Tannoy North America Inc.	
TASCAM, Teac Corp. of America	7
Technics	
3M Broadcasting & Related Products	
Times One	
TOA Electronics, Inc.	
Trax Audio & Music	
UREI	
Video Accessory Corp.	
Ward-Beck Systems Ltd.	
Wersi Electronics	
Yamaha Music Corp., USA Pro Audio Div.	41

CABLE AND CONNECTORS

ADC Telecommunications	
AKG Acoustics Inc.	45
Audio Intervisual Design	
Audio Services Corp.	
Aura Sonic Ltd.	
Beyer Dynamic Inc.	
Bi-Tronics Inc.	
Boulder Amplifiers Silver Lake Research	
Canare Cable Inc.	99
Connectronics Corp.	
FM Acoustics USA	
Furman Sound, Inc.	
Gotham Audio Corp.	
KMD Sound Electronics	
Meyer Sound Labs, Inc.	
Micro-Point Inc.	93
Mogami Product Div. Marshall Electronics, Inc.	
The Music People, Inc.	
Numark Electronics	
Renkus-Heinz, Inc.	
Shure Brothers Inc.	
S.I.L.I. Sano International Ltd. Inc.	
Switchcraft, Inc.	39
Synergetic Services, Inc.	
TASCAM, Teac Corp. of America	7
Whirlwind Interface International Inc.	
Wireworks Corp.	
Zeus Light & Sound Co.	

CASES, EQUIPMENT

J.C. Anglum Co. Inc.	
A&S Case Co.	
Dago Cases	
DeCuir Corp.	
Four Designs Co.	
Gabriel Sound	
Jan-Al Cases	
KMD Sound Electronics	
The Mitek Group	
Pacific Wood Works	
Peavey Electronics	31

	See Adv. Page
Professional Audio Systems	47
Renkus-Heinz, Inc.	
Stagehand Mfg.	
Star Case	
Thermodyne International	67
Top Notch Audio (TNA Case Co.)	
Zeus Light & Sound Co.	

COMPACT DISC PLAYERS

Carver Corp.	51
dbx, A Div. of BSB N.A. Ltd.	
Gotham Audio Corp.	
Kenwood USA Corp.	
Numark Electronics	
Paso Sound Products Inc.	
Shure Brothers Inc.	
Sony Communications Products Co.	
Straight Wire Audio Inc.	
Studer Revox America	BC
TASCAM, Teac Corp. of America	7
Technics	

COMPRESSORS

Advanced Music Systems/Calrec	
Alesis	
Altec Lansing Corp.	
AMR (Audio Media Research)	
Aphex Systems Ltd.	61
API-Audio Products Inc.	
Ashly Audio	
Audio Logic	
Aura Sonic Ltd.	
Beyer Dynamic Inc.	
BSS Audio Ltd.	
Cetec Ivie	
Circuit Research Labs, Inc.	
Crate	
dbx, A Div. of BSB N.A. Ltd.	
Delta Electronics Inc.	
DOD Electronics Corp.	
Dorrrough Electronics	
D&R Electronics	71
Drew Engineering Co.	
Focusrite US Ltd.	
Fostex Corp. of America	53
Furman Sound, Inc.	
Innovative Electronic Designs	
Inovonics Inc.	
JBL Professional	5
Klark-Teknik	19.59
Lexicon Inc.	
Mitsubishi Pro Audio Group	
The Music People, Inc.	
Musically Intelligent Devices	68
Opamp Labs, Inc.	
Orban Associates	
ProTech Audio Corp.	
Rane Corp.	73
Rocktron Corp.	
Roland Corp. US	
Ross Systems Div. of IMC	
S.E.M. Co.	
Shure Brothers Inc.	
Spectra Sonics/Spectra Sound	
Summit Audio Inc.	
Symetrix Inc.	
UREI	

	See Adv. Page
Valley International, Inc.	
Wheatstone Broadcast Group	
Yamaha Music Corp., USA Pro Audio Div.	41

CONNECTORS

ADC Telecommunications	
AKG Acoustics Inc.	45
Aura Sonic Ltd.	
Bi-Tronics Inc.	
Canare Cable Inc.	99
Connectronics Corp.	
Four Designs Co.	
KMD Sound Electronics	
LP Music Group	
Mogami Product Div. Marshall Electronics, Inc.	
The Music People, Inc.	
Paso Sound Products Inc.	
Penn Fabrication (NJ) Inc.	
Rane Corp.	73
Shure Brothers Inc.	
S.I.L.I. Sano International Ltd. Inc.	
Switchcraft, Inc.	39
Whirlwind Interface International Inc.	
Wireworks Corp.	

CONSOLES, AUTOMATION SYSTEMS

Advanced Music Systems/Calrec	
ANT Telecommunications Inc.	
API-Audio Products Inc.	
Audio Kinetics Ltd.	76
Auditronics Inc.	
Broadcast Electronics	
Calrec Audio Ltd. (Calrec by AMS)	
Clarity	
CMX Corp.	
J.L. Cooper Electronics	94
Digital Creations Corp.	
D&R Electronics	71
Editron USA Inc.	
GML, Inc. George Massenburg Labs.	89
IMC/Akai Professionals	
Klark-Teknik	19.59
McCurdy Radio Industries Ltd.	
Mitsubishi Pro Audio Group	
Musically Intelligent Devices	68
Rupert Neve Inc.	13
Ocean Audio Exchange	
Orion Reseach	
Solid State Logic	1FC-1
Soundcraft USA	
Soundtracs	
Studer Revox America	BC
Studio Master Systems	
Touch Technologies, Inc.	
Trident Audio USA	9
Ward-Beck Systems Ltd.	

CONSOLES, DIGITAL

Advanced Music Systems/Calrec	
Akai Div. of IMC	
Amek/TAC	27
ANT Telecommunications Inc.	



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Drums, cymbals, brass and woodwind, and even voice applications. The N/D408 and N/D308 instrument mics do it all.

We designed them as instrument mics, but believe it or not we're also getting great response from vocal performers who think they're fantastic.

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Try them at your Electro-Voice dealer and in concert. Then let us know what you think.



To learn more about N/D Series microphones, see your Electro-Voice dealer or write Electro-Voice, Inc., Dept. N, 600 Cecil Street, Buchanan, MI 49107.

*Actual N/D408, 308 user comments are kept on file at the Electro-Voice Corporate headquarters in Buchanan, Michigan.

Circle (14) on Rapid Facts Card

	See Adv. Page
Calrec Audio Ltd. (Calrec by AMS)	
CompuSonics Corp.	
Gotham Audio Corp.	
IMC/Akai Professionals	
Rupert Neve Inc.	13
Soundtracs	
Trident Audio USA	9
Yamaha Music Corp., USA Pro Audio Div.	41

CONSOLES, FADERS

Advanced Music Systems/Calrec	
ANT Telecommunications Inc.	
API-Audio Products Inc.	
Auditronics Inc.	
Broadcast Audio Corp.	
Broadcast Electronics	
D&R Electronics	71
McCurdy Radio Industries Ltd.	
Mitsubishi Pro Audio Group	
Rupert Neve Inc.	13
Ward-Beck Systems Ltd.	

CONSOLES, PORTABLE

ADM Technology Inc.	
Advanced Music Systems/Calrec	
Allen & Heath Brenell USA Ltd.	
Amek/TAC	27
ANT Telecommunications Inc.	
Audio Logic	
Audio Services Corp.	
Audio-Technica US, Inc.	
Broadcast Audio Corp.	
Broadcast Electronics	
Calrec Audio Ltd. (Calrec by AMS)	
Connectronics Corp.	
Design Direct Sound	
DOD Electronics Corp.	
D&R Electronics	71
E.A.R.S.	
Electro-Voice	23.33
Fostex Corp. of America	53
Furman Sound, Inc.	
Gotham Audio Corp.	
Hill Audio	
Hi-Tech Audio	
Howe Technologies Corp.	
JBL Professional	5
Rupert Neve Inc.	13
Numark Electronics	
Peavey Electronics	31
Precision Design	
Ramsa/Panasonic	
Ross Systems Div. of IMC	
Shure Brothers Inc.	
Soundcraft USA	
Soundtracs	
Spectra Sonics/Spectra Sound	
Star Case	
Studer Revox America	BC
Trident Audio USA	9
Ward-Beck Systems Ltd.	
Yamaha Music Corp., USA Pro Audio Div.	41

CONSOLES, RECORDING AND PRODUCTION

ADM Technology Inc.	
Advanced Music Systems/Calrec	
Akai Div. of IMC	
Allen & Heath Brenell USA Ltd.	
Amek/TAC	27
AMR (Audio Media Research)	
ANT Telecommunications Inc.	
API-Audio Products Inc.	
Audio Logic	
Auditronics Inc.	
The Bertech Organization	
Bertus Productions The Studio	
Biamp Systems	
Broadcast Audio Corp.	
Calrec Audio Ltd. (Calrec by AMS)	
Centro Corp.	
CompuSonics Corp.	
Connectronics Corp.	
Dax Audio Group, Inc.	
DDA	
Design Direct Sound	
DOD Electronics Corp.	
D&R Electronics	71
Electro-Voice	23.33
Focusrite US Ltd.	
Fostex Corp. of America	53
Gotham Audio Corp.	
Hill Audio	
Howe Technologies Corp.	
JBL Professional	5
Klark-Teknik	19.59
Mitsubishi Pro Audio Group	
Neotek	
Rupert Neve Inc.	13
Ocean Audio Exchange	
Opamp Labs, Inc.	
Orion Reseach	
Quantum Audio Labs	60
Radio Systems, Inc.	
Ramsa/Panasonic	
Rane Corp.	73
Ross Systems Div. of IMC	
Solid State Logic	IFC-1
Sony Communications Products Co.	
Sound Workshop Pro Audio Products, Inc.	
Soundcraft USA	
Soundtracs	
Spectra Sonics/Spectra Sound	
Studer Revox America	BC
TASCAM, Teac Corp. of America	7
Trident Audio USA	9
Voice Over L.A., Inc.	
Ward-Beck Systems Ltd.	
Wheatstone Broadcast Group	
Yamaha Music Corp., USA Pro Audio Div.	41

CONSOLES, SOUND REINFORCEMENT

Allen & Heath Brenell USA Ltd.	
Altec Lansing Corp.	
Amek/TAC	27
Audio Logic	
Beyer Dynamic Inc.	
Biamp Systems	

Broadcast Electronics	
Connectronics Corp.	
Crate	
Dax Audio Group, Inc.	
DDA	
DeCuir Corp.	
Design Direct Sound	
DOD Electronics Corp.	
Dorrrough Electronics	
D&R Electronics	71
Electro-Voice	23.33
Galaxy Audio	
Jim Gamble Associates	
Hill Audio	
Hi-Tech Audio	
Innovative Electronic Designs	
JBL Professional	5
Klark-Teknik	19.59
Mitsubishi Pro Audio Group	
Neotek	
Rupert Neve Inc.	13
Numark Electronics	
Peavey Electronics	31
Ramsa/Panasonic	
Rane Corp.	73
Ross Systems Div. of IMC	
Shure Brothers Inc.	
Soundcraft USA	
Soundtracs	
Spectra Sonics/Spectra Sound	
Steven Electronics	
Sunn Pro Sound	
TASCAM, Teac Corp. of America	7
TOA Electronics, Inc.	
Trident Audio USA	9
Ward-Beck Systems Ltd.	
Wheatstone Broadcast Group	
Yamaha Music Corp., USA Pro Audio Div.	41

CROSSOVERS AND FREQUENCY DIVIDERS

Acoustech Corp.	
Altec Lansing Corp.	
Amek/TAC	27
Ashly Audio	
Audio Control Industrial	70
Audio Logic	
Audix	
Audra International	
Aura Sonic Ltd.	
BGW Systems Inc.	
Biamp Systems	
BSS Audio Ltd.	
Carver Corp.	51
Cetec Ivie	
Crate	
Dax Audio Group, Inc.	
DOD Electronics Corp.	
Electro-Voice	23.33
Emilar Corp.	
FM Acoustics USA	
Fostex Corp. of America	53
Furman Sound, Inc.	
Gold Line	
Hill Audio	
JBL Professional	5
Klark-Teknik	19.59
Martin America	

THE IEQ WITH Smartcurve™

Not Just Another Programmable Equalizer With MIDI™

The IEQ with Smartcurve™ is a programmable, high performance graphic equalizer that includes a video output. For those who wish to enjoy the video output of the EQ, ART makes the IEQ Video Monitor.* Smartcurve™, proprietary software developed by ART gives you instant actual frequency response as easy as the push of a button.

The IEQ Family consists of both the 2/3 octave and the 1/3 octave graphic equalizers. Both types come in two varieties: Controllers and Satellites. A Controller is a self-contained programmable intelligent graphic equalizer capable of controlling 15 satellites at once. EQ Satellites are exactly the same unit except the front panel controls are eliminated.

EQ Model Specifications:

Controller & Satellite

- 128 battery backed presets
- MIDI
- Frequency Response
20Hz-20kHz ± 0.5 dB
- THD $\leq 0.005\%$ @ 1kHz 0dBm typical
- Dynamic Range ≥ 100 dB typical
- Balanced inputs and outputs

IEQ Video Monitor Features

- 19" rack mountable
- NTSC compatible monochrome monitor
- 4 Selectable inputs
- Standard RCA jacks for easy connections

It Has To Be A Work Of . . .

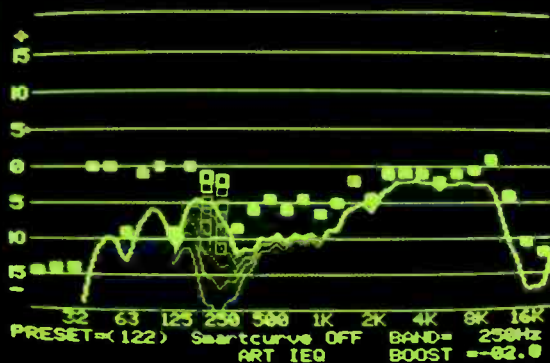
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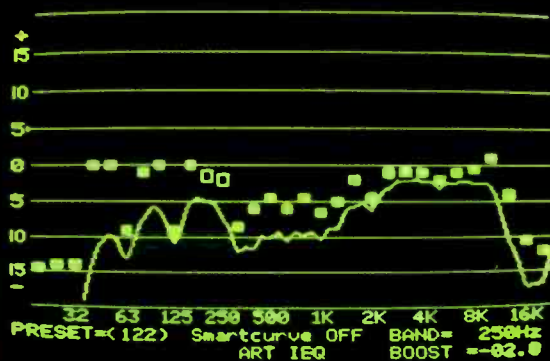
For more information see your local dealer.

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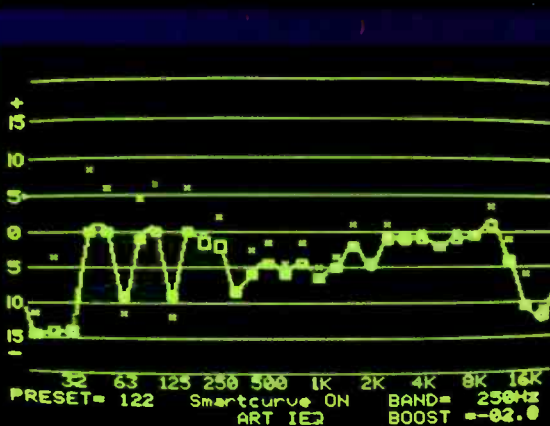
1 See the Sound

This is a video output of the IEQ as the unit is being adjusted. The sliders can be moved ± 15 dB in 1/2dB steps to get the exact response you need. With the simple push of a button, complex equalization can be done in seconds with incredible accuracy.



2 Hear the Sound

The power of the IEQ readily becomes apparent as the video display plots the frequency response due to the slider settings. The IEQ offers high quality constant "Q" equalization. The video graphic display shows the correlation between the sliders and the frequency response.



3 Perfect Sound

Turn Smartcurve™ on and perfect equalization is at your fingertips. Note the difference between the second frame, (Smartcurve™ OFF) and this frame. The position of the sliders represent the actual frequency response of the EQ. Interaction between bands is virtually eliminated. Incredible! Just think, now when you adjust the EQ you get exactly what you need. The "perfect" EQ? Let your eyes and ears decide.



	See Adv. Page
Numark Electronics	
Peavey Electronics	31
Professional Audio Systems	47
Rane Corp.	73
Renkus-Heinz, Inc.	
Ross Systems Div. of IMC	
S.E.M. Co.	
Sound Concepts Inc.	
State of The Art Elektronik	
Sunn Pro Sound	
Tannoy North America Inc.	
TOA Electronics, Inc.	
Trax Audio & Music	
UREI	
Westlake Audio	55
Wheatstone Broadcast Group	
Yamaha Music Corp., USA Pro Audio Div.	41

DELAYS

ADA Signal Processors, Inc.	
Advanced Music Systems/Calrec	
Akai Div. of IMC	
AKG Acoustics Inc.	45
AMR (Audio Media Research)	
Applied Research & Technology, Inc.	25
Audio/Digital Inc.	
Audio Logic	
Aura Sonic Ltd.	
DigiTech	
DOD Electronics Corp.	
Eventide, Inc.	
Fostex Corp. of America	53
Gotham Audio Corp.	
Industrial Research Products	
JBL Professional	5
Klark-Teknik	19.59
Korg USA Inc.	
Lexicon Inc.	
LP Music Group	
McCurdy Radio Industries Ltd.	
The Music People, Inc.	
Numark Electronics	
Peavey Electronics	31
Publison America, Inc.	
Rocktron Corp.	
Roland Corp. US	
S.E.M. Co.	
Sound Concepts Inc.	
Spectra Sonics/Spectra Sound	
T C Electronic America	
TOA Electronics, Inc.	
UREI	
Yamaha Music Corp., USA Pro Audio Div.	41

DISC-MASTERING SYSTEMS

Calrec Audio Ltd. (Calrec by AMS)	
CBS Records Group CBS, Inc.	
CompuSonics Corp.	
D&G Mastering	
Diskmakers	
Future Disc Systems	40
Gotham Audio Corp.	
Sony Communications Products Co.	
Sound Technique Inc.	

DRUM MACHINES

	See Adv. Page
Akai Div. of IMC	
Alesis	
Aura Sonic Ltd.	
Casio, Inc.	
Drumware, Inc.	
IMC/Akai Professionals	
Korg USA Inc.	
The Music People, Inc.	
Oberheim-ECC	
Roland Corp. US	
Sequential Circuits	
Simmons Electronics (USA) Inc.	
Wersi Electronics	

EDITING SYSTEMS, DIGITAL

Advanced Music Systems/Calrec	
Alpha Audio	65
Calrec Audio Ltd. (Calrec by AMS)	
Cipher Digital, Inc.	21
CMX Corp.	
Coherent Communications Inc.	
CompuSonics Corp.	
Fairlight Instruments, Inc.	
For-A Corp. of America	
IMC/Akai Professionals	
Integrated Media Systems, Inc.	
Lexicon Inc.	
Mark of the Unicorn	
Mitsubishi Pro Audio Group	
New England Digital Corp.	
Northeastern Digital Recording	
Publison America, Inc.	
Soundmaster International Inc.	

EDUCATIONAL COURSES AND PROGRAMS

Audio Express Div. Worldwide Communications	
Berklee College of Music Music Production & Engineering	
CareerTrack Publications, Inc.	
First Light Video	
Five Towns College	
Full Sail Center for the Recording Arts	
Institute of Audio-Video Engineering	
Menlo Scientific	
UCLA Extension Professional Designation in Recording Eng.	

EQUALIZERS, GRAPHIC

ADA Signal Processors, Inc.	
Alesis	
Altec Lansing Corp.	
API-Audio Products Inc.	
Applied Research & Technology, Inc.	25
Ashly Audio	
Audio Logic	
Aura Sonic Ltd.	
Biamp Systems	
Cetec Ivie	
Dax Audio Group, Inc.	
dbx, A Div. of BSB N.A. Ltd.	

	See Adv. Page
DOD Electronics Corp.	
Electro-Voice	23,33
Fostex Corp. of America	53
Furman Sound, Inc.	
IMC/Akai Professionals	
Industrial Research Products	
JBL Professional	5
Klark-Teknik	19.59
KMD Sound Electronics	
Korg USA Inc.	
LP Music Group	
McCurdy Radio Industries Ltd.	
MicroAudio	75
Mitsubishi Pro Audio Group	
The Music People, Inc.	
Musically Intelligent Devices	68
Numark Electronics	
Orban Associates	
Paso Sound Products Inc.	
Peavey Electronics	31
Ramsa/Panasonic	
Rane Corp.	73
Ross Systems Div. of IMC	
Scantek, Inc.	
S.E.M. Co.	
Sony Communications Products Co.	
Soundcraftsmen	
Spectra Sonics/Spectra Sound	
Steven Electronics	
Sunn Pro Sound	
TASCAM, Teac Corp. of America	7
T C Electronic America	
Technics	
TOA Electronics, Inc.	
UREI	
Wheatstone Broadcast Group	
White Instruments Div. C Van R, Inc.	
Yamaha Music Corp., USA Pro Audio Div.	41

EQUALIZERS, PARAMETRIC

AMR (Audio Media Research)	
API-Audio Products Inc.	
Ashly Audio	
Audio Logic	
Beyer Dynamic Inc.	
BGW Systems Inc.	
Biamp Systems	
Cetec Ivie	
dbx, A Div. of BSB N.A. Ltd.	
DOD Electronics Corp.	
D&R Electronics	71
Electro-Voice	23,33
Focusrite US Ltd.	
Furman Sound, Inc.	
IMC/Akai Professionals	
JBL Professional	5
Klark-Teknik	19.59
McCurdy Radio Industries Ltd.	
Meyer Sound Labs, Inc.	
Mitsubishi Pro Audio Group	
Musically Intelligent Devices	68
Orban Associates	
Paso Sound Products Inc.	
Rane Corp.	73
Rocktron Corp.	
Roland Corp. US	
S.E.M. Co.	
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Sunset Sound/6650 Sunset Blvd., Hollywood, Ca 90028

AMEK APC 1000 — COURTESY OF STUDIO JIVE, TOKYO.

“We are very proud to have acquired the new AMEK APC 1000 digitally-assignable console with GML automation. Though this marks a distinctive change from our history of designing and building our own consoles, we believe that AMEK has provided us with a revolutionary product that will maintain our reputation for superior signal integrity and sonic excellence.”

TUTTI and PAUL CAMARATA, Sunset Sound

Congratulations, Sunset!



AMEK APC 1000



GEORGE MASSENBURG LABS
Circle (16) on Rapid Facts Card



Head Office, Factory and Sales:
AMEK Systems and Controls Ltd.
New Islington Mill, Regent Trading Estate,
Oldfield Road, Salford M5 4SX, England.
Telephone: 061-834 6747. Telex: 668127.
Fax: 061-834 0592.

In the USA: AMEK Controls Inc.
10815 Burbank Blvd, North Hollywood, CA 91601.
Telephone: 818/508 9788. Telex: 662526.
AMEK USA E-MAIL: AMEK US.
Fax: 818/508 8619.

See Adv. Page

See Adv. Page

See Adv. Page

Steven Electronics
Summit Audio Inc.
Sunn Pro Sound
Symetrix Inc.
TASCAM. Teac Corp. of America 7
T C Electronic America
TOA Electronics, Inc.
UREI
Valley International, Inc.
Ward-Beck Systems Ltd.
Wheatstone Broadcast Group
Yamaha Music Corp., USA Pro Audio Div. 41

EXPANDERS

Aphex Systems Ltd. 61
Ashly Audio
Audio Logic
dbx, A Div. of BSB N.A. Ltd.
Delta Electronics Inc.
D&R Electronics 71
Drew Engineering Co.
Furman Sound, Inc.
Gotham Audio Corp.
Korg USA Inc.
Kurzweil Music Systems, Inc. 37
Lexicon Inc.
Mitsubishi Pro Audio Group
Rane Corp. 73
Simmons Electronics (USA) Inc.
T C Electronic America
Valley International, Inc.

FADERS

API-Audio Products Inc.
Audio Kinetics Ltd. 76
D&R Electronics 71
McCurdy Radio Industries Ltd.
Roland Corp. US
S.E.M. Co.
Ward-Beck Systems Ltd.

HEADPHONES, HEADSETS AND INTERCOM SYSTEMS

AKG Acoustics Inc. 45
Anchor Audio, Inc.
Atlas/Soundolier 43
Audio-Technica US, Inc.
Beyer Dynamic Inc.
Cetec Vega
Electro-Voice 23,33
Fostex Corp. of America 53
Gentner Electronics Corp. 79
HM Electronics, Inc.
Korg USA Inc.
McCurdy Radio Industries Ltd.
The Music People, Inc.
Nady Systems, Inc.
Nakamichi America Corp. 29
Numark Electronics
Paso Sound Products Inc.
Rane Corp. 73
Roh Div. of Anchor Audio, Inc.
Roland Corp. US
RTS Systems, Inc.
Sawyer Camera & Video Co.

Sennheiser Electronics
Shure Brothers Inc.
Sony Communications Products Co.
Stanton Magnetics Inc. 95
Swintek Enterprises
TASCAM. Teac Corp. of America 7
Technics
Telex Communications, Inc. 57
TOA Electronics, Inc.
Ward-Beck Systems Ltd.

LEASING AND RENTAL EQUIPMENT

Akashic Records Group
American Multimedia, Inc. Concept Design
Associated Sound
Astra Services
A/T Scharff Rentals
Audio Innovators, Inc. dba Pro Com Systems
Audio Rents, Inc.
Audio Services Corp.
Audiorent
Aura Sonic Ltd.
Bertus Productions The Studio
C.M.S. Digital, Inc.
DeCuir Corp.
Digital Dispatch, Inc.
Eastern Standard Productions, Inc.
Eventide, Inc.
Hi-Tech Audio
Mitsubishi Pro Audio Group
Gary Raymond Sound Systems
Scantek, Inc.
Southern Thunder Sound Inc. 70
Zeus Light & Sound Co.

LIBRARIES, MUSIC PRODUCTION

Associated Production Music
Bertus Productions The Studio
CompuSonics Corp.
DeWolfe Music Library, Inc.
Dimension Music & Sound Effects 65
Fairlight Instruments, Inc.
Leonardo Software
Manhattan Production Music
Musicworks
Network Production Music, Inc.
Oberheim-ECC
Omnimusic
Bill Rase Productions, Inc.
SoperSound 97
Studio Digital Samples
Valentino, Inc. 102

LIBRARIES, SOUND EFFECTS

Bertus Productions The Studio
CompuSonics Corp.
DeWolfe Music Library, Inc.
Dimension Music & Sound Effects 65
Fairlight Instruments, Inc.
IMC/Akai Professionals

Leonardo Software
Network Production Music, Inc.
Oberheim-ECC
Bill Rase Productions, Inc.
Studio Digital Samples
Valentino, Inc. 102
Voice Over L.A., Inc.

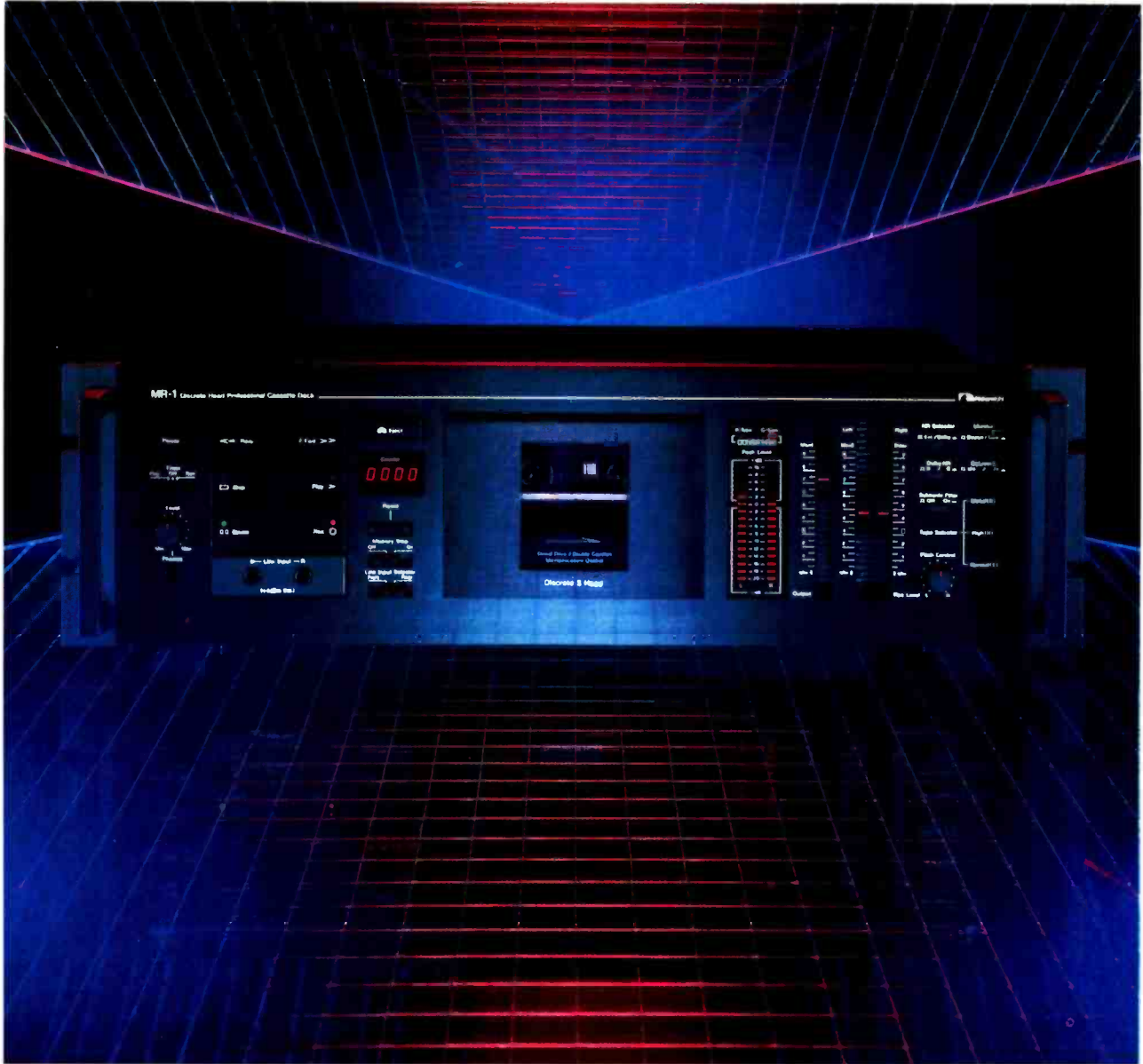
LIGHTING EQUIPMENT

Fidelipac Corp.
Littlite/CAE Inc. 64
LP Music Group
The Music People, Inc.
Penn Fabrication (NJ) Inc.
Gary Raymond Sound Systems
Spectrum Design & Development, Inc.
Sunn Pro Sound
Ultimate Support

LIMITERS

Alesis
Altec Lansing Corp.
Aphex Systems Ltd. 61
Ashly Audio
Audio Logic
Aura Sonic Ltd.
Beyer Dynamic Inc.
Biamp Systems
Broadcast Electronics
BSS Audio Ltd.
Carver Corp. 51
Cetec Ivie
Circuit Research Labs, Inc.
Delta Electronics Inc.
DOD Electronics Corp.
Dorrrough Electronics
D&R Electronics 71
Drew Engineering Co.
Eventide, Inc.
Focusrite US Ltd.
Furman Sound, Inc.
Gold Line
Gotham Audio Corp.
Industrial Research Products
Inovonics Inc.
JBL Professional 5
Klark-Teknik 19,59
Korg USA Inc.
Martin America
McCurdy Radio Industries Ltd.
Mitsubishi Pro Audio Group
Musically Intelligent Devices 68
Opamp Labs, Inc.
Orban Associates
ProTech Audio Corp.
Publison America, Inc.
Rane Corp. 73
Roland Corp. US
Ross Systems Div. of IMC
S.E.M. Co.
Spectra Sonics/Spectra Sound
Summit Audio Inc.
Symetrix Inc.
UREI
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Ward-Beck Systems Ltd.
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Circle (17) on Rapid Facts Card

	See Adv. Page
Yamaha Music Corp., USA Pro Audio Div.	41

LOUDSPEAKERS, COMPONENT

Acoustech Corp.	
Altec Lansing Corp.	
ANT Telecommunications Inc.	
Atlas/Soundolier	43
Audio Analysts USA Inc.	
Audix	
Audra International	
Auratone Corp.	
Bag End/Mitek	
Beyer Dynamic Inc.	
Celestion Industries, Inc. C-Audio	
Cetec Gauss	69
Community Light & Sound, Inc.	77
dbx, A Div. of BSB N.A. Ltd.	
Design Direct Sound	
Electro-Voice	23,33
Emilar Corp.	
Fostex Corp. of America	53
Galaxy Audio	
HRC Magnetics	
JBL Professional	5
McCurdy Radio Industries Ltd.	
MISCO/Minneapolis Speaker Co.	
The Mitek Group	
Mitsubishi Pro Audio Group	
Musicians' Service Complex	
Pacific Wood Works	
Paso Sound Products Inc.	
Peavey Electronics	31
Professional Audio Systems	47
Ramsa/Panasonic	
Red Acoustics (USA) Ltd.	
Renkus-Heinz, Inc.	
Sammi Sound Technology	
Scantek, Inc.	
Shure Brothers Inc.	
S.I.L.I. Sano International Ltd. Inc.	
Tannoy North America Inc.	
Technics	
TOA Electronics, Inc.	

LOUDSPEAKERS, SOUND REINFORCEMENT

Acoustical Physics Lab	
Altec Lansing Corp.	
Amplified Music Products Corp.	
Anchor Audio, Inc.	
ANT Telecommunications Inc.	
Apogee Sound	
Atlas/Soundolier	43
Audio Analysts USA Inc.	
Audix	
Auratone Corp.	
Bag End/Mitek	
Beyer Dynamic Inc.	
CBS Records Group CBS, Inc.	
Celestion Industries, Inc. C-Audio	
Cerwin-Vega Inc.	
Cetec Gauss	69
Community Light & Sound, Inc.	77
Crate	
Cyber-Kinetek Systems, Inc.	

dbx, A Div. of BSB N.A. Ltd.	
DeCuir Corp.	
Design Direct Sound	
Eastern Acoustic Works	
Electro-Voice	23,33
Emilar Corp.	
Fostex Corp. of America	53
Frazier	
Gabriel Sound	
Galaxy Audio	
Hill Audio	
Intersonics, Inc. ServoDrive	
JBL Professional	5
Klipsch & Associates, Inc.	
KMD Sound Electronics	
Kustom Music, Inc.	
Martin America	
McCurdy Radio Industries Ltd.	
Meyer Sound Labs, Inc.	
The Mitek Group	
Mitsubishi Pro Audio Group	
The Music People, Inc.	
Musicians' Service Complex	
Numark Electronics	
Paso Sound Products Inc.	
Peavey Electronics	31
Professional Audio Systems	47
Pyramid Audio Inc.	
Ramsa/Panasonic	
Red Acoustics (USA) Ltd.	
Renkus-Heinz, Inc.	
Ross Systems Div. of IMC	
Sammi Sound Technology	
Shure Brothers Inc.	
S.I.L.I. Sano International Ltd. Inc.	
Sonic Systems Inc.	
Spectra Sonics/Spectra Sound	
Stagehand Mfg.	
Sunn Pro Sound	
Tannoy North America Inc.	
3M Broadcasting & Related Products	
TOA Electronics, Inc.	
Top Notch Audio (TNA Case Co.)	
Trax Audio & Music	
Turbosound Inc.	
Wersi Electronics	
Yamaha Music Corp., USA Pro Audio Div.	41
Zeus Light & Sound Co.	

LOUDSPEAKERS, STUDIO MONITORING

Acoustech Corp.	
Acoustical Physics Lab	
Altec Lansing Corp.	
AMR (Audio Media Research)	
Anchor Audio, Inc.	
ANT Telecommunications Inc.	
Apogee Sound	
Astra Services	
Audix	
Auratone Corp.	
Bag End/Mitek	
Boston Acoustics, Inc.	
CBS Records Group CBS, Inc.	
Celestion Industries, Inc. C-Audio	
Cerwin-Vega Inc.	
Cetec Gauss	69
Design Direct Sound	
E.A.R.S.	

	See Adv. Page
Electro-Voice	23,33
Emilar Corp.	
Four Designs Co.	
Galaxy Audio	
Gotham Audio Corp.	
IMC/Akai Professionals	
JBL Professional	5
Klark-Teknik	19,59
Klipsch & Associates, Inc.	
KSS Sound	
Lakeside Associates	
Manta Electronics Group	
McCurdy Radio Industries Ltd.	
Meyer Sound Labs, Inc.	
The Mitek Group	
The Music People, Inc.	
Musicians' Service Complex	
Numark Electronics	
OWI Inc.	
Paso Sound Products Inc.	
Professional Audio Systems	47
Ramsa/Panasonic	
Red Acoustics (USA) Ltd.	
Roger Sound Labs	
Ross Systems Div. of IMC	
Sammi Sound Technology	
Sony Communications Products Co.	
Spectra Sonics/Spectra Sound	
State of The Art Electronik	
Studer Revox America	BC
Tannoy North America Inc.	
TASCAM, Teac Corp. of America	7
Technics	
TOA Electronics, Inc.	
Trax Audio & Music	
Westlake Audio	55

MAINTENANCE EQUIPMENT

Apogee Electronics Corp.	
Astra Services	
Black Audio Devices	
BSS Audio Ltd.	
Clean Co.	
Delta Electronics Inc.	
Denecke Inc.	68
Klark-Teknik	19,59
Metro Audio USA	
P.A.S.	
RE Instruments AS	
Sound Technology, Inc.	
Tentel	
Vertigo Recording Services	

MICROPHONE ACCESSORIES

Accurate Sound Corp.	
ACO Pacific Inc.	
AKG Acoustics Inc.	45
Altec Lansing Corp.	
AMR (Audio Media Research)	
Astatic/CTI	
Atlas Soundolier	43
Audio-Technica US, Inc.	
Audix	
Aura Sonic Ltd.	
Beyer Dynamic Inc.	

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Circle (18) on Rapid Facts Card

See Adv. Page	See Adv. Page	See Adv. Page
Black Audio Devices	Yamaha Music Corp., USA Pro Audio Div. 41	MICROPHONES, PRE-AMPLIFIERS
Calrec Audio Ltd. (Calrec by AMS)		ACO Pacific Inc.
Compton Electronics		Altec Lansing Corp.
Countryman Associates Inc. 87	MICROPHONE BOOMS AND STANDS	API-Audio Products Inc.
Crown International Inc.	Accurate Sound Corp.	Audio Engineering Associates
DeCuir Corp.	AKG Acoustics Inc. 45	Auditronics Inc.
Electro-Voice 23,33	Astatic/CTI	Benchmark Media Systems, Inc.
Gotham Audio Corp.	Atlas/Soundolier 43	Beyer Dynamic Inc.
KMD Sound Electronics	Audio-Technica US, Inc.	Calrec Audio Ltd. (Calrec by AMS)
LP Music Group	Beyer Dynamic Inc.	Crate
Metro Audio USA	Black Audio Devices	D&R Electronics 71
Milab International	Bruel & Kjaer 35	Electro-Voice 23,33
Mogami Product Div. Marshall Electronics, Inc.	Electro-Voice 23,33	Focusrite US Ltd.
The Music People, Inc.	Gotham Audio Corp.	Fostex Corp of America 53
Numark Electronics	KMD Sound Electronics	HM Electronics, Inc.
Paso Sound Products Inc.	LP Music Group	IQS Inc.
Peavey Electronics 31	Micron Audio Products, Ltd.	Micron Audio Products, Ltd.
Penn Fabrication USA Inc.	The Music People, Inc.	Mitsubishi Pro Audio Group
Ross Systems Div. of IMC	Paso Sound Products Inc.	Paso Sound Products Inc.
Sanken Microphone Pan Communications, Inc.	Peavey Electronics 31	ProTech Audio Corp.
Schoeps GmbH	Penn Fabrication (NJ) Inc.	Radio Systems, Inc.
Schoeps/Posthorn Recordings	Ramsa/Panasonic	Ramsa/Panasonic
Sennheiser Electronics	Ross Systems Div. of IMC	Ross Systems Div. of IMC
Shure Brothers Inc.	Sawyer Camera & Video Co.	Sanken Microphone Pan Communications, Inc.
Spectra Sonics/Spectra Sound	Scantek, Inc.	Sawyer Camera & Video Co.
Stewart Electronics Corp. 85	Schoeps/Posthorn Recordings	Schoeps GmbH
Switchcraft, Inc. 39	Shure Brothers Inc.	Schoeps/Posthorn Recordings
Whirlwind Interface International Inc.	Spectra Sonics/Spectra Sound	S.E.M. Co.
Wireworks Corp.	Ultimate Support	

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delivers...twice the output
in half the space!**

Concert sound is getting smaller. System size, that is, not tour dollars! In fact, the high-level sound market is stronger than ever. But high transportation and setup costs are forcing lighter, smaller and more efficient speaker systems. While audiences demand better fidelity.

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The MTA-42 Manifold Technology adapter combines four compression drivers without added distortion. And without the phase cancellations of Y-adapters! That's 4 supertweeter and 4 upper-midrange compression drivers on identical 60° x 40° constant-directivity horns. To complete the MTH-4 "high" box, four DL1CX woofers use proprietary phase plugs to provide seamless vocals from 160-1600 Hz. The result is flawless 138-dB midbass at 1 meter!

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Concert Sound System
50,000-Watt Array



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Circle (20) on Rapid Facts Card

	See Adv. Page
Shure Brothers Inc.	
Spectra Sonics/Spectra Sound	
Stewart Electronics Corp.	85
Straight Wire Audio Inc.	
Studio Technologies, Inc.	
Summit Audio Inc.	
T C Electronic America	
Telex Communications, Inc.	57
TOA Electronics, Inc.	
Valley International, Inc.	
Yamaha Music Corp., USA Pro	
Audio Div.	41

MICROPHONES, STUDIO AND PA

Accurate Sound Corp.	
ACO Pacific Inc.	
Advanced Music Systems/Calrec	
AKG Acoustics Inc.	45
Altec Lansing Corp.	
AMR (Audio Media Research)	
Astatic/CTI	
Audio-Technica US, Inc.	
Audix	
Audra International	
Aura Sonic Ltd.	
Beyer Dynamic Inc.	
Bruel & Kjaer	35
Calrec Audio Ltd. (Calrec by AMS)	
Crown International Inc.	
Electro-Voice	23,33
ETC-Essential Telecommunications Corp.	
Gotham Audio Corp.	
KMD Sound Electronics	
Micron Audio Products, Ltd.	
Milab International	
The Music People, Inc.	
Numark Electronics	
Ocean Audio Exchange	
Paso Sound Products Inc.	
Peavey Electronics	31
Ramsa/Panasonic	
Sanken Microphone Pan	
Communications, Inc.	
Sawyer Camera & Video Co.	
Schoeps/Posthorn Recordings	
Sennheiser Electronics	
Shure Brothers Inc.	
Sony Communications Products Co.	
Spectra Sonics/Spectra Sound	
TASCAM, Teac Corp. of America	7
Telex Communications, Inc.	57
3M Broadcasting & Related Products	
TOA Electronics, Inc.	
Uher of America	
Yamaha Music Corp., USA Pro	
Audio Div.	41

MICROPHONES, WIRELESS AND RF

AKG Acoustics Inc.	45
Astra Services	
Beyer Dynamic Inc.	
Cetec Vega	
Coherent Communications Inc.	
Countryman Associates Inc.	87

HM Electronics, Inc.	
Lectrosonics Inc.	
Micron Audio Products, Ltd.	
Nady Systems, Inc.	
Paso Sound Products Inc.	
Peavey Electronics	31
Ramsa/Panasonic	
Samson Technologies Corp.	
Sanken Microphone Pan	
Communications, Inc.	
Sawyer Camera & Video Co.	
Sennheiser Electronics	
Shure Brothers Inc.	
Sony Communications Products Co.	
Spectra Sonics/Spectra Sound	
Swintek Enterprises	
Telex Communications, Inc.	57
TOA Electronics, Inc.	

MIDI DEVICES, ADD-ON

ADA Signal Processors, Inc.	
Allen & Heath Brenell USA Ltd.	
AMR (Audio Media Research)	
APM/Kahler	
Applied Research & Technology,	
Inc.	25
Audio Logic	
BSS Audio Ltd.	
Casio, Inc.	
Clarity	
J.L. Cooper Electronics	94
DigiTech	
DOD Electronics Corp.	
Drumware, Inc.	
Eventide, Inc.	
Fairlight Instruments, Inc.	
Forte Music, Inc.	
Fostex Corp. of America	53
Harmony Systems Inc.	
IMC/Akai Professionals	
Korg USA Inc.	
Mark of the Unicorn	
Mogami Product Div. Marshall	
Electronics, Inc.	
Musically Intelligent Devices	68
Musicians' Service Complex	
Musicworks	
Oberheim-ECC	
Passport Designs Inc.	
Peavey Electronics	31
Publison America, Inc.	
Ross Systems Div. of IMC	
Simmons Electronics (USA) Inc.	
USA Productions	
Wersi Electronics	
Yamaha Music Corp., USA Pro	
Audio Div.	41

NOISE GATES

ADM Technology Inc.	
Alesis	
AMR (Audio Media Research)	
Aphex Systems Ltd.	61
Ashly Audio	
Audio Logic	
Aura Sonic Ltd.	

	See Adv. Page
BSS Audio Ltd.	
Circuit Research Labs, Inc.	
dbx, A Div. of BSB N.A. Ltd.	
DOD Electronics Corp.	
D&R Electronics	71
Drew Engineering Co.	
Focusrite US Ltd.	
Furman Sound, Inc.	
Gold Line	
Industrial Research Products	
Innovative Electronic Designs	
Klark-Teknik	19,59
Korg USA Inc.	
Mitsubishi Pro Audio Group	
Musically Intelligent Devices	68
Opamp Labs, Inc.	
ProTech Audio Corp.	
Rane Corp.	73
Roland Corp. US	
Valley International, Inc.	
Yamaha Music Corp., USA Pro	
Audio Div.	41

NOISE REDUCTION SYSTEMS

ANT Telecommunications Inc.	
Ashly Audio	
Audio Logic	
Circuit Research Labs, Inc.	
CompuSonics Corp.	
dbx, A Div. of BSB N.A. Ltd.	
DOD Electronics Corp.	
Dolby Labs	
D&R Electronics	71
Drew Engineering Co.	
Electron Processing	
Gotham Audio Corp.	
Numark Electronics	
Opamp Labs, Inc.	
Packburn Electronics Inc.	
Rocktron Corp.	
Roland Corp. US	
TASCAM, Teac Corp. of America	7
Ward-Beck Systems Ltd.	

PATCHBAY AND JACK PANELS

ADC Telecommunications	
Akai Div. of IMC	
Astra Services	
Audio Accessories, Inc.	97
Audio Intervisual Design	
Auditronics Inc.	
Aura Sonic Ltd.	
Bi-Tronics Inc.	
Canare Cable Inc.	99
D&R Electronics	71
Fostex Corp. of America	53
Furman Sound, Inc.	
Gentner Electronics Corp.	79
IMC/Akai Professionals	
Korg USA Inc.	
Lowing Products	
McCurdy Radio Industries Ltd.	
Radio Systems, Inc.	
Ross Systems Div. of IMC	

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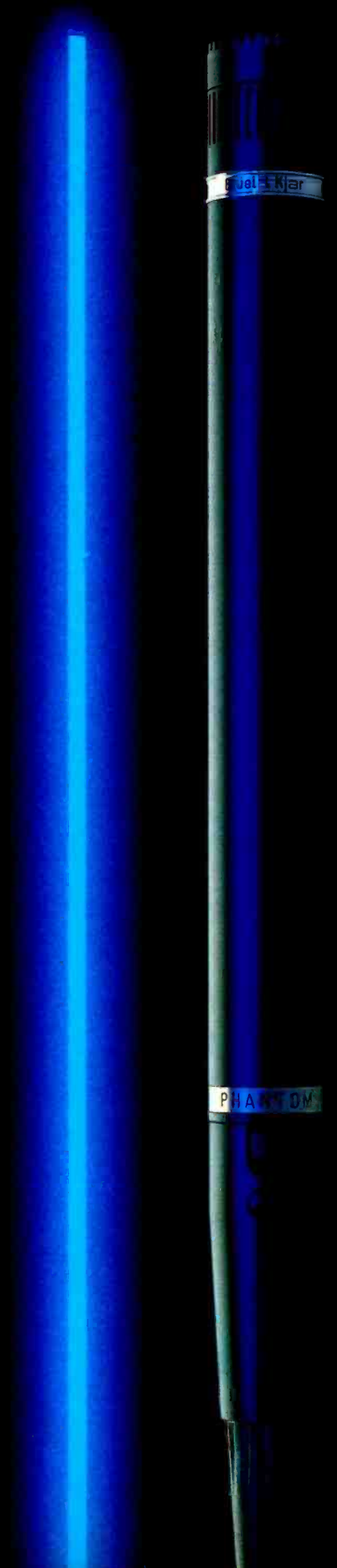
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Norway 02-78 70 96 · Singapore 225 8533 · Spain (91) 263 1000
Sweden (08) 711 27 30 · Switzerland (042) 65 11 31 · Taiwan (02) 7139303
USA (617) 481-7000 · Local representatives and service organisations world-wide



	See Adv. Page
Switchcraft, Inc.	39
TASCAM, Teac Corp. of America	7
Ward-Beck Systems Ltd.	
Whirlwind Interface International Inc.	
Wireworks Corp.	
Zeus Light & Sound Co.	

PERIPHERAL AND MISCELLANEOUS ACCESSORIES

Applied Creative Technology Inc.	
Associated Sound	
Astra Services	
Atlas/Soundolier	43
Audio Intervisual Design	
Audio Kinetics Ltd.	76
Audio Logic	
Audio Services Corp.	
Auditronics Inc.	
The Bertech Organization	
Black Audio Devices	
W.H. Brady Co. STP Div.	
Broadcast Electronics	
BSS Audio Ltd.	
Celestion Industries, Inc. C-Audio	
Clean Co.	
DeCuir Corp.	
Denecke Inc.	68
D&R Electronics	71
DW Labs, Inc.	
E.A.R.S.	
El Mar Plastics Inc.	100
Electron Processing	
Fat Box	
Fidelipac Corp.	
Fostex Corp. of America	53
Four Designs Co.	
FSR Inc.	
Juice Goose c/o Whinton Industries Inc.	
King Instrument Corp.	
Klark-Teknik	19,59
LP Music Group	
Metro Audio USA	
Micro-Trak Corp.	
Middle Atlantic Audio Products	
Nitty Gritty Record Care Products	
Omnimount Systems	
P.A.S.	
The Patchbay Designation Co.	85
Peavey Electronics	31
Penn Fabrication (NJ) Inc.	
Polyline Corp.	62
Radio Systems, Inc.	
Shure Brothers Inc.	
Stewart Electronics Corp.	85
Strategic Sound, Inc.	
Summit Audio Inc.	
Synergetic Services, Inc.	
TASCAM, Teac Corp. of America	7
Westlake Audio	55
Whirlwind Interface International Inc.	
Zeus Light & Sound Co.	

PHASERS

Audio Logic	
DOD Electronics Corp.	

Eventide, Inc.	
Roland Corp. US	
T C Electronic America	
Yamaha Music Corp., USA Pro Audio Div.	41

PHONOGRAPH CARTRIDGES

AKG Acoustics Inc.	45
Audio-Technica US, Inc.	
Gotham Audio Corp.	
Numark Electronics	
Shure Brothers Inc.	
Stanton Magnetics Inc.	95
Sumiko, Inc.	

PHONOGRAPH TURNTABLES

Broadcast Electronics	
Gotham Audio Corp.	
McCurdy Radio Industries Ltd.	
Numark Electronics	
Paso Sound Products Inc.	
Studer Revox America	BC

PITCH SHIFTERS

ADA Signal Processors, Inc.	
Advanced Music Systems/Calrec	
Akai Div. of IMC	
Applied Research & Technology, Inc.	25
Eventide, Inc.	
Publison America, Inc.	
Roland Corp. US	
Yamaha Music Corp., USA Pro Audio Div.	41

RACKS AND STANDS

AMR (Audio Media Research)	
Atlas/Soundolier	43
Broadcast Electronics	
Centro Corp.	
Dago Cases	
DeCuir Corp.	
D&R Electronics	71
Fidelipac Corp.	
FM Tubecraft	
Four Designs Co.	
Invisible Products Corp.	
Jan-Al Cases	
KMD Sound Electronics	
Korg USA Inc.	
Lowing Products	
LP Music Group	
McCurdy Radio Industries Ltd.	
The Mitek Group	
The Music People, Inc.	
Numark Electronics	
Otari Corp	3,101
Pacific Wood Works	
P.A.S.	
Paso Sound Products Inc.	
Peavey Electronics	31
Radio Systems, Inc.	

Ross Systems Div. of IMC	
Solid Support Industries	
Stagehand Mfg.	
Storeel Corp.	
Ultimate Support	
Ward-Beck Systems Ltd.	
Whirlwind Interface International Inc.	
Winsted Corp.	
Zeus Light & Sound Co.	

RECORDING TAPE, AUDIO

Ampex Corp. Magnetic Tape Div.	11
Apogee Electronics Corp.	
Audiolab Electronics, Inc.	
Aura Sonic Ltd.	
BASF Corp. Information Systems	
Burlington Audio/Video Tapes, Inc.	
Capitol Magnetic Products	50
CBS Records Group CBS, Inc.	
Creative Sound Corp.	
Diskmakers	
Embassy Cassette Inc.	
Fidelipac Corp.	
Fostex Corp. of America	53
Master Cassette & Duplication	
Nakamichi America Corp.	29
Plantron International Corp.	
Precision Audio Inc.	
Bill Rase Productions, Inc.	
Sony Communications Products Co.	
Sony Magnetic Products Co. Professional Tape Div.	
Sprague Magnetics, Inc.	
Studio Magnetics Co., Inc.	
3M Magnetic Media Div.	
Uni-Sette, Inc.	

RECORDING TAPE, U-MATIC

Ampex Corp. Magnetic Tape Div.	11
Audiolab Electronics, Inc.	
Aura Sonic Ltd.	
Sawyer Camera & Video Co.	
Sony Communications Products Co.	
Sony Magnetic Products Co. Professional Tape Div.	
Sprague Magnetics, Inc.	
3M Magnetic Media Div.	

REVERB DEVICES

Advanced Music Systems/Calrec	
AKG Acoustics Inc.	45
Alesis	
AMR (Audio Media Research)	
Applied Research & Technology, Inc.	25
Audio Logic	
Aura Sonic Ltd.	
DigiTech	
DOD Electronics Corp.	
D&R Electronics	71
Eventide, Inc.	
Furman Sound, Inc.	
Gold Line	
Gotham Audio Corp.	
IMC/Akai Professionals	



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	See Adv. Page
Klark-Teknik	19,59
Lexicon Inc.	
LP Music Group	
Opamp Labs, Inc.	
Peavey Electronics	31
Publison America, Inc.	
Roland Corp. US	
Scantek, Inc.	
Yamaha Music Corp., USA Pro Audio Div.	41

SIGNAL PROCESSORS

ADA Signal Processors, Inc.	
ADM Technology Inc.	
Advanced Music Systems/Calrec	
AKG Acoustics Inc.	45
Alesis	
Altec Lansing Corp.	
AMR (Audio Media Research)	
Analog Systems	
Aphex Systems Ltd.	61
API-Audio Products Inc.	
Applied Research & Technology, Inc.	25
Ashly Audio	
Audio/Digital Inc.	
Audio Logic	
Aura Sonic Ltd.	
BBE	
Biamp Systems	
Brick Audio	
BSS Audio Ltd.	
Cetec Ivie	
Clarity	
dbx, A Div. of BSB N.A. Ltd.	
Delta Electronics Inc.	
DigiTech	
DOD Electronics Corp.	
Dorrrough Electronics	
D&R Electronics	71
Drew Engineering Co.	
DW Labs, Inc.	
Electro-Voice	23,33
Electron Processing	
Eventide, Inc.	
FM Acoustics USA	
Focusrite US Ltd.	
Four Designs Co.	
Full Compass Systems	
Furman Sound, Inc.	
Gold Line	
Gotham Audio Corp.	
Howe Technologies Corp.	
Industrial Research Products	
Innovative Electronic Designs	
Inovonics Inc.	
IQS Inc.	
JBL Professional	5
Klark-Teknik	19,59
Korg USA Inc.	
Lexicon Inc.	
MicroAudio	75
Musically Intelligent Devices	68
Musicians' Service Complex	
New England Digital Corp.	
Opamp Labs, Inc.	
Orban Associates	

	See Adv. Page
Peavey Electronics	31
Publison America, Inc.	
Rane Corp.	73
Renkus-Heinz, Inc.	
Rocktron Corp.	
Roland Corp. US	
Ross Systems Div. of IMC	
Scantek, Inc.	
S.E.M. Co.	
Sound Concepts Inc.	
Sound Studio	
Steven Electronics	
Studer Revox America	BC
Studio Technologies, Inc.	
Symetrix Inc.	
TASCAM, Teac Corp. of America	7
T C Electronic America	
TOA Electronics, Inc.	
UREI	
Valley International, Inc.	
White Instruments Div. C Van R, Inc.	
Yamaha Music Corp., USA Pro Audio Div.	41

SOFTWARE, BUSINESS

Advanced Music Systems/Calrec	
Audio Express Div. Worldwide Communications	
C&C Consultants	
First Light Video	
Leonardo Software	
Micro-Point Inc.	93
Pristine Systems Inc.	
Scientific Design Software	
Studio Master Systems	

SOFTWARE, MUSIC AND PRODUCTION

Aegis Development, Inc.	
Dr. T's Music Software	
Passport Designs Inc.	

SOUND SAMPLERS

Advanced Music Systems/Calrec	
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Aura Sonic Ltd.	
Design Direct Sound	
DigiTech	
DOD Electronics Corp.	
Drumware, Inc.	
E-Mu Systems Inc.	
Eventide, Inc.	
Fairlight Instruments, Inc.	
IMC/Akai Professionals	
Innovative Electronic Designs	
Korg USA Inc.	
Kurzweil Music Systems, Inc.	37
New England Digital Corp.	
Oberheim-ECC	
Publison America, Inc.	
Roland Corp. US	
Sequential Circuits	
Simmons Electronics (USA) Inc.	

	See Adv. Page
T C Electronic America	
Yamaha Music Corp., USA Pro Audio Div.	41

SYNTHESIZERS AND KEYBOARDS

Akai Div. of IMC	
Bertus Productions The Studio	
Casio, Inc.	
Ensoniq Corp.	
Fairlight Instruments, Inc.	
IMC/Akai Professionals	
KMD Sound Electronics	
Korg USA Inc.	
Kurzweil Music Systems, Inc.	37
Musicians' Service Complex	
New England Digital Corp.	
Oberheim-ECC	
Roland Corp. US	
Sequential Circuits	
Studio Technologies, Inc.	
Technics	
Wersi Electronics	

TAPE DUPLICATION, CASSETTE

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Apex Machine Co.	
Associated Audio Services	
Audio Cassette Center	
Audio Digital Inc.	
Audio Express Div. Worldwide Communications	
Audio-VideoGraphics	
Audiolab Electronics, Inc.	
Avid Productions	
CBS Records Group CBS, Inc.	
Cetec Gauss	69
Cinram Ltd	
Davkore Co.	
Digital Brothers	
Digital 1 Duplication Inc.	
Diskmakers	
Domain Communications Inc.	
Eastern Standard Productions, Inc.	
Electro Sound, Inc.	
Embassy Cassette Inc.	
Greencorp. Inc.	
HRC Magnetics	
Inovonics Inc.	
KABA Research & Development	IBC
Loran Audio & Cassette Products	
Magnifax International, Inc.	
Master Cassette & Duplication	
Master Track Productions	
Mobile Fidelity Sound Lab	
Nakamichi America Corp.	29
Otari Corp.	3,101
Precision Audio Inc.	
Bill Rase Productions, Inc.	
Recortec Inc.	
R.E.P. Sound Image Recording Ltd.	
Sawtooth Magnetic Tape	
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See Adv. Page

See Adv. Page

See Adv. Page

Shur-Sound & Sight, Inc.
 Sony Communications Products Co.
 Stereodyne/Dynapak Ltd.
 Studio Magnetics Co., Inc.
TASCAM, Teac Corp. of America 7
Telex Communications, Inc. 57
 3M Magnetic Media Div.
 Trax Audio & Music
 Uni-Sette, Inc.
 Versadyne International, Inc.
 Voice Over L.A., Inc.

Shur-Sound & Sight, Inc.
Telex Communications, Inc. 57
 3M Magnetic Media Div.
 Voice Over L.A., Inc.

Strategic Sound, Inc.
Studer Revox America BC
TASCAM, Teac Corp. of America 7
 Uher of America

**TAPE DUPLICATION,
 REEL-TO-REEL**

Accurate Sound Corp.
 Associated Audio Services
 Audiolab Electronics, Inc.
 Avid Productions
Cetec Gauss 69
 Davkore Co.
 Digital Brothers
 Digital 1 Duplication Inc.
 Domain Communications Inc.
 Eastern Standard Productions, Inc.
 Magnefax International, Inc.
 Master Track Productions
Otari Corp. 3,101
 Bill Rase Productions, Inc.
 Recortec Inc.

**TAPE MACHINE
 REPLACEMENT HEADS**

Auteri Associates, Inc.
JRF Magnetic Sciences 101
 Norton Associates Inc.
Otari Corp. 3,101
Saki Magnetics, Inc. 78
 Sprague Magnetics, Inc.
 Strategic Sound, Inc.

**TAPE MACHINES,
 CARTRIDGE**

Audico, Inc.
 Audiolab Electronics, Inc.
 Auditronics Inc.
 Broadcast Electronics
Cetec Gauss 69
 Fidelipac Corp.
 International Tapetronics 3M
 Broadcasting & Related Products Div.
Otari Corp. 3,101

TAPE MACHINES, ANALOG

Akai Div. of IMC
 Audiolab Electronics, Inc.
Cetec Gauss 69
Fostex Corp. of America 53
 Gotham Audio Corp.
 IMC/Akai Professionals
 Inovonics Inc.
 Kudelski SA
 Nagra Magnetic Recorders
 Ocean Audio Exchange
Otari Corp. 3,101
 Sony Communications Products Co.
 Soundcraft USA

**TAPE MACHINES,
 CASSETTE**

Accurate Sound Corp.
 Akai Div. of IMC
 AMR (Audio Media Research)
 Audico, Inc.
 Audiolab Electronics, Inc.
Cetec Gauss 69
Fostex Corp. of America 53
 Gotham Audio Corp.
 IMC/Akai Professionals
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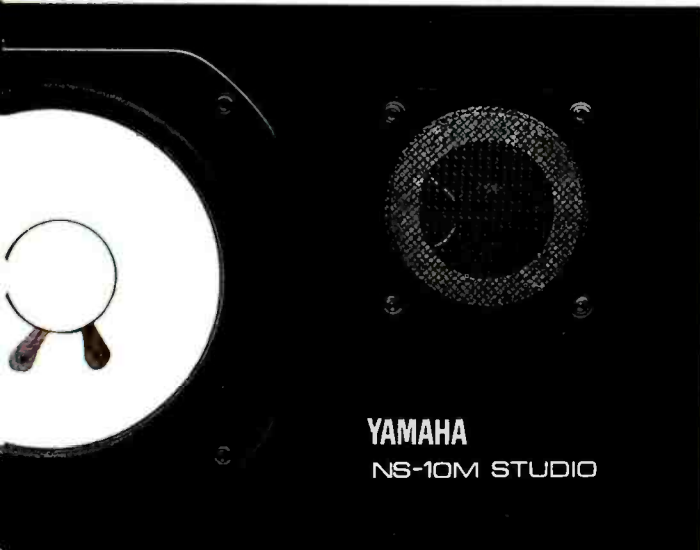
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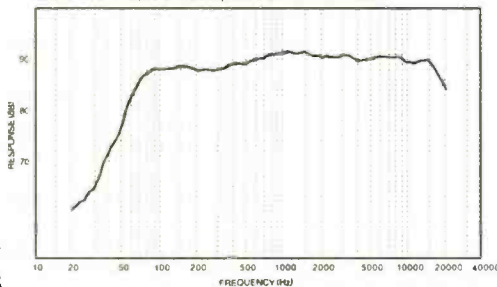
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	See Adv. Page
Nakamichi America Corp.	29
Otari Corp.	3,101
Paso Sound Products Inc.	
Ross Systems Div. of IMC	
Sharp Electronics Corp. Professional Products Div.	
Studer Revox America	BC
TASCAM, Teac Corp. of America	7
Technics	
TOA Electronics, Inc.	
Uher of America	
Uni-Sette, Inc.	
Yamaha Music Corp., USA Pro Audio Div.	41

TAPE MACHINES, DIGITAL

Akai Div. of IMC
 Apogee Electronics Corp.
 Audiolab Electronics, Inc.
 CompuSonics Corp.
 IMC/Akai Professionals
 Integrated Media Systems, Inc.
 International Tapetronics 3M
 Broadcasting & Related Products Div.
 Mitsubishi Pro Audio Group
 Ocean Audio Exchange
 Otari Corp. 3,101
 Sony Communications Products Co.
 Studer Revox America

TAPE MACHINES, MAG FILM

Audiolab Electronics, Inc.
 Inovonics Inc.
 Mitsubishi Pro Audio Group

TEST AND MEASURING EQUIPMENT

ACO Pacific Inc.
 Altair Electronics Inc.
 Apogee Electronics Corp.
 Audio Control Industrial 70
 Audio Precision 81
 BASF Corp. Information Systems
 B&B Systems Inc.
 CBS Records Group CBS, Inc.
 Cetec Ivie
 Delta Electronics Inc.
 Electro Sound, Inc.
 Four Designs Co.
 Gold Line
 Inovonics Inc.
 IQS Inc.
 Jasoni Electronics
 Kenwood USA Corp.
 Klark-Teknik 19,59
 KMD Sound Electronics
 Leitch Video of America Inc.
 Magnetic Reference Lab 74

	See Adv. Page
McCurdy Radio Industries Ltd.	
Menlo Scientific	
Metro Audio USA	
MicroAudio	75
Micro-Point Inc.	93
Opamp Labs, Inc.	
Portland Instrument-SCV	
Precision Design	
RCA Test Tapes	
RE Instruments AS	
Recortec Inc.	
Research Technology International	
RTS Systems, Inc.	
Scantek, Inc.	
Sound Technology, Inc.	
Standard Tape Lab, Inc.	
T C Electronic America	
Tentel	
Turbosound Inc.	
Video Accessory Corp.	
Ward-Beck Systems Ltd.	
Whirlwind Interface International Inc.	
White Instruments Div. C Van R, Inc.	
Wireworks Corp.	

TIME CODE SYNCHRONIZERS

Adams-Smith
 Advanced Music Systems/Calrec
 Allen & Heath Brenell USA Ltd.
 AMR (Audio Media Research)
 Amtel
 APM/Kahler
 Audio Kinetics Ltd. 76
 Cipher Digital, Inc. 21
 CMX Corp.
 Coherent Communications Inc.
 J.L. Cooper Electronics 94
 Editron USA Inc.
 Evertz Microsystems Ltd.
 Fostex Corp. of America 53
 Gotham Audio Corp.
 Harmony Systems Inc.
 IMC/Akai Professionals
 Otari Corp. 3,101
 Publison America, Inc.
 Roland Corp. US
 Skotel Corp.
 Sony Communications Products Co.
 Soundmaster International Inc.
 Strategic Sound, Inc.
 Studer Revox America BC
 TASCAM, Teac Corp. of America 7
 Timeline Inc.

TRANSFORMERS, AUDIO

Altec Lansing Corp.
 Astatic/CTI
 BSS Audio Ltd.
 FSR Inc.
 Jensen Transformers 32
 Klark-Teknik 19,59
 McCurdy Radio Industries Ltd.
 The Music People, Inc.

	See Adv. Page
Opamp Labs, Inc.	
Paso Sound Products Inc.	
ProTech Audio Corp.	
Reichenbach Engineering Co., Inc.	
Shure Brothers Inc.	
Stewart Electronics Corp.	85
Ward-Beck Systems Ltd.	
Whirlwind Interface International Inc.	
Yamaha Music Corp., USA Pro Audio Div.	41

VU/PPM METERS

API-Audio Products Inc.
 Apogee Electronics Corp.
 Astra Services
 B&B Systems Inc.
 Dorrrough Electronics
 Furman Sound, Inc.
 Gotham Audio Corp.
 Inovonics Inc.
 McCurdy Radio Industries Ltd.
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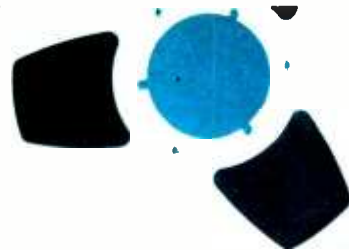
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ACO Pacific Inc.

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Oakland, CA 94621
415-632-1323
800-241-8888

Adams-Smith

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Hudson, MA 01749
617-562-3801

ADC Telecommunications

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Minneapolis, MN 55435
612-893-3071

ADM Technology Inc.

1626 E. Big Beaver Road
Troy, MI 48084
313-524-2100

Advanced Music Systems/Calrec

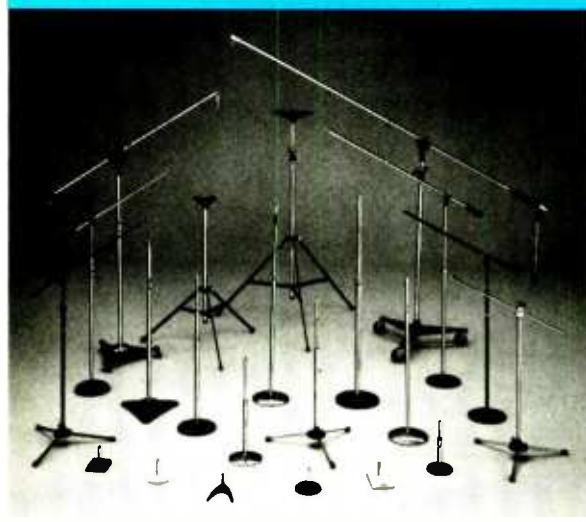
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Los Angeles, CA 90016
213-467-8000

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Orange, CT 06477
203-795-3594

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Thousand Oaks, CA 91360
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405-324-5311

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The Carver PM-1.5 Magnetic Field Power Amp—For performance, reliability and sound.

On the Road Since the professional debut in 1983 of the Carver PM-1.5 Low Feedback High Headroom Magnetic Field Power Amplifier, the sonic excellence and reliability of this 21-lb., 450 watts per channel* powerhouse has been tested—and proven—on some of the biggest and toughest tours ever to go on the road. 108 Carver PM-1.5's were used by Clair Brothers on the Bruce Springsteen tour, and 180 PM-1.5's on the Michael Jackson "Victory" tour. In both cases the result was purely awesome power.

"Our new Carver amp racks pack twice the number of channels in about the same truck volume as the conventional racks they replace. In addition the average power per channel has increased while the average weight per channel has decreased. In the low end, for example, we now have 1,200 watts per cabinet where 650 watts were previously available. They take less room on the truck, they weigh less and our systems have more headroom than before. The Carver amplifier has allowed us to take a significant step in improving our sound systems." **CLAIR BROTHERS**

And not only a sound industry giant like Clair Brothers tours with Carver.

"We have toured Carvers with the following artists: Softcell, Paul Young, Johnny Mathis, Donna Summers, Howard Jones, Pointer Sisters, Psychedelic Furs, Lee Greenwood, General Public, George Thorogood. This is exclusive of our numerous one-nighters. The consensus of the performers is that the equipment sounds great. They have been amazed by the sound of the amps as well as their size and weight. As for reliability, out of 50 amps we had only one fail in the past year of touring. This is by far the best record we've had with any manufacturer of amplifiers. Sonically, the extra headroom is readily apparent. We, at Manticore unanimously agree that the PM-1.5 is incredible and is the only amp we intend to buy."

Tom Whisner (owner) MANTICORE

In the Laboratory The Carver PM-1.5 was rigorously tested by Len Feldman for MODERN RECORDING (February 1985). His laboratory test results also prove that the PM-1.5 really delivers. The following quotes from the Lab Report are reprinted with permission of MODERN RECORDING & MUSIC:—

"The first thing we noticed when we began to work with the Carver PM-1.5 was the ease with which the amplifier delivered almost limitless power to speaker loads which we had previously considered to be difficult to drive to loud levels. This is the sort of amplifier that just refuses to quit."

"The amplifier delivered a clean 480 watts per channel into 8-ohm loads with both channels driven for its rated harmonic distortion level of 0.5%. Even at the frequency extreme of 20 Hz, power output for rated THD was 470 watts as against 450 claimed by Carver. Furthermore, at rated power output, distortion decreased to an insignificant 0.015% at mid-frequencies and 0.007% at 20 Hz. When connected to 4-ohm loads, the PM-1.5 delivered 750 watts per channel for rated THD of 0.05%—far more than the 600 watts claimed by Carver. Clearly, when it comes to specs for a professional amplifier, Carver has taken a very conservative approach... All (manufacturer's claims) equaled or exceeded published specifications—usually by a wide margin."

"Carver has managed to deliver a tremendous amount of power in a small lightweight package at a very reasonable cost..."

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4030 Synchronizer with switching power supply

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4035



4050

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TM-3*



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Standard Tape Lab, Inc.

26120 Eden Landing Road, Suite 5
Hayward, CA 94545
415-786-3546

Stanton Magnetics Inc.

Terminal Drive
Plainview, NY 11803
516-349-0235

Star Case

648 Superior
Munster, IN 46321
219-922-4440

State of The Art Electronik

43-1010 Polytek St.
Ottawa, Ont., Canada K1J 8Z2
613-744-1003

Stereodyne/Dynapak Ltd.

3121 Universal Drive
Mississauga, Ont., Canada L4X 2E2
416-625-8311

Steven Electronics

160 Belmont Ave.
Garfield, NJ 07026
201-478-6903

Stewart Electronics Corp.

11460 Sunrise Gold Circle, Suite B
Rancho Cordova, CA 95742
916-635-3011

Storeel Corp.

3337 W. Hospital Ave.
Atlanta, GA 30341
404-458-3280

Straight Wire Audio Inc.

4611 Columbia Pike
Arlington, VA 22201
703-979-1990
800-368-2081

Strategic Sound, Inc.

2495 Middlefield Ave.
Fremont, CA 94539
415-656-4154

Studer Revox America

1425 Elm Hill Pike
Nashville, TN 37210
615-254-5651

Studio Digital Samples

23131 Canzonet St.
Woodland Hills, CA 91367
818-704-6585

Studio Magnetics Co., Inc.

12 Long Island Ave.
Holtsville, NY 11742
516-289-3400
800-874-2202

Studio Master Systems

P.O. Drawer P
North Miami Beach, FL 33160
305-945-9774

Studio Technologies, Inc.

5520 W. Touhy Ave.
Skokie, IL 60077
312-676-9177

Sumiko, Inc.

P.O. Box 5046
Berkeley, CA 94705
415-843-4500

Summit Audio Inc.

P.O. Box 1678
Los Gatos, CA 95031
408-395-2448

Sunn Pro Sound

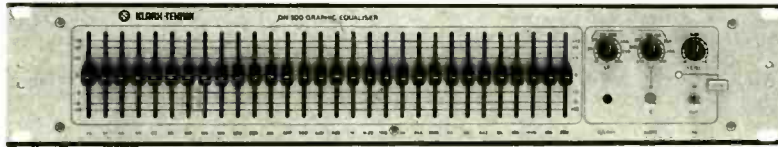
1130 Columbia St.
Brea, CA 92621
714-671-5657
800-854-6230

Swintek Enterprises

587 Division St.
Campbell, CA 95008
408-378-8091

30 band 1/2 octave graphic equaliser - Frequency response $\pm 0.5\text{dB}$ (20Hz - 20kHz). Distortion (+4dBm) < 0.01% at 1kHz. Equivalent input noise < -90dBm. Auto-bypass failsafe. Low and high pass variable filters. Balanced XLR input and output.

Also available for stereo applications DN360 Dual Channel 30 band 1/2 octave graphic equaliser.



DN300

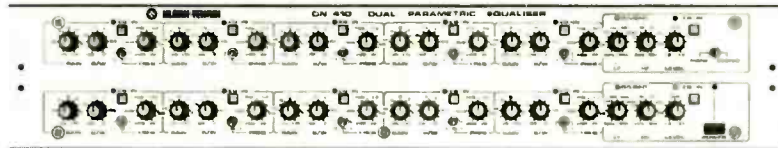
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Dual channel 5 band parametric equaliser - Frequency response $\pm 0.5\text{dB}$ (20Hz - 20kHz). Distortion (+4dBm) < 0.01% at 1kHz. Equivalent input noise < -90dBm. 100% Frequency overlap for each filter + variable bandwidth. Bypass, XLR inputs and outputs.

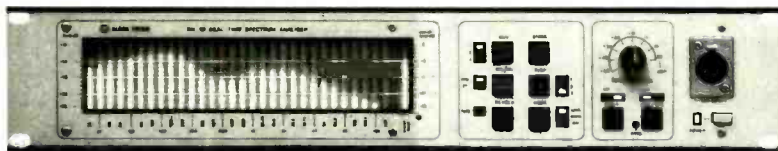
Also available DN405 Single Channel 5 band parametric equaliser.



DN410

PARAMETRIC EQUALISER

Real time audio spectrum analyser - 30 band 1/2 octave + overall level, LED display. Pink noise source, Mic/line XLR input, AT1 measuring microphone, X-Y plotter output. Add-on reverbation analyser available.



DN60

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They rely on

One input-three outputs digital delay line - Frequency response $\pm 1\text{dB}$ (20Hz-20kHz). Distortion < 0.01% at 1kHz. Dynamic range > 90dB. Minimum increment 20 micro sec. Delay range 0-1.311 sec. Digital conversion 16 Bit Linear, XLR terminated input and outputs.

Also available DN773 Stereo 10 sec. digital delay line.



DN716

DIGITAL DELAY LINE

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Klark-Teknik's renowned "reliability control" - assuring dependable system performance

The sonic excellence of Klark-Teknik audio engineering

Consistent ability to satisfy supply schedules

Unparalleled international technical support

Digital reverbation system - Bandwidth (reverb model) 20Hz-12kHz. Distortion < 0.03% at 1kHz. Dynamic range 85dB. Digital conversion 16 Bit Linear. Arithmetic processor 32 Bit. Stereo processing. Balanced XLR input and outputs. 7 parameter control, 28 programme library. 50 user memories. Midi interface. Updatable programming. Remote control.



DN780

DIGITAL REVERB

Worldwide distributors: Australia: Synthe International, Sydney Tel: 002 406 4700 Austria: Audio Sales, Vienna Tel: 02246 26123 Belgium: Agenburg, Trans European Music, Brussels Tel: 002 589 0823 Brazil: Sonora Communications, Rio De

Productions, Tel Aviv Tel: 003 454003 Italy: Audio Link, Parma Tel: 00521 39872319 Japan: Hibino Electric Sound, Tokyo Tel: 003 442 4101 Korea: Young Nak, Seoul Tel: 002 267 9697 8 Malaysia: Pony Enterprise, Kuala Lumpur Tel: 003 7825158 New Zealand:

Japan: Tel: 0031 274 5003 Canada: Chimimeda Corporation, Montreal Tel: 514 436 9871 Canary Isles: Pichali, Las Palmas Tel: 072534 072734 Caribbean: Audiofon Systems, Jamaica Tel: 926 2569 2771 Denmark: S C Sound, Copenhagen Tel: 002 998877 Finland: Naves Oy, Helsinki Tel: 004520311 France: Belgiscom, Paris Tel: 1 43 965050 Germany (West): Expotus, Leobnig, England Tel: 001 445 9685 Germany (East & East Europe): Denis Wier Ltd, G1 Missenden, England Tel: 0044662622 Greece: Bon Studio, Athens Tel: 001 36 33572 Holland: Trans European Music, Breda Tel: 0078 812872 Hong Kong: Peoples Rep. of China: Studer Rexx (Far East), Hong Kong Tel: 5 412050 Israel: More

General Communications, Wellington Tel: 4 881 101 Norway: Led Bonnet, Oslo Tel: 002 114 085 Singapore: Inchausti, Studer Rexx Audio, Singapore Tel: 250 7222 South Africa: Proground, Johannesburg Tel: 0011 337 6556 Spain: Auprosa, Barcelona Tel: 00340 2554104 Sweden: Intersonic, Stockholm Tel: 0046 744 5850 and Tel & Ton Electronics, Goteborg Tel: 31 903620 Switzerland: Di VA GmbH, Zollikon Zurich Tel: 001 391 3039 Taiwan: Lanfair, Taipei Tel: 2 321 4454 United Kingdom: Klark-Teknik Plc, Kildermister Tel: 00562 741515 U.S.A.: Klark-Teknik Electronics Inc., Birmingdale, N.Y. Tel: 516 249 2680



Klark-Teknik Plc
Klark Industrial Park, Wilton Nash Road, Kildermister,
Worcestershire DV11 7LJ, England.
Tel: 00562 741515 Telex: 339821 KLARK G Bx No: 005621 745371
Klark-Teknik Electronics Inc.
308 Banfi Plaza North, Birmingdale, N.Y. 11735, USA.
Tel: (516) 249-3660 Fax No: (516) 420-0661

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Switchcraft, Inc.
5555 N. Elston Ave.
Chicago, IL 60630
312-792-2700

Symetrix Inc.
4211 24th Ave. W.
Seattle, WA 98199
206-282-2555

Synergetic Services, Inc.
1926 N.E. 151st St.
North Miami Beach, FL 33162
305-947-7372

T

Tannoy North America Inc.
300 Gage Ave., Unit 1
Kitchener, Ont., Canada N2M 2C8
519-745-1158

**TASCAM,
Teac Corp. of America**
7733 Telegraph Road
Montebello, CA 90640
213-726-0303

T C Electronic America
120 County Road
Tenafly, NJ 07670
201-568-1820

T C Electronics
Grimhøjvej 3
KD-8220 Brabrand, Denmark
456-262800

Technics
One Panasonic Way
Secaucus, NJ 07094
201-348-7781

Telex Communications, Inc.
9600 Aldrich Ave. S.
Minneapolis, MN 55420
612-887-5531

Tentel
1506 Dell Ave.
Campbell, CA 95008
408-379-1881
800-538-6894

Thermodyne International
20850 S. Alameda St.
Long Beach, CA 90810
213-603-1976

3M Broadcasting & Related Products
3M Center, 223-5S-08
St. Paul, MN 55144
612-733-9214

3M Magnetic Media Div.
3M Center, 223-5N-01
St. Paul, MN 55144
612-733-1082

Timeline Inc.
270 Lafayette St.
New York, NY 10012
212-431-0330

Times One
22937 Arlington Ave.
Torrance, CA 90501
213-325-5200

TOA Electronics, Inc.
480 Carlton Court
San Francisco, CA 94080
415-588-2538

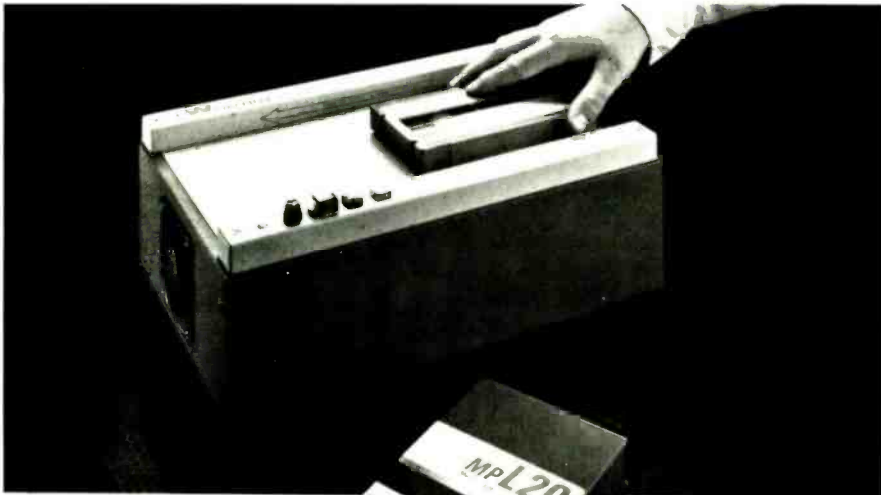
Top Notch Audio (TNA Case Co.)
P.O. Box 403
Highlands, NJ 07732
201-872-9190

Touch Technologies, Inc.
363 Adelaide St. E.
Toronto, Ont., Canada M5A 1N3
416-865-1877

Trax Audio & Music
545 West 500 South
Bountiful, UT 84010
801-298-3280

Trend Textiles
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Schiller Park, IL 60176
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Trident Audio USA
2720 Monterey St., Suite 403
Torrance, CA 90503
213-533-8900

Turbosound Inc.
611 Broadway, Suite 841
New York, NY 10012
212-460-9940

Video Accessory Corp.
2450 Central Ave.
Boulder, CO 80301
303-443-4950
800-821-0426

Voice Over L.A., Inc.
1717 N. Highland Ave., Suite 620
Hollywood, CA 90028
213-463-8652

Ward-Beck Systems Ltd.
841 Progress Ave.
Scarborough, Ont., Canada M1H 2X4
416-438-6550

Wersi Electronics
1720 Hempstead Road
Lancaster, PA 17601
717-299-4327
800-233-3865

U

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Los Angeles, CA 90024
213-825-9064

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7067 Vineland Ave.
North Hollywood, CA 91605
818-764-1120

Ultimate Support
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Fort Collins, CO 80522
303-493-4488

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1854 Fulton Ave.
Sacramento, CA 95825
916-485-9534

UREI
8500 Balboa Blvd.
Northridge, CA 91329
818-893-8411

USA Productions
6363 Sunset Blvd., Suite 810
Hollywood, CA 90028
213-467-5258
800-338-2011

V

Valentino, Inc.
151 West 46th St.
New York, NY 10036
212-869-5210
800-223-6278

Valley International, Inc.
P.O. Box 40306
Nashville, TN 37204
615-383-4737

Velodyne Acoustics
1746 Junction Ave.
San Jose, CA 95112
408-436-0688
800-VELODYNE

Versadyne International, Inc.
504-D Vandell Way
Campbell, CA 90058
408-379-0900
800-233-9370

Vertigo Recording Services
12115 Magnolia, Suite 116
North Hollywood, CA 91607
818-907-5161

W



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(818) 765-2212 • TWX: 910-321-5762

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Westlake Audio
7265 Santa Monica Blvd.
Los Angeles, CA 90046
213-851-9800

Wheatstone Broadcast Group
6720 VIP Parkway
Syracuse, NY 13211
315-455-7740

Whirlwind Interface International Inc.
100 Boxart St.
Rochester, NY 14612
716-663-8820
800-772-9997

**White Instruments
Div. C Van R, Inc.**
P.O. Box 698
Austin, TX 78767
512-892-0752

Winsted Corp.
10901 Hampshire Ave. S.
Minneapolis, MN 55438
612-944-8556
800-447-2257

Wireworks Corp.
380 Hillside Ave.
Hillside, NJ 07205
201-686-7400
800-624-0061

Y

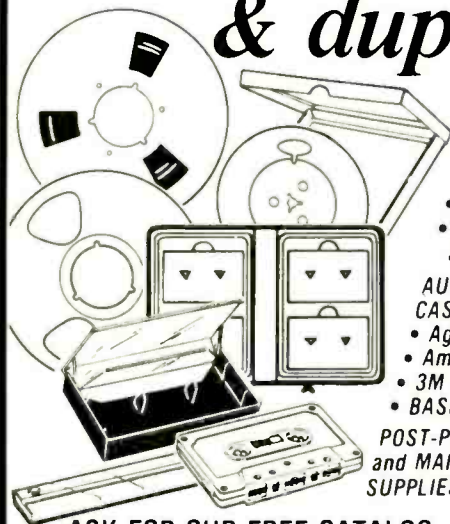
Yamaha Music Corp., USA
Pro Audio Div.
P.O. Box 6600
Buena Park, CA 90620
818-986-4643

Z

Zeus Light & Sound Co.
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BUYERS' GUIDE

Dealers/Distributors Directory

The Dealers/Distributors Directory features a listing of dealers/distributors complete with addresses, telephone numbers, territory served and products represented. Listings are arranged alphabetically by state/company. Please note that companies listed do not include all dealers/distributors serving an area, but only those that returned the *RE/P's* questionnaire.

See the example below of a dealer/distributor listing. The geographic code key is included on this page for your reference.

Example listing

- (1) **Johnston Pro Audio Sales,**
3900 Ocean Park Blvd.
- (2) Los Angeles, CA 90029
(213) 221-4338
- (3) CA, OR, WA
- (4) Loudspeakers; sound reinforcement,
studio monitoring.

- (1) company name, street address
- (2) city, state, zip, phone number
- (3) geographic region served
- (4) products represented

This company serves California, Oregon and Washington and sells loudspeaker components for sound reinforcement and monitoring.

ARIZONA

Advanced Audio (Div. of Aljon Systems), 3943 E. Whitton Ave., Phoenix, AZ, 85018 (602-954-8155) AZ, CA, NV, NM, UT, Loudspeakers for Monitoring, etc.; General Systems Consulting; Design & Fabrication of Custom Electronics Devices; Specialists in Design & Fabrication of Custom Multi-Amplified Powered Loudspeaker Systems for Professional Applications

Arizona Cine Equipment, 2125 East 20th St., Tucson, AZ, 87519 (602-623-8268) AZ, CA, NM, NV, UT, Amplifiers; Equalizers; Loudspeakers, S.R.; Microphones & Acces.; Signal Processors; Test & Measurement; Lighting

E.A.R. Professional Audio-Video, 2641 E. McDowell Road, Phoenix, AZ, 85008 (602-267-0600) AZ, CA, CO, NM, OK, OR, TX, UT, WA, NY, Amplifiers; Consoles; Editing Systems; Equalizers; Loudspeakers; Microphones; MIDI; Noise Reduction; Recording Tape; Signal Processors; Synthesizers; Tape Dupers; Analog & Digital Recorders, Time Code Synchronizers

ARKANSAS

Allrent, Inc., Route 2, Box 19, Perryville, AR, 72126 (501-889-5416) Central & No. West-AR, Audio; Keyboards; Synthesizers; Speakers

CALIFORNIA

David L. Abell, Inc., 8162 Beverly Blvd., Los Angeles, CA, 90048 (213-651-3060) CA, Amplifiers; Equalizers; Loudspeakers, Studio; MIDI Devices & Sound Samplers; Signal Processors; Synthesizers & Keyboards; Time Code Synchronizers

Advanced Recording Products, 7190 Clairemont Mesa Blvd., San Diego, CA, 92111 (619-277-2540; 800-854-1061; CA-800-858-1061) Nationwide, Recording Tape; Tape Duplication-audio cassettes; Cassettes; Reels & Boxes; Splicing & Leader Tape; Hold Down Tape; Video Tape; Studio Dispensers and More

AEA, Inc., 1029 N. Allen Ave., Pasadena, CA, 91104 (818-798-9127) So.-CA, Consoles; Digital Processors; Recorders; Microphones; Stands & Acces.; Audio Tape; Signal Processing; Noise Reduction Systems; Reverb, Echo & Delay; Synchronizers; Preamps/Amps/Loudspeakers/Headphones; Cables & Connectors; Turntables; Cartridges; Test Equip.; MIDI; Accessories & Misc. Equip.

Dan Alexander Audio, 2944 San Pablo Ave., Berkeley, CA, 94702 (415-644-2363) Worldwide, All types of professional used recording gear. Microphones

Derek Allen Associates, P.O. Box 2229, Toluca Lake, CA, 91602 (818-840-8327) AZ, So.-CA, HI, So.-NV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Studio Monitoring; Microphones & Acces.; Signal Processors; Tape Machines Analog; Test & Measurement Equip.; Cable, Audio & Video

American Sound & Video Corp., 27,790 Ave. Hopkins, Valencia, CA, 91355 (805-257-0700) Nationwide, Tape Duplication

ASC Video Corporation, 3816 Burbank Blvd., Burbank, CA, 91505 (818-843-7004) CA, Video Editing Systems; Microphones & Acces.; Recording Tape; Tape Machines, Analog; Time Code Synchronizers

Associated Sound, 2120 P St., Sacramento, CA, 95816 (916-443-4773; 800-492-6800) CA, NV, Amplifiers; Consoles SR; Equalizers; Speakers; Microphones; Signal Processors, Tape Machines, Analog; Test & Measurement Equip.

Audio Intervisual Design, 1032 N. Sycamore, Los Angeles, CA, 90038 (213-469-4773) AZ, CA, CO, FL, GA, HI, IL, MI, NV, OR, TN, UT, VA, Amplifiers; Consoles, Recording & Production; Editing Systems; Equalizers; Loudspeakers, Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Recording Tape; Tape Duplication; Tape Machines, Analog & Digital; Time Code Synchronizers; Digital Interfaces

Audio LA, 11349 Santa Monica Blvd., Los Angeles, CA, 90025 (213-477-1516) AK, AZ, CA, CO, HI, OR, NV, NM, TX, UT, WA, A full service organization specializing in Music and Audio Production Systems for recording, video and film-scoring applications. Our expertise includes system design and installation, advanced SMPTE and MIDI engineering, and computer-assisted music systems

Audio Rents Inc., 7237 Santa Monica Blvd., Hollywood, CA, 90046 (213-874-1000) CA, Equalizers; Microphones & Acces.; Noise Reduction Systems; Signal Processors

Audio Services Corp., 4210 Lankershim Blvd., North Hollywood, CA, 91602 (818-980-9891) USA & Canada, Audio Equip.-Film, Video, Live Entertainment, News; Test & Measurement Equip.; Tape; Service & Repair; Used Equip.

Audio Village, P.O. Box 4692, Palm Springs, CA, 92263 (619-320-0728) USA, Asia, Canada, Europe, All Equip.-Used (Consignement & From Stock) Sales; Recording; PA; Musical Instruments; Computers; Replacement Heads

Bananas At Large, 802 Fourth St., San Rafael, CA, 94901 (415-457-7600) USA, GU, PR, VI, Amplifiers; Consoles, Recording Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement, Microphones & Acces.; Loudspeakers, Studio Monitoring; Microphones & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Berman Gravley Co., Inc., 350-B Fisher Ave., Costa Mesa, CA, 92626 (714-549-2122) So.-CA, So.-NV, Amplifiers; Microphone & Acces.; Portable P.A. Systems; Broadcast Circuitry; Signal Processor; Cables

B & L Sales, Inc., 10640 Magnolia Blvd., North Hollywood, CA, 91601 (818-985-1792) National, Microphones & Acces.; Recording Tape; Tape Duplication Equip.; Blank Cassettes; Cassette Recorders, Boxes & Labels; Empty Reels & Boxes; Recorder Care Accessories

Bowdish Associates, 4432 Ensenada

Drive, Woodland Hills, CA, 91364 (818-704-6324) AR, CA, HI, NV, UT, Amplifiers; Consoles; Recording & Production Equip.; Routing Switchers, Time Code Synchronizers; Equipment Racks & Cases

Broadcast Marketing Associates (BMA), 4196 Cleveland Ave., San Diego, CA, 92103 (619-295-0784) AZ, CA, Amplifiers; Consoles-Recording & Production; Editing Systems; Studio Monitoring; Microphones & Acces.; Signal Processors; Tape Machines; Test & Measurement Equip.; Time Code Synchronizers; Video Production & Editing Equip.

Christy's Editorial Film Supply, Inc., 135 N. Victory Blvd., Burbank, CA, 91502 (818-845-1755) USA, Recording Tape; Film Editing Equip.-Sales & Rentals Magnetic Film; Leaders; Editorial Tapes and Supplies

CMTV Inc., 1900 W. Burbank Blvd., Burbank, CA, 91506 (818-843-6644; 714-841-4397) CA, CT, DE, IN, MD, MA, NV, NJ, NY, OR, PA, RI, VT, WA, Amplifiers; Editing

Systems; Equalizers; Loudspeakers, Studio Monitoring; Microphones & Acces.; Recording Tape; Signal Processors; Tape Machines, Analog & Digital; Time Code Synchronizers; Studio Microphones

Creative Marketing Group Inc., 2720 Monterey St., Torrance, CA, 90503 (213-533-5112) USA & Canada, Consoles Recording, Production & Sound Reinforcement

Digital Dispatch, Inc., P.O. Box 4426, Burbank, CA, 91503 (818-952-FAST; 800-446-FAST) USA & Canada, Tape Machines, Analog & Digital; Time Code Synchronizers; Signal Processors; Recording Tape; Video Monitors; Equalizers; Digital Reverbs & Delays; MIDI Devices & Sound Samplers; Noise Reduction Systems; Microphones & Acces.; Synthesizers & Keyboards

Dan Dugan Sound Design, 290 Napoleon St., Studio E, San Francisco, CA, 94124 (415-821-9776) No.-CA, Tape Machines, Analog; Equalizers; Recording Tape

Educational Electronics Corp., P.O. Box 339, Inglewood, CA, 90306 (213-677-8167) National, Audio Cassette Duplicators

The Enright Co., 3965 Walnut Ave., Long Beach, CA, 90807 (213-595-4624) AZ, CA, NV, NM, HI, Test & Measurement Equip.; Time Code; Accessories; Digital Effects; Time Base Correctors; Video/Audio D.A.'s; Sync Generators; Cases; Miniature Chip Cameras

Everything Audio, 2721 W. Burbank Blvd., Burbank, CA, 91505 (818-842-4175) CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Loudspeakers, Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

See advertisement on page 15

Gefen Systems, 5068 San Feliciano Drive, Woodland Hills, CA, 91367 (818-884-6294) Nationwide, Disc Loaders; Editing Systems; Time Code Synchronizers; Software Packages

Goodman Music, 5311 Lankershim Blvd., North Hollywood, CA, 91601 (818-760-4430) So.-CA, Keyboards & Synthesizers; MIDI Products

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313/231-9373

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Haight Ashbury Music Center, 1540 Haight St., San Francisco, CA, 94117 (415-863-7327) CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement; Loudspeakers, Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital

Jensen Transformers, Inc., 10735 Burbank Blvd., North Hollywood, CA, 91601 (213-876-0059) USA & Canada, Amplifiers; Microphone Pre Amps; Audio Transformers; Moving Coil Cartridge Step-Up Units, AC-Circuit Analysis & Optimization Software; Phono Pre Amps; Power Amplifiers

See advertisement on page 32

KABA Research & Development, 24 Commercial Blvd., Suite E, Novato, CA, 94949-9959 (415-883-5041; 800-231-TAPE) USA, Canada, Central & South America, Recording Tape; Signal Processors; Tape Duplication; Tape Machines,

Analog; Cassette Labeling Equip. & Loading Equip.; Shrink Wrap Systems; Turnkey & Audio Cassette Duplication Systems

See advertisement on IBC

Leo's Audio & Music Technologies, 5447 Telegraph Ave., Oakland, CA, 94609 (415-652-1553) CA, NV, OR, WA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers; Microphones; MIDI Devices; Noise Reduction Systems; Tape; Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test Equip.; Time Code Synchronizers

Mated Hi-Fidelity, Inc., 2199 E Camino Real, San Mateo, CA, 94403 (415-573-6506) CA, Signal Processors; Computer Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems, Recording Tape

Mayhew & Co., 3115 W. Olive, Suite 6, Burbank, CA, 91505 (818-840-9293) CA, Wireless Microphones; Sales; Rental; Service

Sye Mitchell Sound Co. Inc., 22301 Cass Ave., Woodland Hills, CA, 91364 (818-348-4977) Worldwide, Amplifiers; Consoles, Recording & Production; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Noise Reduction Systems; Signal Processors; Tape Machines, Analog & Digital; Time Code Synchronizers

John Muehsam, 6375 Zuma Mesa Drive, Malibu, CA, 90265 (213-457-7728) CA, Commercial Music Production

New World Audio Express, 4792 Clairemont Mesa Blvd., San Diego, CA, 92117 (619-569-1944; 800-854-2005) USA, Amplifiers; Consoles (recording, production, sound reinforcement); Editing Systems; Equalizers; Loudspeakers (sound reinforcement, studio monitoring); Microphones & Acces.; MIDI Devices & Sound Samplers, Noise Reduction Systems; Recording Tape;

Signal Processors; Synthesizers & Keyboards, Tape Duplication; Tape Machines (analog), Time Code Synchronizers

Ocean Audio, 366 Las Casas, Pacific Palisades, CA, 90272 (213-459-2743) National, Used Equipment Broker, All Products Handled

Pacific Coast Marketing, 14125 Capri Drive, Los Gatos, CA, 95030 (408-370-3505) CA, NV, Cart Machines & Carts; Test & Measurement Equip.

Pacific Radio Electronics, 1351 Ca- huenga Blvd., Hollywood, CA, 90028 (213-462-1393; 818-762-8950; 714-641-7433) National By Catalog, Wire & Cable; Connectors; Patching Systems; Tool & Technical Aids; Cleaning & Maintenance Supplies

Patterson & Associates, 2555 E. Chapman Ave., Suite 300, Fullerton, CA, 92631 (714-992-1422) CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Signal Processors; MIDI Devices & Sound Samplers; Synthesiz-

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ers & Keyboards, Tape Duplication; Tape Machines Analog

Peoples Music, 122 N. Main St., Sebastopol, CA, 95472 (707-823-7664) CA, Amps; Loudspeakers; Microphones; Recording Tape; Signal Processors

Plaza Music, 6901 La Palma, Buena Park, CA, 90620 (714-522-3553) CA, Amplifiers; Consoles Sound Reinforcement; Equalizers Sound Reinforcement; Microphones & Acces.; MIDI Devices & Sound Samplers, Noise Reduction Systems; Signal Processors; Synthesizers & Keyboards; Time Code Synchronizers; Tape Machines, Analog

Plus Four Marketing, 1360 N. Main St., Walnut Creek, CA, 94596 (415-937-0650) No.-CA, No.-NV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitors; Signal Processors; Tape Machines Analog; Computer Controlled Audio Systems; Microphone & Inter-face Cable

Pro Media, 185 Berry St., Suite 358, San Francisco, CA, 94107 (415-957-1383) No.-CA, Am-

plifiers; Consoles Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Tape Machine Analog; Equipment Rental; Complete Sound System Design & Installation

Professional Audio Services & Supply Co., 619 S. Glenwood Place, Burbank, CA, 91506 (818-843-6320) CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; MIDI Devices & Sound Samplers; Microphones & Acces.; Signal Processors; Tape Duplication; Tape Machines, Analog; Loudspeakers, Sound Reinforcement & Studio Monitoring

Rainbow Park, 1033 Battery St., Suite 204, San Francisco, CA, 94111 (415-421-2875) CA, Amplifiers; Consoles, Sound Reinforcement; Microphones & Acces.; Recording Tape; Tape Duplication; Tape Machines, Analog; Multi-Image Control Equip.

RGS-Richard Griffin Sales, 8519 Chester St., Paramount, CA, 90723 (213-634-3042) So.-CA, Con-

soles Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Noise Reduction Systems; Signal Processors; Tape Machines, Analog; Time Code Synchronizers; Full Line Video & Photographic Equip.

RTS Systems, Inc., 1100 W. Chestnut St., Burbank, CA, 91506 (818-840-7119) USA and Canada, Headsets & Headphones

Santa Cruz Sound Co., 2-1513 E. Cliff Drive, Santa Cruz, CA, 95062 (408-475-0768) Monterey Bay & San Francisco Metro. Areas, Amplifiers; Consoles; Equalizers; Loudspeakers (Loudspeaker Reconciling-Electronic Repair); Microphones; DJ Supplies; Sound Systems Rental, Microphone Stand Repair

Sawyer Camera & Video Co., 1208 W. Isabel St., Burbank, CA, 91506 (818-843-1781; 800-423-7779) AK, AZ, AR, CA, CO, GU, HI, ID, IL, IN, IA, KS, KY, LA, MI, MN, MS, MO, MT, NE, NV, NM, ND, OK, OR, SD, TX, UT, WA, WI, BC in Canada, Amplifiers; Loudspeakers; Microphones

Sequoia Electronics, 209 Lester Lane, Los Gatos, CA, 95032 (408-356-3232) AK, AZ, CA, HI, ID, NV, NM, OR, WA, Equalizers; Signal Processors; Tape Machines, Analog; Magnetic Tape Heads; Recorder Care Products; Test Tapes, Carts & Cassettes; Clocks & Timers; Repair Parts

Doc Siegel Audio Services, 5755 Cor-teen Place, North Hollywood, CA, 91607 (213-877-2300) USA, Amplifiers; Equalizers; Microphones & Acces.; Recording Tape; Signal Processors; Tape Machines, Analog; RF Equip.

Simon Systems, 707 Clear Haven Drive, Agoura Hills, CA, 91301 (818-707-9980) USA, Signal Processing; Direct Boxes; Headphone Cue Boxes; Power Supplies; Electronic Consulting

Skip's Music, Inc., 2740 Auburn Blvd., Sacramento, CA, 95821 (916-484-7575) No.-CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Re-

Washington Professional Systems

Soundcraft TS24 In-line Console

- Available in frame sizes of 24, 32, 40, 48 & 56
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cording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog

The Sound Center, 9278 Civic Center Drive, Beverly Hills, CA, 90210 (213-274-6951) CA, Amplifiers; Equalizers; Loudspeakers, Studio Monitoring; Microphones & Acces.; Noise Reduction Systems; Recording Tape; Signal Processors; Tape Machines, Analog

Sound Expressions, 3249 Santa Rosa Ave., Santa Rosa, CA, 95407 (707-528-3565) CA, HI, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring, Microphone & Acces.; MIDI Devices & Sound Samplers; Signal Processors

South Bay Sound & Light, P.O. Box 174, El Segundo, CA, 90245 (213-322-6059) Greater Los Angeles Area, Loudspeakers, Sound Reinforcement; Microphones; Amplifiers; Consoles; Signal Processors; Stage Lighting Equip.

Stanislaus Audio Visual, 1431 Kansas Ave., Modesto, CA, 95351 (209-529-2700; 800-341-1441) CA, Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Tape Machines, Analog; Tape Duplication

Suntronics, P.O. Box 734, Upland, CA, 91786 (714-985-0701) So.-CA, Remote Controls

Tele-MIDI, 30 N. Raymond Ave., Suite 601, Pasadena, CA, 91103 (818-584-5814; 800-356-MIDI) USA & Canada, MIDI Services & Sound Samplers; MIDI Software & Peripherals

Thrifty Electronic Supply Co., 13643 Burbank Blvd., Van Nuys, CA, 91401 (818-786-1610) CA, Amplifiers; Equalizers; Loudspeakers, Studio Monitoring & Acces.; Recording Tape; Tape Machines, Analog & Digital

Todd Tillemans Audio, 923 W. Third St., Azusa, CA, 91702 (818-969-6910) CA, Audio Acoustic Foam; New & Used Equipment Sales

T.M.B. Associates, 3416 W. Burbank, Burbank, CA, 91505 (818-842-9651) USA, Cable & Connectors; Cases; Lighting Equip.; Microphones, Studio; Patchbay & Jack Panels; Peripheral & Miscellaneous Acces.

Brian Trankle & Associates, 1504 Industrial Way, Suite 4, Belmont, CA, 94002 (415-595-4004) CA, HI, NV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring;

Microphones & Acces.; MIDI Devices & Sound Samplers

VIF International, P.O. Box 1555, Mountain View, CA, 94502 (408-739-9740) Worldwide, Recording Tape; Spare Parts for Professional A/V Recorders; Motor Remanufacturing

West LA Music, 11345 Santa Monica Blvd., Los Angeles, CA, 90025 (213-477-1945) Nationwide, mostly-CA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems;

Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring, Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape Signal-Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Westlake Audio, 7265 Santa Monica Blvd., Los Angeles, CA, 90046 (213-851-9800) USA, Pro Audio Equip.

See advertisement on page 65

Westwood Musical Instruments, Inc., 2301 Purdue Ave., Los Angeles, CA, 90064 (213-478-4251) USA & Canada, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Studio Monitoring & Sound Reinforcement; Microphones & Acces.; MIDI Devices & Sound Samplers; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Machines; Time Code Synchronizers; MIDI Guitar Systems; Acoustic & Electric Guitars; Electronic Service; Guitar Repair

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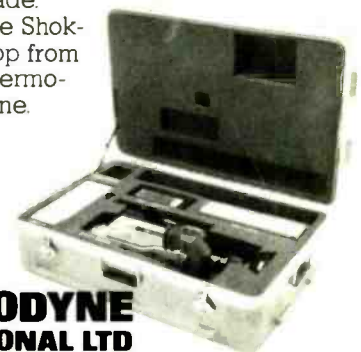
Shok-Stop™ cases are tough. Hit the road with them once, and you'll know exactly what we're talking about.

Built like no other, Shok-Stop cases can take a beating that would turn other cases into so much scrap metal and sawdust. The Shok-Stop's rugged high density polyethylene shell, with its unique ribbed design, absorbs virtually all impact shock. The little remaining vibration reaching the interior is instantly overcome by the high density custom fitted foam. And, your very valuable extremely sensitive broadcast equipment is left totally unharmed.

Shok-Stop cases are water tight, scuff resistant and are the only field repairable cases on the market today. They can be ordered with optional EMI/RFI shielding and pressure release valves.

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80110 (303-761-7940) CO, Recording
Tape; Tape Duplication

Kart Kair, 9445 West 52nd Ave.,
Denver, CO, 80002 (303-422-7219)
Worldwide, Recording Tape & Cartridges;
Broadcast Carts & Products; Cartridge
Remanufacturing

Mirrmore Audio, 7150 West 38th

Ave., Wheatridge, CO, 80033
(303-431-2348) CO, CA, ID, KS,
MT, NE, NJ, NM, NY, UT, WY,
Amplifiers; Consoles, Sound Rein-
forcement & Recording & Produc-
tion; Editing Systems; Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Microphones &
Acces.; MIDI Devices & Sound Sam-
plers; Noise Reduction Systems; Re-
cording Tape; Signal Processors;
Tape Machines, Analog; Test &
Measurement Equip.; Time Code
Synchronizers

Wind Over The Earth, Inc., 1135 Pearl

St., Suite 7, Boulder, CO, 80302
(303-443-9822) CO, Amplifiers;
Equalizers; Microphones & Acces.;
Noise Reduction Systems; Recording
Tape; Signal Processors; Tape Du-
plication; Tape Machines, Analog &
Digital; Time Code Synchronizers

CONNECTICUT

John B. Anthony Co., 922 High Ridge
Road, Stamford, CT, 06905
(203-322-9202; 212-585-
2027) Metro-NY, Amplifiers, Con-

soles, Recording, Production &
Sound Reinforcement; Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Microphones;
Noise Reduction Systems; Signal
Processors; Tape Duplication; Tape
Machines, Analog & Digital; Test
& Measurement Equip.; Time Code
Synthesizers

Cassette Tek, 408 Woodbury Road,
Watertown, CT, 06795 (203-
274-6955) CT, ME, MA, NH, RI,
VT, Cassette Duplication & Equip.

The Music People, Inc., P.O. Box 648,
West Hartford, CT, 06107
(203-521-2248) USA, Signal
Processors; Loudspeakers, Sound
Reinforcement; Microphones &
Acces.; Headphones; Stereo Mixers

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AMP Services, 224 Datura St., Suite
614, West Palm Beach, FL, 33401
(305-659-4805; 800-826-
0601) Worldwide, Parts for: Tape
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log

Computers & Music, 19470 N.W.
59th Ave., Miami, FL, 33015
(305-620-4483) Miami, Carib-
bean, MIDI & Recording Studio Con-
sultant; Recording Studio;
Monitoring; Computer Sequencing

Harris Audio Systems, Inc., 1962 N.E.
149th St., N. Miami, FL, 33181 FL,
PR, VI, Amplifiers; Consoles, Record-
ing, Production & Sound Reinforce-
ment, Editing Systems, Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Noise Reduc-
tion Systems; Recording Tape; Signal
Processors; Tape Duplication; Tape
Machines, Analog & Digital; Time
Code Synchronizers

GEORGIA

American Sound & Video Corp., 2225
Faulkner Road N.E., Atlanta, GA,
30324 (404-633-4577) Nation-
wide, Tape Duplication

National Sound & Video Engineering,
1756 Wilwat Drive, Norcross, GA,
30093 (404-447-1717 AL, GA,
NC, SC, TN, Amplifiers; Consoles,
Recording, Production & Sound
Reinforcement; Editing Systems;
Equalizers; Loudspeakers, Sound
Reinforcement & Studio Monitoring;
Microphones & Acces.; MIDI Devices
& Sound Samplers; Noise Reduction
Systems; Recording Tape; Signal
Processors; Synthesizers & Key-
boards; Tape Duplication; Tape Ma-
chines, Analog & Digital; Test
Measurement Equip.; Time Code
Synchronizers

MegaMix™

MOVING FADER GRAPHICS

- Uses MTA 1537 VCA
- Low noise high quality audio specs
- Easily interfaces to any console
- 16-40 Channels in one 3 space rack. 80 Channel capability

- Software runs on IBM and Mac PC (Atari ST available soon)
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MegaMix made easy what could have been a potentially difficult mix

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With MegaMix. All I used was a \$1250.00 mixing console

Jeffrey Reid Baker
"The MegaMix system has given my studio a whole new meaning"

Frank Serafine
"I am very excited about incorporating MegaMix into my system"

Herbie Hancock

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- Reshapes Time Code for copying
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regular
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\$395.00

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Studio Monitoring; Microphones &
Acces.; Signal Routing & Patching
Equip.; Cables; Studio Editing & Pro-
duction Supplies; Studio D-Mag &
Erase Products; Tape Reels & Boxes

WJR Distributors, Inc., 4451 Log
Cabin Drive, Suite 132, Smyrna, GA,
30080 (800-423-8859) AL, GA,
MS, NC, SC, TN, Amplifiers; Con-
soles, Recording, Production &
Sound Reinforcement; Loudspeakers,
Sound Reinforcement & Studio
Monitoring; Microphones; Noise Red-
uction; Signal Processors; Tape Ma-
chines, Analog; Time Code Synchron-
izers; Test & Measurement
Equip.

HAWAII

Full Circle Music Center, 1901 Kapi-
olani Blvd., Honolulu, HI, 96826
(808-941-3944) HI, Amplifiers;
Consoles, Recording, Production &
Sound Reinforcement; Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Microphones &
Acces.; MIDI Devices & Sound Sam-
plers; Recording Tape; Signal
Processors; Synthesizers & Key-
boards; Tape Machines, Analog;
Time Code Synchronizers; Music
Software, Compilers

ILLINOIS

AAA Swing City Music, 1312 Van-
dalia, Collinsville, IL, 62234
(618-345-6700) IL, MO, Amplifiers;
Consoles; Recording, Production
& Sound Reinforcement; Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Microphones &
Acces., MIDI Devices & Sound Sam-
plers; Noise Reduction Systems; Re-
cording Tape; Signal
Processing; Synthesizers & Key-
boards; Tape Machines, Analog;
Time Code Synchronizers

Audio Resources, Inc., 778 Burr Oak
Drive, Westmont, IL, 60559
(312-665-1180) IL, IN, KY, MN,
ND, WI, SD, Amplifiers; Consoles,
Recording, Production & Sound
Reinforcement; Equalizers; Loud-
speakers, Sound Reinforcement &
Studio Monitoring; Microphones &
Acces.; Noise Reduction Systems;
Signal Processors; Tape Machines,
Analog & Digital; Test & Measure-
ment Equip.; Time Code Synchron-
izers

Bridgewater Custom Sound, P.O. Box
135, South Holland, IL, 60473
(312-596-0309) IL, IN, MI, WI,

Amplifiers; Consoles, Recording,
Production & Sound Reinforcement;
Equalizers; Loudspeakers, Sound
Reinforcement & Studio Monitoring;
Misc. & Accessories; Noise Reduc-
tion Systems; Recording Tape; Signal
Processors; Tape Duplication; Tape
Machines, Analog; Test & Measure-
ment Equip.; Time Code Synchron-
izers

See advertisement on page 102

Columbia Audio/Video, 1741 Second
St., Highland Park, IL, 60035

(313-433-6010) IL, IN, IA, MO,
WI, Consoles; Editing Systems; Mi-
crophones & Acces.; Recording Tape

D J's Pro Audio, 7009 W. Ogden,
Berwyn, IL, 60402 (312-863-
7400) IL, IN, WI, Amplifiers; Con-
soles, Recording & Sound Reinforce-
ment; Equalizers; Loudspeakers,
Studio & S.R.; MIDI Devices & Sam-
plers; N.R. System; Tape; Signal
Processors; Synthesizers & Key-
boards; Tape Machines, Analog;
Time Code Synchronizers; Music

Software

Milam Audio Co., 1470 Valle Vista,
Pekin, IL, 61554 (309-346-
3161) USA, Amplifiers; Consoles,
Recording, Production & Sound
Reinforcement; Editing Systems;
Equalizers; Loudspeakers, Sound
Reinforcement & Studio Monitoring;
Microphones & Acces.; MIDI Devices
& Sound Samplers; Noise Reduction
Systems; Recording Tape; Signal-
Processor; Synthesizers & Key-
boards; Tape Duplication; Tape

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If you're upgrading for better sound, be sure to include Gauss coaxial monitors in your plans. Your choice of 12" or 15". Remember, if you can't hear the mistakes, they end up in your finished product. Let your speakers be the strongest link!

Call us today for the name of your nearest dealer or rep so you can arrange a demonstration.



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213/815-1900 Telex 194989

Circle (53) on Rapid Facts Card

Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

New Horizons Electronic Marketing, 2211 Lakeside Drive, Bannockburn, IL, 60015 (312-234-6500) Upper half-IL, So-WI, Amplifiers; Consoles; Equalizers; Loudspeakers; Microphones; Signal Processors

Douglas Ordon & Co., Inc., 230 E. Ohio St., Suite L-02, Chicago, IL, 60611 (312-440-0500) IL, IN, IA, MI, MN, MO, WI, Amplifiers; Consoles, Recording, Production & Sound Reinforcement, Loudspeakers, Studio Monitoring; Noise Reduction Systems; Signal Processors; Test & Measurement Equip., Time Code Synchronizers; Disk Based Digital Recorder/Editor

Pyramid Audio Inc., 450 W. Taft Drive, South Holland, IL, 60473 (312-339-8014) AR, IL, IN, IA, KS, KY, MI, MN, MO, NE, ND, OH, SO, WI, Amplifiers; Consoles-Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers-Sound Reinforcement & Studio Monitors; Microphones, MIDI;

Noise Reduction; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines Analog & Digital; Time Code Synchronizers

Sound Core Music, 715 S. University, Carbondale, IL, 62901 (618-457-5641) IL, IN, MO, KY, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test Measurement Equip.; Time Code Synchronizers

Studio-Sonics Corp., 1165 Tower Road, Schaumburg, IL, 60173 (312-843-7400) IL, IN, IA, KS, MI, MN, MO, OH, WI, Amplifiers; Consoles, Recording & Production; Equalizers; Loudspeakers, Studio Monitoring; Microphones & Acces.; Noise Reduction Systems; Signal

Processors; Tape Machines Analog-Tape Machines, Digital; Time Code Synchronizers; Cable & Connectors

Tek Media Supply Co., 4700 W. Chase Ave., Lincolnwood, IL, 60646 (312-677-3000; 800-323-7520) National, Video/Film Supplies & Acces.; Storage Systems

Video Basics, Inc., 1220 Richards St., Joliet, IL, 60433 (815-726-6411) IL, IN, WI, Editing Systems; Microphones & Acces.; Video Production Equipment Sales; Cases

Consoles, Sound Reinforcement; Equalizers; MIDI Devices; Synthesizers & Keyboards; Signal Processor; Loudspeakers, Sound Reinforcement

IRC Audio Inc., 8112 Castleway Court W., Indianapolis, IN, 46250 (317-849-6887) IL, IN, KY, MI, OH, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers Sound Reinforcement & Studio Monitoring; Microphones & Acces., MIDI; Noise Reduction Systems, Recording Tape; Signal Processors; Tape Machines Analog; Test & Measurement Equip.; Time Code Synchronizers

INDIANA

Fox Electronics Co. Inc., 711 S. Ninth St., Richmond, IN, 47374 (317-935-7343) IN, KY, MI, OH, Amplifiers; Consoles, Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement; Microphones & Acces.

Greencastle Music Center, 500 N. Jackson St., Greencastle, IN, 46135 (317-653-3916) IN, Amplifiers;

LOUISIANA

Shreveport Music Co. Inc., 1610 E. Bert Kouns, Shreveport, LA, 71105 (318-798-6000; 318-797-MIDI) AR, LA, TX, Amplifiers; Consoles Recording & Sound Reinforcement; Equalizers; Loudspeaker, Sound Reinforcement & Studio; Microphones; MIDI Devices; Noise Reduction Systems; Signal Processors; Synthesizers

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Options: • Printer (parallel) interface • Internal, rechargeable battery pack
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- Unique "Floating Subgroup System"**
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- 8 Effects send busses per module**
- Stereo "In-place" solo and PFL (pre-fade listen)**
- Hand-crafted cabinetry with pedestal base**
- Digital quality specifications**

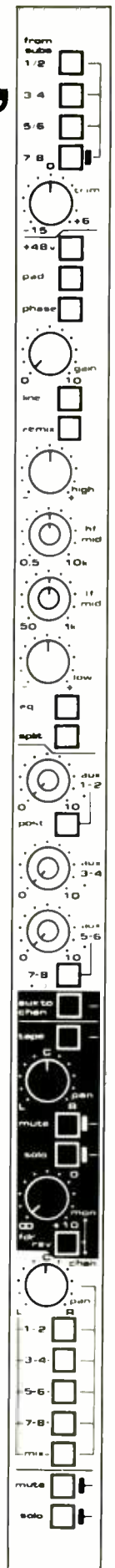


Crafted By:

D&R

D&R USA
1720 Chip N Dale Drive
Arlington, TX 76012
Ph. (817) 548-1677
FAX 817-277-6066

D&R Electronica b.v.
Rijnkade 15B
1382 GS Weesp, Holland
Ph. 02940-18014
FAX 2940-16987



Beyond Comparison

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Specialty Sound Co. Inc., P.O. Box 4139, Monroe, LA, 71211 (318-387-3628) LA, Amplifiers; Consoles, Sound Reinforcement; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Signal Processing; Synthesizers & Keyboards; Tape Machines, Analog

MARYLAND

Avtecs, 619 Hungerford Drive, Rockville, MD, 20850 (301-279-2500) DC, MD, VA, Amplifiers; Consoles; Editing Systems; Equalizers; Noise Reduction; Signal Processors; Tape Duplication; Recorders Analog & Digital

MASSACHUSETTS

Boston Light & Sound Inc., 124 Brighton Ave., Allston, MA, 02134 (617-787-3131) CT, ME, MA, NH, RI, VT, Amplifiers; Consoles, Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement

& Studio Monitors; Microphones & Acces.; Signal Processors

E.A.R.S., 3 Hanson St., Boston, MA, 02118 (617-423-9565) USA, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Signal Processors; Time Code Synchronizers; Transformers

Lake Systems Corp., 287 Grove St., Newton, MA, 02166 (617-244-6881) CT, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Studio Monitoring & Sound Reinforcement; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Tape Machines, Analog & Digital; Time Code Synchronizers

LaSalle Audio Systems, P.O. Box 820, Astor Station, Boston, MA, 02123 (617-536-2030) CT, ME, MA, NH, RI, VT, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound

Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Music Designers, Inc./Precision Motor Works, 241 White Pond Road, Hudson, MA, 01749 (617-562-4420) USA, Microphones & Acces.; Tape Machines, Analog; Cleaning Fluids; Motor Servicing & Rebuilding

Professional Audio Associates Inc., 170 Cambridge St., Burlington, MA, 01803 (617-229-6050) New England States, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Test & Measurement Equip.; Time Code Synchronizers

Star Systems, 462 Merrimack St., Methuen, MA, 01844 (617-

794-9399) CT, ME, MA, NH, RI, VT, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers, Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces., MIDI Devices & Sound Samplers; Noise Reduction; Recording Tape; Signal Processors; Synthesizers, Analog Tape Machines, Time Code Synchronizers

MICHIGAN

The Audio Broadcast Group, Inc., 2342 S. Division Ave., Grand Rapids, MI, 49507 (616-452-1596) USA, Amplifiers; Consoles, Recording & Production; Equalizers; Loudspeakers, Studio Monitoring; Microphones; Noise Reduction; Tape Machines, Analog; Studio Furniture

Cooks Music, 615 N. Mission, Mount Pleasant, MI, 48858 (517-772-2455) MI, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement, & Studio Monitoring; Microphones & Acces., MIDI Devices & Sound Samplers;

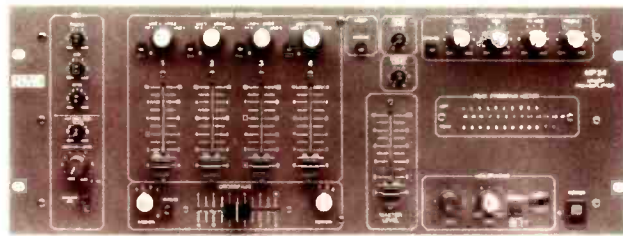
NO NOISE.

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**CHUCK LEVIN'S
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KING OF CLUBS



Go downtown and look around. The fancy pants dance where the music is cool. And the smoothest, easiest way to perfect a club's sound is Rane's innovative MP 24.

We've loaded this new Stereo Program Mixing Console to the gills with features. You're looking at more flexibility and performance in this one unit than in any other mixer/preamp made. Furthermore, it's got the highest level of signal quality: noise and distortion are virtually eliminated. And it's priced at \$1099.

Here's a partial rundown of why the MP 24 just made the competition obsolete. Nine stereo inputs (three phono and six line)

are accessed through four stereo mixing buses, each with its own 4-position selector switch and Alps studio grade 60mm slider. Crossfade is completely assignable via another 60mm slider and two selector switches. Then there's

separate mic and program EQ, mic and program loops, master balanced outputs, zone and booth outputs, light trigger output, cue system... whew! And that's not the half of it.

Those in the know are already saying our MP 24 will be the industry standard. But why be modest? We think it'll be the king.

Rane Corporation, 6510 216th Southwest,
Mountlake Terrace, WA 98043. 206/774-7309.



**RIGHT
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RANE**

Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication, Tape Machines, Analog; Test & Measurement Equip.; Time Code Synchronizers

FiFe-Pearce Electric Co., 17141 Ryan Road, Detroit, MI, 48212 (800-521-1062) Nationwide, Tape Eraser Equip. Video/Audio

Hy James - The Audio Professionals, 24166 Haggerty, Farmington Hills, MI, 48024 (313-471-0027) IL, IN, MI, OH, WI, Consoles; Tape Recorders; Cartridge Machines; CD Players; Microphones; Direct Boxes; Speakers; Amplifiers; Reverberation; Signal Processing; Equalization; Noise Reduction; TT & Cartridges; Intercoms; Telephone Interfaces; Headphones; Recording Tape; Film & Video; Clock Systems; SMPTE Time Code/MIDI; Test Equip.; RF; Accessories

Key Marketing, Inc., 44808 Helm St., Plymouth, MI, 48170 (313-459-6040) MI, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices; Signal Processing; Tape Machines, Analog; Time Code Synchronizers

The Music Castle, Inc., 34 S. Telegraph, Pontiac, MI, 48053 (313-682-0544) MI-primarily metro Detroit & surrounding area, Amplifiers; Consoles, Sound Reinforcement; Loudspeakers, Sound Reinforcement; Equalizers; Microphones & Acces.; Noise Reduction Systems; Signal Processors; Tape

Machines, Analog

The Music Castle, Inc., 1418 N. Woodward, Royal Oak, MI, 48067 (313-543-5070) MI-primarily metro Detroit & surrounding area, Amplifiers; Consoles, Sound Reinforcement; Loudspeakers, Sound Reinforcement; Equalizers; Microphones, Acces.; Noise Reduction Systems.; Signal Processors; Tape Machines, Analog

MINNESOTA

American Audio Systems, 4834 Park Glen Road, St. Louis Park, MN, 55416 (612-929-4000) Nationwide, Amplifiers, Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Southern Thunder Sound, Inc., 212 Third Ave. N., Minneapolis, MN, 55401 (612-339-6303) IA, MN, NE, ND, SD, WI, Man., Loudspeakers, Sound Reinforcement; Signal Processors; Rigging; Amplifiers; Equalizers; Acoustic Design & Construction; Microphones & Acces.; Amplifiers

See advertisement on page 70

Yore Co., 3564 Rolling View Drive, White Bear Lake, MN, 55110 (612-770-9760) MN, ND, SD, West-WI, Amplifiers; Consoles, Recording, Production, & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Signal Processors; Tape Machines, Analog; Test & Measurement Equip.; Intercom; School Intercom Telco Equip.

MISSOURI

Paradise Sight & Sound, 1620 S. Broadway, St. Louis, MO, 63104 (314-421-1211) FL, GA, IL, MA, MO, VI, Amplifiers; Consoles, Recording & Production; Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement; Recording Microphones & Acces.; Noise Reduction; Recording Tape-Signal Processors; Tape Machines, Analog; Time Code Synchronizers

NEBRASKA

Midwest Sound & Lighting, Inc., 2324 O St., Lincoln, NE, 68510 (402-474-4918) IA, KS, MO, NE, SD, Amplifiers; Consoles, Recording, Production and Sound Reinforcement; Editing Systems; Equalizers;

Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog; Test & Measurement Equip.

Midwest Sound & Lighting, Inc., 308 South 72nd St., Omaha, NE, 68114 (402-399-8028) IA, KS, MO, NE, SD, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog; Test & Measurement Equip.

NEW HAMPSHIRE

Interface, 660 S. Main St., Keene, NH, 03431 (603-357-5040) ME, MA, NH, VT, Amplifiers; Equalizers; Loudspeaker SR & Monitor; Microphones; Recording Tape; Tape Machines, Analog

Promusica Sales, 93 Roxbury St., Keene, NH, 03431 (603-352-4831) CT, ME, MA, NH, NJ, NY, RI, VT, Amplifiers; Consoles, Recording & Sound Reinforcement; Equalizers, Loudspeakers; Microphones; MIDI Devices; Signal Processors; Test & Measurement Equip.; Software

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For a catalog and a list of over 60 dealers in the USA and Canada, contact J. G. (Jay) McKnight at:

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The MRL Calibration Graph is your proof of the quality control that goes into every MRL Reproducer Calibration Tape. We guarantee each one to exceed the performance requirements of IEC, NAB, AES, and EIA Standards.

MRL Calibration Tapes are designed and supported by experts in magnetic recording and audio standardization... we helped write the standards. Each tape comes with detailed instructions and application notes.

The MRL catalog includes tapes for all studio applications. In addition to the usual spot-frequency tapes, we make single-tone tapes, rapid-swept frequency tapes, wideband or 1/3rd octave-band pink random noise tapes, and difference-method azimuth-setup tapes. Most are available from stock.

Tape Fluxivity Level vs Value in Table (overleaf) (dB)

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NEW JERSEY

American Sound & Video Corp., 3
Fairfield Crescent, West Caldwell,
NJ, 07006 (201-575-8484) Na-
tionwide, Tape Duplication

Gabriel Sound, P.O. Box 34, Haskell,
NJ, 07420 (201-835-5004) CT,
No.-NJ, NY, Amplifiers; Mikes;
Stands; Speakers; Speaker Cabinets;
Servo-Bass; Flight Cases; Process-
ing; Consoles; Complete Tour Pack-
aging; Custom Multi-Pin Work;
Speaker Reconing & Electronic
Maintenance

Impact Audio, 175 Hornblower Ave.,
Belleville, NJ, 07109 (201-
759-0261) CT, NJ, NY, Amplifiers;
Consoles Recording, Production &
Sound Reinforcement; Equalizers;
Loudspeakers Sound Reinforcement
& Studio Monitoring; Signal Proces-
sors; Flight Cases

JRF Magnetic Sciences, 249 Kennedy
Road, Greendell, NJ, 07839
(201-579-5773) USA, Magnetic
Recording Heads; Sales & Service

Noise Unlimited, Inc., 104 S. Bridge
St., Somerville, NJ, 08889
(201-725-1700) CA, CT, DE, DC,
IL, IN, ME, MD, MA, MI, MN, MO, NH,
NJ, NY, NC, OH, OK, PA, TX, VT, VA,
WA, Acoustical Testing, Consulting
& Engineering

Professional Audio Video Corp., P.O.
Box 14, Towaco, NJ, 07082
(201-523-3333) USA, Amplifi-
ers; Consoles, Recording, Production
& Sound Reinforcement; Equalizers;
Loudspeakers, Sound Reinforcement
& Studio Monitoring; Microphones &
Acces.; Noise Reduction Systems;
Recording Tape; Signal Processing;
Tape Machines, Analog

Peter E. Schmitt Co., Inc., 240 Grand
Ave., Leonia, NJ, 07605-0334
(201-944-2806) NJ, NY, Amplifi-
ers; Consoles, Recording & Produc-
tion; Equalizers;
Loudspeakers Sound Reinforcement;
Microphones & Accessories; Digital
Reverbs; Aural Exciters, Speakers

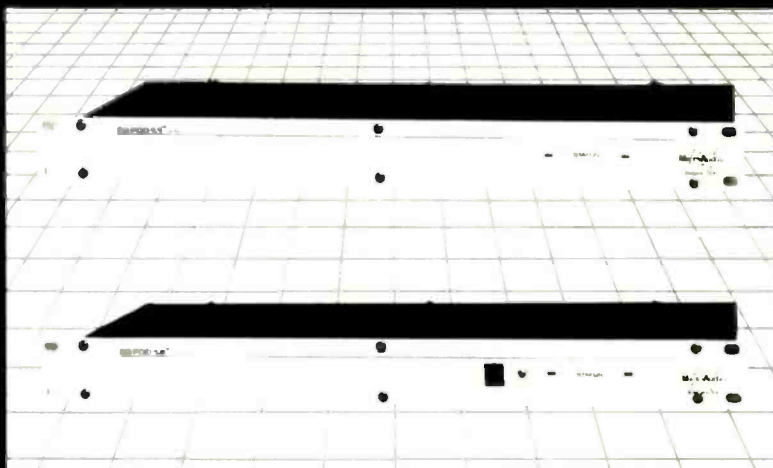
NEW YORK

Acoustilog, Inc., 19 Mercer St., New
York, NY, 10013 (212-925-
1365) CT, NJ, NY, Consoles, Re-
cording & Production; Microphones
& Acces.; Recording Tape; Signal
Processors

Remote

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The MicroAudio PODs can do it for you!

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Patent Pending

Alex Musical Instruments, Inc., 164 West 48th St., New York, NY, 10036 (212-819-0070) USA, Amplifiers, Consoles, Recording, Production & Sound Reinforcement; Editing Systems, Equalizers, Loudspeakers, Sound Reinforcement & Studio Monitoring, Microphones & Acces., MIDI Devices & Sound Samplers, Recording Tape; Signal Processors, Synthesizers & Keyboards, Tape Duplication, Tape Machines, Analog; Time Code Synchronizers; Video, MIDI Computer Software

Aura Sonic Ltd, P.O. Box 791, Flushing, NY, 11352-0791 (718-886-6500) USA, Cable, Connectors; Compressors; Crossovers & Frequency Dividers; Delays; Drum Machines; Equalizers; Rentals; Limiters; Microphones; Noise Gates; Patch Bays; Recording Tape Audio & Video; Reverb Units; Signal Processors, Samplers

Brighton Sound, Inc., P.O. Box 60977, Lyell Station, Rochester, NY, 14606 (716-328-1220) NY, PA, Amplifiers; Consoles, Recording Pro-

duction & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Recording Tape; Signal Processor; Synthesizers & Keyboards, Tape Machines, Analog; Time Code Synchronizers

Burlington Audio/Video Tapes, Inc., 106 Mott St., Oceanside, NY, 11572 (516-678-4414; 800-331-3191) NATIONWIDE, Recording Tape & Accessories (Audio & Video)

Camera Mart Inc., 456 West 55th St., New York, NY, 10019 (212-757-6977) CA, CT, DE, IN, MD, MA, NV, NJ, NY, OR, PA, RI, VT, WA, Amplifiers; Editing Systems; Equalizers; Loudspeakers & Studio Monitoring; Microphones & Acces.; Recording Tape; Signal Processors; Tape Machines, Analog & Digital; Time Code Synchronizers

Colotti Enterprises, P.O. Box 639, Levittown, NY, 11756 (516-221-0974) Nationwide, Hard Drives; Modems; Tape Back Ups

Eastern Standard Productions, Inc., 26 Baxter St., Buffalo, NY, 14207 (716-876-1454) NATIONWIDE, CANADA, ENGLAND, FRANCE, Blank Audio & Video Cassettes, Vinyl Folder Audio & Video; Video Boxes

Manny's Music/Professional Audio Div., 156 West 48th St., New York City, NY, 10036 (212-819-0576) CT, MA, NJ, NY, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards, Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Martin Audio Video Corp., 423 West 55th St., New York, NY, 10019 (212-541-5900) CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loud-

speakers, Sound Reinforcement & Studio Monitoring; Microphones & Accessories; MIDI Devices & Sound Samplers, Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards, Tape Duplication; Tape Machines, Analog & Digital; Test Equip.; Time Code Synchronizers

See advertisement on page 62

Merimack Sound, 901 Monroe Ave., Rochester, NY, 14620 (716-442-5050) NY, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

L. Matthew Miller Associates Ltd., 48 West 21st St., New York, NY, 10010 (212-741-8011) USA, CANADA, EUROPE, SOUTH

MASTER MIX

'It's clean, quiet and reliable. There is virtually no change of sound quality or noise. It is intuitive in its operation. I used it for a week before I even read the manual.'

John Rotundi, Chief Engineer of Sound Services Inc.

'Having used MasterMix I don't know how I managed before. It takes the drudgery out of remixing.'

Ken Gordon, Joint Managing Director, Saunders and Gordon Ltd.

'It's automatic to go to MasterMix. I couldn't work without it.'

Robin Saunders, Joint Managing Director, Saunders and Gordon Ltd.

'The mixing process was flawless on four consecutive albums. I especially enjoyed the compare feature.'

Richard Landis, Country & Western Producer, of Richard Landis Studio, L.A.

'MasterMix clearly demonstrates that there's more than one superb automated mix system on the market.'

Unit 3 Recording Studios, London.

The Universal Console Automation System.

The Customers speak for themselves.



Audio Kinetics Ltd, Kinetic Centre, Theobald St, Borehamwood, Herts WD6 4PJ, England. Tel: 01-953 8118 Fax: 01-953 1118.

Circle (86) on Rapid Facts Card

AMERICA, Video Recording; Video Editing Systems; Microphones, Video Tape, Video Tape Duplication Machines; Test & Measurement Equip. For Video, Video Time Code Machines

Mineroff Electronics, Inc., 946 Downing Road, Valley Stream, NY, 11580 (516-825-4702) Nationwide, Amplifiers; Recording; Equalizers; Loudspeakers; Microphones & Acces.; Recording Tape; Tape Duplication; Tape Machines

Onondaga Music & Sound, 412 S. Clinton St., Syracuse, NY, 13202 (315-422-8423) NY, Amplifiers, Consoles, Equalizers, Loudspeakers, Sound Reinforcement; Studio Monitors; Microphones; MIDI Devices & Samplers; Noise Reduction, Tape, Signal Processors, Synthesizers; Tape Machines

Studio Consultants, Inc., 321 West 44th St., New York, NY, 10036 (212-586-7376) CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, PR, RI, VT, Amplifiers, Consoles, Recording & Production; Equalizers; Loudspeakers,

Studio Monitoring; Sound Samplers; Recording Tape, Signal Processors. Time Code Synchronizers; Hard Disk Based Digital Recording & Editing Systems

Success Specialty Sales Corp., P.O. Box 77, Rockville Centre, NY, 11570 (516-798-2311) USA, Splicing Tapes; Packaging Products Audio & Video

Unistage, Inc., 330 Genesee St., Buffalo, NY, 14204 (716-853-6500) West-NY, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Noise Reduction Systems; Signal Processors; Synthesizers & Keyboards; Tape Machines, Analog; Time Code Synchronizers

NORTH CAROLINA

Reliable Music, 650 E. Stonewall St., Charlotte, NC, 28202 (704-375-8662) FL, GA, NC, SC, VA,

WV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards, Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

Wyco Sales, P.O. Box 887, Cary, NC, 27512 (919-467-8113) NATIONWIDE, Microphones & Acces.; Recording Tape - Video & Audio; Storage Systems & Carrying Cases

OHIO

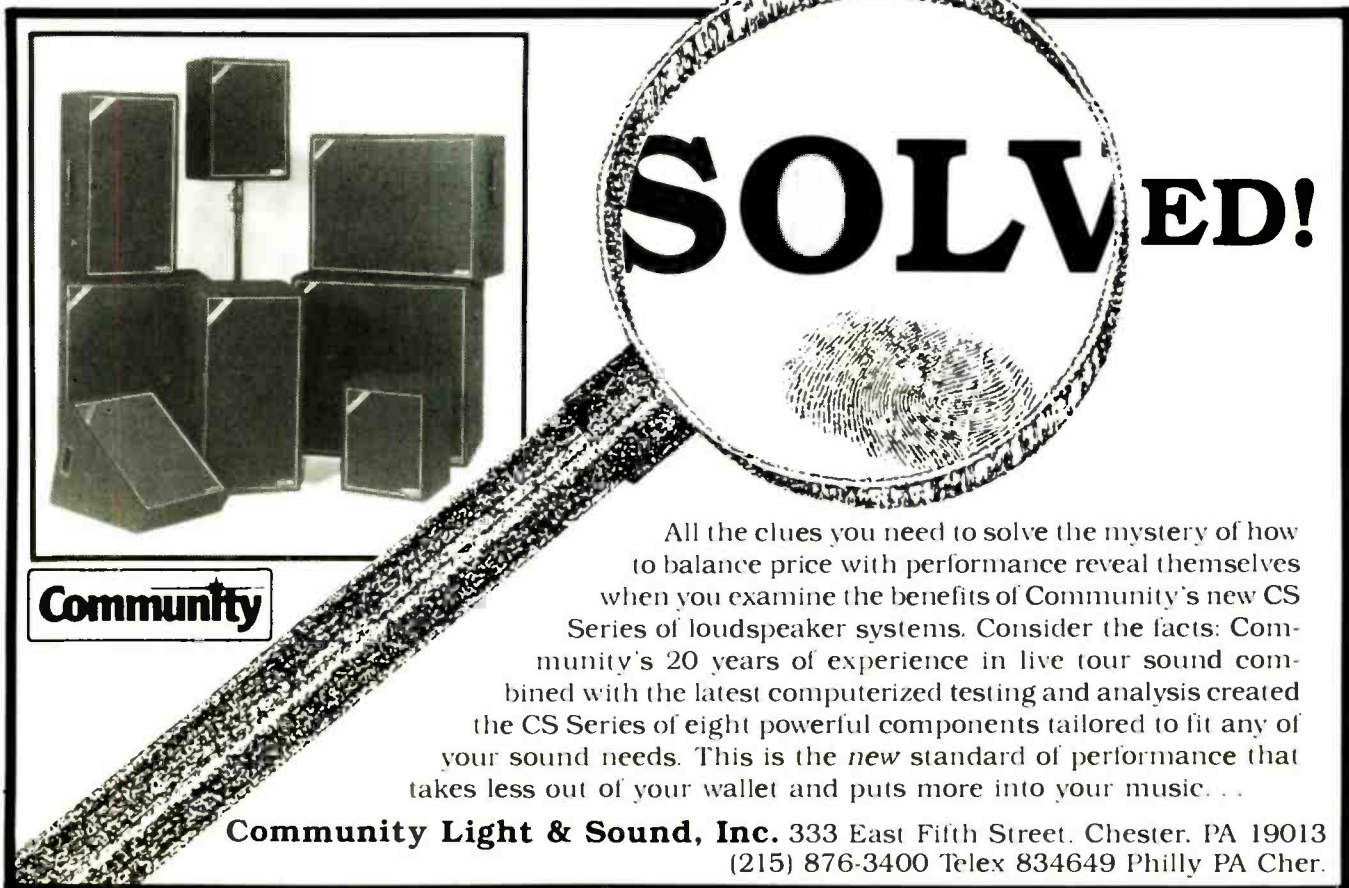
Central Music Exchange, 11504 Lorain Ave., Cleveland, OH, 44111 (216-671-0093) OH, PA, Amplifiers; Consoles, Sound Reinforcement; Equalizers; Loudspeakers, Sound; Loudspeakers, Studio; Microphones & Acces.; MIDI Devices; Noise Reduction; Signal Processors; Synthesizers & Keyboards; Electronic Percussion

Hood Industries Inc., 5700 Superior Ave., Cleveland, OH, 44103 (216-431-4663) OH, Amplifiers; Consoles, Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Signal Processors; Tape Machines, Analog

ICB Audio Co., 1349 E. McMillan St., Cincinnati, OH, 45206 (513-281-5535) IL, IN, KY, OH, PA, TN, WV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Tape Duplication; Tape Machines, Analog; Test & Measurement Equip.; Time Code Synchronizers

Ray Lammers Music House, Inc., 610 Walnut St., Cincinnati, OH, 45202 (513-241-0200) IN, KY, OH, Amplifiers; Consoles, Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement; Microphones & Acces.; Noise Reduction Systems; Signal Processors

Ohio Sound Systems, 1399 East 17th St., Cleveland, OH, 44114



Community

SOLVED!

All the clues you need to solve the mystery of how to balance price with performance reveal themselves when you examine the benefits of Community's new CS Series of loudspeaker systems. Consider the facts: Community's 20 years of experience in live tour sound combined with the latest computerized testing and analysis created the CS Series of eight powerful components tailored to fit any of your sound needs. This is the *new* standard of performance that takes less out of your wallet and puts more into your music. . .

Community Light & Sound, Inc. 333 East Fifth Street, Chester, PA 19013 (215) 876-3400 Telex 834649 Philly PA Cher.

Circle (67) on Rapid Facts Card

(216-781-1234) OH, Amplifiers, Equalizers; Loudspeakers, Sound Reinforcement; Microphones & Acces.; Noise Reduction Systems

Pi Keyboards & Audio, 2121 Brookpark Road, Cleveland, OH, 44134 (216-741-1400) IN, KY, MI, OH, PA, Amplifiers; Consoles; Recording, Production & Sound Reinforcement; Editing Systems; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; MIDI Devices & Sound Samplers; Noise Reduction Systems; Recording Tape; Signal Processors; Synthesizers & Keyboards; Tape Duplication; Tape Machines, Analog & Digital; Test & Measurement Equip.; Time Code Synchronizers

C.L. Pugh & Associates, Inc., 13477 Prospect Road, Suite 209, Cleveland, OH, 44136 (216-238-1777) OH, West-PA, WV, Amplifiers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.

Phil Reddish Supply, Inc. dba Phil Reddish Sound, 11725 Royalton Road, North Royalton, OH, 44133 (216-582-4333) OH, Amplifiers; Consoles, Recording, Production &

Sound Reinforcement; Equalizers; Loudspeakers, Sound Reinforcement & Studio Monitoring; Microphones & Acces.; Noise Reduction Systems, Recording Tape; Signal Processors; Tape Duplication; Tape Machines, Analog & Digital; Time Code Synchronizers; Wireless Microphones & Intercom; Production Intercom; Theatre Sound System

Roadshow Sound, 3665 Karl Road, Columbus, OH, 43224 (614-263-3720) IN, OH, MI, PA, WV, Amplifiers; Consoles, Recording, Production & Sound Reinforcement; Equalizers; Loudspeakers; Studio Monitors; Microphones & Acces.; MIDI Devices & Sound Samplers; Synthesizers & Keyboards, Tape Machines, Analog; Time Code Synchronizers

Speakers Unlimited, 3138 N. Main St., Dayton, OH, 45405 (513-275-7417) IN, OH, Amplifiers; Consoles, Recording & Sound Reinforcement; Equalizers; Loudspeakers; Studio Monitors; Microphones & Acces.; MIDI Devices; Noise Reduction Systems; Recording Tape; Signal

Processors; Synthesizers & Keyboards; Tape Machines, Analog; Time Code Synchronizers

Bob White Associates, P.O. Box 39104, Solon, OH, 44139 (216-248-1317; 219-424-1800; 517-592-5138) IN, KY, OH, MI, West-PA, WV, Amplifiers; Consoles, Recording & Sound Reinforcement; Equalizers; Loudspeakers; Studio Monitoring & Sound Reinforcement; Microphones; Sound Samplers; Synthesizers; Cases, Lighting Equip., Wire

OKLAHOMA

Ford Audio-Video Systems Inc., 4800 West I-40, Oklahoma City, OK, 73128 (800-654-6744) AR, KS, LA, MO, NM, OK, TX, Amplifiers, Consoles, Recording & Sound Reinforcement, Editing Systems, Equalizers, Loudspeakers, Sound Reinforcement & Studio Monitor; Noise Reduction Systems; Recording Tape; Signal Processors; Tape Machine, Analog & Digital,

Time Code Synchronizers

Rock Studio Supply, P.O. Box 5997, Norman, OK, 73070 (405-329-8431) AL, AK, AZ, AR, CO, FL, GA, HI, ID, LA, MS, MT, NV, NM, OK, OR, PR, SC, TN, TX, UT, VI, WA, WY, Amplifiers; Consoles, Recording & Production; Equalizers; Tape Machines, Analog; Cables, Connectors; Direct Boxes & Acces.

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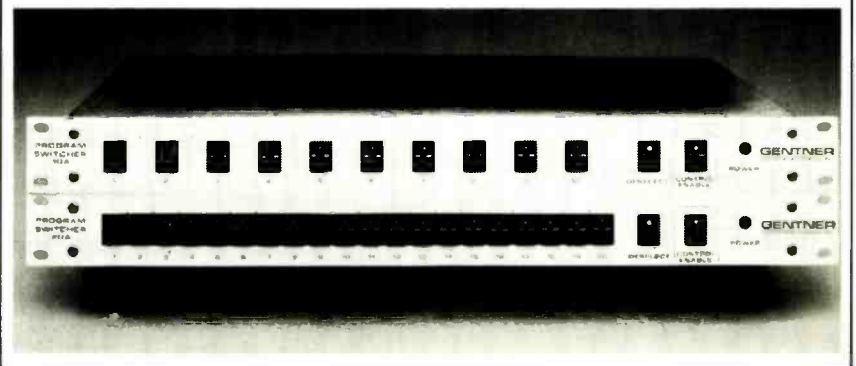
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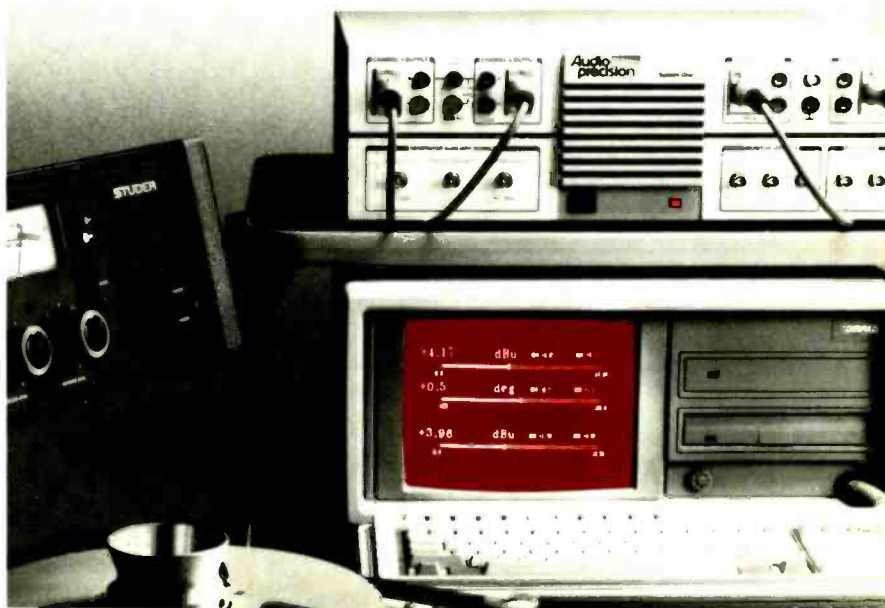
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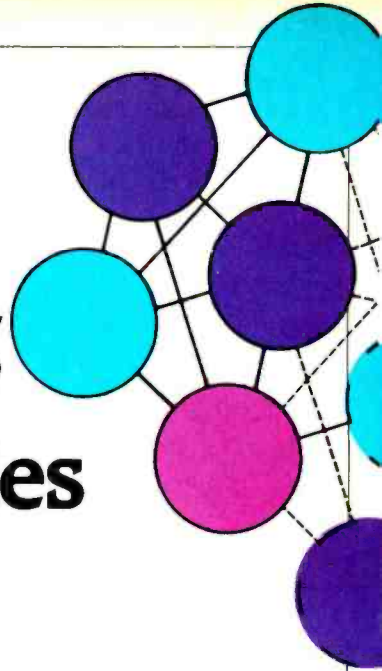
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Continued on page 102

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Selecting Accounting Software for Recording and Production Facilities



By Robert Carr

A carefully chosen accounting package can increase the efficiency of your studio and allow you to have maximum control over your money.

The primary concern of an owner/operator of a recording and production facility is probably cash flow: keeping money coming in to pay salaries and day-to-day bills. For this reason, accounting principles and bookkeeping are usually the first business skills that engineers and musicians have to learn when they open their own studios.

Surprisingly, a large percentage of studios continue to maintain their books by hand, even when the workload approaches "out of control" levels. In many cases, studio operators are just not sure how to automate their accounting functions. Rather than making their record-keeping work a valuable asset, they or their employees spend most of their time reacting to small daily financial crises: scrambling to track past-due accounts; forgetting to pay important fees or payments on time; spending hours, and sometimes days, developing net worth and net income statements to get a bank loan; and so on.

Certainly, modest operations handling just a few clients may find that converting to a computerized accounting system is just not worth the effort. The time required to enter and manipulate data and then generate small reports can be more time-consuming than doing the books by hand, especially if you're not good at using a typewriter-style keyboard. But if your recording studio is growing, and you already feel the pressure, then an automated accounting system can save time

and money, as well as provide your clients with peripheral services that will make them want to come back for more.

Benefits of an automated accounting system

While the selection, installation and maintenance of an automated accounting system can easily seem overwhelming, there are several important benefits that make the investment worthwhile.

Many studios continue to maintain their books by hand, even when the workload approaches "out of control" levels.

• **Increased Financial Control.** Assuming that your studio employees keep your computer records up to date and accurate, an automated accounting system helps reconcile any account with statements received, a task that could take virtually hours to do by hand. With a few keystrokes, you can print summaries detailing the specific sources of your cash, the amounts received and the anticipated cash disbursements (the amount of money you owe) for any given period (the next week, last month, a fiscal quarter, a full year, etc.).

Such reports help you avoid unnecessary late finance charges that drain your cash; they warn you about clients who owe you money but haven't paid on time; they highlight inconsistencies in charges from vendors; and generally give you complete control over your money.

• **Faster Processing Time.** Studio accounting functions can be accelerated to track and process larger amounts of data in shorter amounts of time. The extra time frees your employees to do other tasks, or to provide additional services to session clients, which can then be billed to generate additional revenues.

• **Better Decision Making.** With the right data available to the user (net worth statements, graphs of seasonal fluctuations in business, charts indicating current/projected rate of growth), you can make better strategic management decisions with regard to facility expansion, equipment service contracts, lease vs. buy agreements, etc.

What is accounting software?

The jargon of an accounting world, coupled with the complexity inherent in computer hardware/software, can sometimes make automated accounting seem like "the right decision for the other guy, but not for me." From a software point of view, the layout of a computer accounting system is really quite simple.

Generally speaking, an accounting package is a relational database program with arithmetic capabilities. At the heart of the accounting package are several data files.

Robert Carr is an administrator of computer-based projects with software publisher Ashton-Tate.

Data are entered into these files by filling in customized input screens that appear on your CRT display. For convenience, the input screens are usually designed to resemble typical accounting forms or layouts that appear in ledger books. In this way, the operator can make obvious associations between the automated system and manual methods.

Because the database is relational, data in the files can be manipulated in powerful ways. Individual pieces of data input to the same on-screen form via the keyboard can automatically be analyzed and sent to the appropriate files for storage. Data can be passed from one file to another. Specific data can be pulled from several files and sent to the screen (or to a printer or a separate data file on floppy disk) in the form of a customized report.

In all these cases (data input, manipulation and output), the functions are simply routine capabilities of relational databases. The only major difference between a relational database and an automated accounting program lies in how these capabilities are presented to the operator.

In some smaller accounting packages, two or more of the sample data files may be combined into one file to keep the accounting program simple and compact enough to run on smaller PCs. These types of programs also limit the number of input-screen designs and report forms to include only those most commonly requested by small businesses.

As a business grows in complexity, however, the demands on the system increase as well. Studio managers may find that they want a greater variety of specialized reports. As more aspects of the business are put on computer, so the number of specialized input-screen layouts increases. And the sheer volume of data to be processed requires that more and more routine functions be done automatically by the computer, rather than being initiated each time by the operator.

All of these considerations require greater computer memory capacity to hold the program and the stored data.

Unfortunately, as program files and data files increase in size, the time required to carry out typical operations increases. To reduce the processing time of the computer to acceptable levels, the software developer usually chooses to break the files down into smaller, more specialized groupings, as can be seen from Figure 1.

The same approach is also followed for the program files. Common functions and processes are grouped together, which is why you see accounting programs sold by the module. All input screens, functions and custom reports that relate to Accounts Pay-

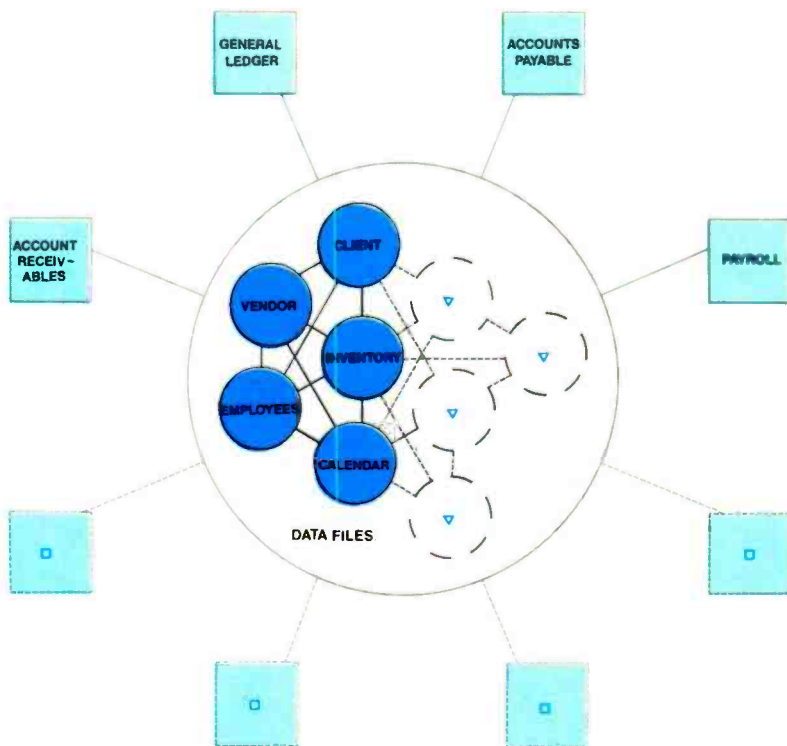


Figure 1. General relationship between various modules in a typical accounting software package to their respective data files. All transaction data is stored in files on floppy or hard disk, with each file holding data relating to a specific topic. (For example: client, vendor or inventory information, etc.) The relevant data are accessed via software modules that specialize in handling Data Entry screens, operations and report formats of a similar nature. (For instance: Accounts Payable functions, Payroll functions, General Ledger functions, etc.)

able, for example, are included in the A/P module. All input screens, functions and reports that relate to Payroll are included in the Payroll module, and so on. (The sidebar *Typical Accounting Modules* provides breakdown of the types of available modules, and how they would be used in a recording studio.)

Not all businesses need all the available modules. The basic financial functions required by most businesses include accounts payable (A/P), accounts receivable (A/R), payroll and general ledger (G/L). These functions can be included in one package (with limited features and capabilities), or each localized to its own dedicated module.

Typical accounting features

Accounting, like most disciplines, has evolved its own jargon which, to outsiders, may appear to be quite foreign. The transfer of accounting functions to computers has further complicated the terms used to describe specific processes and procedures.

The following words of explanation should shed some light on the more common features you may want to include in the system for your studio.

1. *Audit trail* is a simple and dependable way to follow the path or progress of a trans-

action through the accounting system to allow the operator to verify all entries related to that transaction. An audit trail also protects your data from tampering by preventing someone changing or deleting important records without following prescribed security procedures.

2. *Password protection* is the ability to require passwords for access to various parts of your accounting system, and prevent unauthorized personnel from reviewing or altering sensitive information. Access can be controlled for an entire module or for specific operations within a given module (e.g. in the Accounts Receivable module, access levels might be: a. enter invoices only; b. enter and edit invoices only; c. enter, edit and approve invoices to payment; or d. perform all previous operations, plus Period End Close.

3. *Automatic posting* allows each module to automatically update companion modules at user-defined intervals (such as immediately, daily, weekly, monthly or quarterly). This capability means that the operator doesn't have to re-enter data into each module for every new transaction.

4. *Custom report generation* is useful because not all businesses require the same types of data laid out the same way. The ability to define the look and content of

Typical accounting modules

Full-scale accounting programs are laid out in subsystems called modules. The four most commonly used modules are **general ledger (G/L)**, **accounts payable (A/P)**, **accounts receivable (A/R)**, and **payroll**. Whether you need any other modules will depend on the individual requirements of your studio business.

The following is a brief overview of several types of accounting modules, and the services they are intended to provide:

- **Accounts receivable** keeps track of the amount of money clients owe you.
- **Accounts payable** keeps track of the amount of money you owe to your vendors and suppliers.
- **Payroll** keeps track of the amount of money you have to pay your employees, and the deductions (taxes, social security, etc.) required by law.
- **General ledger** provides a summary of all the previous information for given periods of time (month, quarter, year, etc.).
- **Remote banking module** links your PC with your bank's computer so you can do banking transactions from your office or studio.
- **Built-in word processing** is useful for generating sales and collection letters, maintaining mailing lists, etc.
- **Job costing price lists** might be worth considering if you extend courtesies to preferred clients, actively maintain two or more price lists, or follow a particularly involved logic for calculating session costs. Evaluate this software module for file size, and for the number of available pricing categories.
- **Sales order (session data) entry** can be the real test of a program's quality because so many other functions are tied to it. Ideally, order entry should generate a traffic order to alert all personnel (engineers, technical staff, sales people, etc.) that a session is scheduled for a certain time, and that specific people, equipment and services are required. It should automatically update inventory files to subtract reels of tape used; track equipment that is rented and installed for the session; automatically flag pieces of requested equipment that are not available in house and need to be rented from an outside vendor; flag double bookings, and so on. The module might also generate an invoice with a detailed list of services and equip-

ment provided for specific lengths of time or specific dates; update the Accounts Receivable file (to bill the client); and update the General Ledger file (to provide a full financial snapshot of business over a given period).

- **Time accounting (or project tracking)** follows the lengths of sessions for accurate computation of billings at hourly rates.

- **Inventory** is the reason many facilities automate their operations. If you have a retail or rental business (musical instruments or pro-audio gear) along with your studio, this module can help you track your stock. Depending on the program's functions and capabilities, it may also be able to handle the contents of your tape vault.

- **Fixed assets** tracks all depreciable assets over a certain value (like \$500 or \$750 per item). The module automatically calculates depreciation and transfers that debit to the general ledger file; it can also be used to track equipment.

- **Purchase order** generates POs for buying new equipment and supplies and keeps track of what has been ordered, when it's supposed to arrive and item descriptions. This module should talk to the accounts payable module and, ideally, with the fixed-asset module for purchases of depreciable capital equipment.

- **Retail system** is similar to order entry and probably unnecessary for most studio operations. But for those occasional retail businesses—a music or pro-audio store that does a cash-and-carry business in addition to operating a recording studio—the RS module will update files via direct data entry at the cash register. Keep in mind that retail systems usually add considerably to the equipment cost of automating. But, depending on the over-the-counter sales activity, they can pay for themselves many times over by quickly pointing out discrepancies between cash amounts and inventory movements, which can deter employee theft.

- **Commission reporting** computes commissions of salespeople. Be sure the module figures the commission the way you usually do.

- **Service contracts** is intended for people in the rental or sales business who provide equipment service. It also helps schedule preventive maintenance calls, alerts you to contract expirations and keeps track of service department hours and revenues.

your reports according to your requirements can save you time and help eliminate costly misinterpretations of data.

5. *Intuitive design* is a rather arbitrary aspect of a program that depends a great deal on your current methods of operation. The key here is to clearly define the way you operate your accounting procedures now, and find a program that follows those procedures as closely as possible. The program should be organized in a way that's familiar to you and your staff, with on-screen menus that are easy to understand and follow.

6. *Stand-alone Modules* means that each module should operate independently. If all you need at first is a general ledger module, it won't be too much use to you if it requires an A/P module and an A/R module to operate. Also make sure that you can add more modules painlessly as your business grows, and that all the modules you might possibly need are available. An A/P module from one company, however, probably won't work with a general ledger module from another company.

7. *Search on incomplete data* is the ability to scan the database for specific records based on incomplete data, such as the first three letters of a client's name, or by the date of a session.

8. *Simultaneous access to multiple data-entry screens or files* is best explained by the following example: suppose you have finished entering the specs on an upcoming session and the computer refuses to accept it because there is no record created for that specific client. Some programs force you to back out of that data-entry mode, access another menu option, create a client data record and then re-enter your session data again.

Obviously, programs that let you put the first screen on hold—but without dumping your data—while you quickly build the client record are a big advantage.

9. *Multiple profit-center tracking and consolidation* is useful if your business comprises multiple, but separate, profit centers/companies (equipment and instrument rental, sound reinforcement services, recording studio, tape duplication services, etc.). If so, check to see whether the software can handle multiple sets of records and then merge summaries of financial activity from each company into one consolidated report on a periodic (monthly, quarterly or yearly) basis.

How to choose a system

In the December 1986 issue, I outlined several factors to consider when automating a recording studio operation. All of those same parameters also apply to choosing accounting software. However, there's an additional couple of other points that need to be kept in mind.

Take a long, close look at your current

accounting procedures. Involve your employees in writing down the structure of your business, and all the data you have to record, track and analyze for efficient studio operation. Develop an application diagram—a chart that visually describes the data you usually record, the paths the data follow as they travel through your system, and the types of reports you'll need to meet various needs. This activity will also help you identify any "unique needs" your studio may have. And it certainly wouldn't hurt to talk with other studio owners and find out what their thoughts are, or what programs they may have tried or purchased for their rooms.

These activities may seem like a waste of time, but I cannot stress their importance too much. Most studio personnel think they know all about the businesses they own or operate. Too often, however, they're quite surprised to discover that they have many holes in their accounting procedures, or that they really don't understand the entire accounting process.

Remember, you don't want to pick a package just because it has the friendliest style of operation, or has the most functions, or is the most well known. The planning, lists and diagrams you create will help you evaluate a given software package for its applicability to your own recording studio business.

Keep in mind that it's not unusual to spend eight to 10 hours looking at the features of a single business accounting package. In fact, two or three visits may be necessary to fully grasp the functionality of a package under evaluation. You may even want to do some benchmark testing for performance of the software packages that look promising. (An accounting program with 1,000 or 5,000 records can seem like a totally different system than the one that sorted and processed 25 records in lightning speed during the demonstration.)

Preliminary analysis of your needs and preferences can help narrow down your options to just one or two software packages, and ensure that the time you do spend at a demonstration is used wisely.

Definitely deal with a full-service vendor; one that sells solutions to *situations* rather than just hardware and software. Because such dealers are rare, also do some homework here. If you have an accountant now, I recommend that you take advantage of any expertise he or she has in this area. Many CPAs have already automated their own businesses, and have set up consulting services to help their clients automate their accounting functions. Working with such an accountant might offer the added benefit of your being able to transport data to his or her office electronically at regular intervals for analysis and auditing, thus saving time (no data re-entry), and providing faster turnaround time for analysis and advice.

Finally, everyone who will operate the system should be involved in the process of deciding *how* the system will be used and *which* system will be purchased. Their participation will help break down any fears or resistance they may have to automation. Then, once they're working on the system, listen to their feedback. They will probably be the first to realize whether or not the system is right for your business. If it's not, think seriously about changing to another system, rather than proceeding with the original system, which may cause untold

frustration and cost you even more money when you finally have to switch at a later date.

The accounting package you choose for your recording or production facility will become the foundation for all your business operations. I'm sure you wouldn't continue to work with studio monitors or a tape recorder that didn't perform up to your expectations. Why trust your finances to anything less than state-of-the-art perfection?

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Yamaha DMP-7 Digital Mixing Processor

By Paul D. Lehrman

With the Yamaha DMP-7, MIDI-controlled automated mixing and signal processing seems finally to have come of age. In one package, the DMP-7 combines an 8x2 mixer, eight channels of parametric equalization and three digital effects processors, all operating completely in the digital domain.

Add to that the most comprehensive MIDI control ever implemented in a piece of hardware and a user interface radically different from any other mixer on the market and you can understand why the DMP-7 has been garnering tremendous interest since its introduction last fall.

But because it is such a major departure in console design, the unit has been raising just as many questions as eyebrows. The device explores areas of manipulation and control that most people have never even *thought* about, much less demanded. Therefore, any review of it has to explain first what it does, and why.

System configuration

To begin with, the DMP-7 is a mixer, with eight inputs, two outputs, one effects send and a stereo effects return. The inputs are unbalanced, high-impedance, with continuous trim controls that allow them to be used with source levels from -20dBv to +4dBv. The effects send and returns are unbalanced and fixed at a nominal output level of +4dBv. The outputs are also +4dBv, but there are two sets: unbalanced 15k Ω and balanced 600 Ω . There is also a headphone output, which comes directly off the main stereo output, and has no independent level control of its own.

There are eight main faders (which serve multiple functions, as we shall see later), an effects return fader and a main stereo output fader. Above each fader is a button that



turns the channel on and another, labeled "Select," that accesses the subsidiary functions of the channel, pan and equalization. It also instructs an 8-segment peak-reading LED to read that channel's input level. There are similar displays for send level, and left and right output levels.

All other functions are handled by a bank of buttons and a single "data entry" slider at the right side of the unit. Two of the buttons, marked with up- and down-arrows, duplicate or complement the action of the data slider and have a "repeat" function when held, with a very smooth acceleration characteristic when held longer. All of the faders and the data entry slider are motorized, the significance of which I'll get to later on. There is a jack for a foot pedal, which can be used to duplicate either the master stereo fader or the data slider.

There are various indicator lights all over the unit showing the status of many of the functions and controls, and a large 2-digit red LED above the faders for showing program numbers. The bulk of the unit's functional information, however, is displayed on a two-line by 16-character lighted LCD, similar to that found on a digital synthesizer in the upper right corner.

Signal path

When a signal reaches one of the DMP-7's inputs, it passes through a single amplification stage, and is then immediately converted to a 16-bit linear digital signal sampled at 44.1kHz. It then goes through a 3-band equalizer with each stage providing ± 15 dB of gain. The low band ranges from 32Hz-800Hz, in either peaking or shelving mode, with adjustable bandwidth (in peaking mode only) of 0.1-5.0; the mid-band EQ covers 250Hz to 8kHz with adjustable gain and bandwidth; and the high band covers 1kHz to 18kHz, peaking or shelving.

After equalization, the signal's phase can be inverted, and then it passes through the main channel fader, through one or more effects loops (which I'll get to in a moment), and then on to the stereo mix bus through a 16-position programmable pan control. At the main output stage is a "compressor" (actually a limiter) that provides a kind of digital level-chopping across the output signal, which is adjustable from 0%-100%.

Also at this stage are 8-pin input and output DIN jacks labeled "cascade," which allow multiple DMP-7s to be linked together while staying within the digital domain. Finally, the stereo signal is passed through a digital-to-analog converter and sent to the outside world.

The range of effects available on the DMP-7 is impressive. There are three independent effects loops, the first two featuring 17 different programs, comprising six reverbs (including gated and reverse), two flangings, three chorusing, phasing, tremolo, two early-reflection programs and two straight delays. The effects are highly reminiscent of, without being identical to, those produced by Yamaha's SPX-90.

There are default values for all of the effects which sound perfectly good, but the user can also adjust each parameter of each effect individually. The third effects bus has

Paul Lehrman is REIP's electronic music consulting editor and is a Boston-based electronic musician, producer and free-lance writer.

only four of these effects, plus an auto-panning feature, but it is through this bus that the *external* effects loop passes. When the external loop is enabled, the internal effects on the bus are disabled, but an extra set of EQs (low, mid, and high) is available for the stereo returns.

Although there is a return fader, there are no effects send controls immediately visible on the DMP-7. Instead, there are three buttons marked "Send 1," "2," and "3," and selecting one of them causes the return fader to physically move (remember, all of the faders are motorized) to the position appropriate for that particular bus. Pressing a button marked "Fader Flip" turns the eight main faders into effects sends for the selected bus, and makes them *all* march obediently to their proper positions for this function. Indicator lights above the faders show whether they are in normal or effects-send mode, and if the latter, which of the three buses is being worked on. Another switch allows each of the 24 effects sends to be pre- or post-fader.

Changing settings

This approach to console design makes the control surface look very clean and uncluttered, but it means a certain amount of gymnastics have to be accomplished to change some settings. To adjust, for example, the center frequency of the mid-range EQ on channel 2, you have to first press the "select" button above fader 2, then press one of the three EQ buttons at the right.

Then, when the parameters for the equalizer appear in the LCD window, press a button marked with a right arrow until the frequency parameter starts to blink. (Each time you change the parameter, the data slider moves to the appropriate position—this thing is a little scary to watch sometimes.) Then you move the data slider or press buttons marked with the up and down arrows to get to the value you want.

Changing effects parameters is even more complex. Each effect can have up to eight adjustable parameters, which means two display "pages" of values to step through, and many of the parameters have double-precision values, so that the data slider does coarse adjustments while the arrow keys handle fine adjustments.

MIDI control

As if all this weren't enough, the DMP-7 allows every onboard parameter to be controlled by MIDI. Essentially, there are three MIDI modes, although because they can all work together simultaneously, the distinction between them is a little blurred.

One mode is to call up the unit's internal "scene change" memories with MIDI program changes. There are 98 storage registers (30 in internal RAM, the others on a RAM cartridge), and the setting of every parameter on the unit can be recorded into

a register by pressing a button marked "Store." You can also assign to each memory register a name, which will appear in the LCD whenever it is recalled. (The character set available for the names not only contains a full Roman alphabet, numerals, umlauts, 28 punctuation marks and four graphics elements, it also has 50 Kanji characters.)

A memory can be called up by dialing its number into the LED display with a pair of up- and down-arrow switches (which are different from the switches used for parameter adjustment), and pressing "Recall," or it can be accessed via a MIDI program change. There is no direct or default one-to-one correspondence between MIDI program numbers and memory numbers, however—you have to go into a special mode that lets you "map" program-change numbers to memory numbers.

The time the unit takes to move from one memory to another is controlled by the "fade-time" parameter, accessed from the "utility" button, which is adjustable from 0.1 to 10 seconds. (Unlike the Akai MPX-820, reviewed in these pages in May, the fade time is not stored as part of an individual memory, but is constant.)

The second MIDI mode lets you map MIDI controllers to specific parameters, so

that, for example, the foot pedal on a synthesizer can operate the Q of the mid-frequency equalizer on channel 6. At the risk of repeating myself, *every* parameter on the board is assignable, including all the individual equalization and effects controls, channel ons and offs, pre- and post-fader effects switches, and even the fade time. There are no scaling or offset controls for these parameters—sending a controller value of 128 will always set the assigned parameter to its maximum value, and sending a controller 0 will set it to minimum.

Of course, when MIDI data is received, any faders being controlled externally will move to their proper positions, and if the data slider happens to be set to act on a parameter that is being MIDI-controlled, it will move as well.

Third mode

The third mode lets you assign MIDI *Note* numbers to individual parameters, with the velocity of incoming notes (0 to 128) determining the parameter values.

The MIDI implementation works in both directions—the DMP-7 generates MIDI information as well as reads it. When a memory register is called from the front panel, and there has been a program change assigned to that memory, then the program change will be transmitted over

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Dynamic range: 88dB.

Frequency response: 22Hz-20kHz, $\pm 1/3$ dB.

Total harmonic distortion: 0.03% at 1kHz, maximum output.

Digital conversion: 16-bit linear PCM, 44.1kHz sampling rate.

Equalization: 3-band, 32Hz-800Hz, 250Hz-8,000Hz, 1kHz-18kHz, ± 15 dB, peaking or shelving (except mid-band), Q variable from 0.1 to 5.0.

Effects: Four reverb, two flange, two chorus, phasing, two tremolo, two early reflections, two gated reverb, two stereo delay, autopan. Three independent effects loops, one external.

Memories: Thirty internal, 67 on data cartridge. All settings memorized.

MIDI control: Program change, controller change, note-ons. System exclusive dump available.

Displays: Four 8-segment LED peak meters, 2-digit numeric memory indicator, 16-character x 2-line backlit LCD parameter display.

Dimensions: 18 $\frac{1}{8}$ " x 5 $\frac{1}{2}$ " x 17 $\frac{1}{8}$ " rack-mountable.

Weight: 23.1 lbs.

Power consumption: 85W.

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MIDI. Likewise, if a MIDI note and/or controller is assigned to a fader or parameter, then changing that parameter from the front panel will cause the note or controller change to be transmitted.

This means that both scene changes and individual fader moves can easily be recorded in a sequencer, and overdubbed, edited, and played back just like a synthesizer track. All of these functions are switchable—you can toggle separately the transmission and reception of controllers, notes, or program changes. (The unit can be set to read any MIDI channel, or in Omni On mode. It transmits on the same channel it's reading, and when it is in Omni mode it transmits on channel 1.)

Any MIDI data sent to the mixer, which the mixer is configured to respond to, can be echoed back out again to the MIDI Out jack (there is also a standard MIDI Thru jack). I'm not sure what this feature is for, except perhaps for ganging two DMP-7s. There is no "Local Control Off," so there is no easy way to use the device as a controller for other MIDI equipment, without affecting its own settings. On the other hand, there's a clever scheme—sort of an auto-

mated punch mode—for using the device to edit its own sequenced tracks, if you happen to be using it with a sequencer which does not edit tracks easily, like Yamaha's QX5.

Should you get in the way of a moving fader or slider, and try to make it stop, one of two things can happen, depending on the setting of a button marked "auto/manual." In the manual mode, the fader will attempt to finish its "electrical" motion (i.e., the level will continue to change), pause for about a second, and then adjust the signal level to match the physical position at which you're holding it. In the auto mode, the fader will ignore you electrically, and politely but quite firmly insist on finishing its physical motion as soon as you let go of it.

Finally, there are four separate MIDI configuration "banks," each with its own unique MIDI assignments (including channel), which can be switched among at will. Of course, all of the internal settings can be bulk dumped and/or loaded over MIDI system-exclusive, and software to do all the mapping and editing off-line will soon be available from several companies, including Digital Music Services and Digidesign.

In-use

A few minutes' thought will show that the potential uses of the DMP-7 are enormous. Yamaha itself has said that it didn't have a particular use in mind for the device when it was introduced, but the most obvious application would be as a synthesizer mixer in a sequencer-based production studio. With good sequencing software (especially the new breed that allows graphic controller editing and definable controller density), the unit can be made to accomplish some rather astounding feats.

On the minus side, however, there are a lot of new concepts to get used to, which will make the unit less than easy to learn for some. And more important drawbacks are that there are some design trade-offs that limit the device's true utility, and there are some other design decisions that just seem wrong.

Looking briefly at the audio performance of the unit, the action of the D/A converters is good, showing a little bit of high-frequency rolloff as input levels approach the saturation point. Even when the built-in digital output limiter is turned off (and it's not a bad idea just to leave it off—except at very low ratios, it doesn't sound very good), there seems to be some kind of limiting always in place, with the result that overloaded outputs don't sound quite as obnoxious as the board's digital nature would have you expect.

Headroom is adequate, but you should be careful with sources with excessive high-frequency content: at the "+4" setting of the input trim, a 1,900Hz input signal will

clip at a level of +18dBv, while at 20kHz the clipping level goes down to about +3dBv. As long as levels are kept down, frequency response is dead flat.

The dynamic range is not quite the 88dB claimed for it—my uncontrolled tests place it at about 70dB—but it is far wider than the majority of synthesizers that will be plugged into it. The faders operate with approximately 0.5dB resolution, but only cover a range of about 35dB—at the bottom of the fader travel, the signal level drops off a cliff, landing at the noise floor some 35dB below. Despite the finite resolution, the fader action sounds exceptionally smooth.

Under MIDI control, the faders behave beautifully. There's an interesting phenomenon that occurs when the unit receives a program change in which several faders have to move simultaneously. The physical movements of the faders do not match each other—some faders will arrive at their destinations well before others, like those old wind-up horse race games. Electrically, however, they all track each other perfectly.

For some obscure reason, the fade-time parameter affects not only program changes, but controller and note velocity changes to the faders as well. If the fade time is set for 6 seconds, then any controller change will take six seconds to have an effect. Fortunately, the data buffer that handles incoming controller events operates in a last-in-last-out manner, and therefore the delays are not cumulative, or else a simple sweep of a mod wheel could hang the thing up for several minutes.

A completely befuddling effect that goes along with this, is that if you alter the fade-time parameter *while* a fader is moving under MIDI control, the *physical* fader movement will reflect the new fade time (i.e., if you shorten the fade time, the fader will move more quickly), but the *electrical* fader movement will remain unaltered. Weird.

The equalizers and effects buses are a completely different story. Their action is not smooth, but under many circumstances is rather jumpy, and changing a parameter while a signal is passing through often results in an audible click. (This is especially true with the effects, which is not unexpected.) The fade-time parameter has no effect on parameter changes, but there is a *very* troubling delay that occurs when accessing a parameter over MIDI.

If only one command comes in, it gets executed right away, but if a string of commands is received, such as that generated by a modulation wheel, there will be a significant pause, sometimes 2 seconds or more, while the unit seems to digest all the data, before it starts to execute the commands.

Furthermore, while it's digesting, the board essentially goes dead—you can't

change any of the controls except the faders. Fortunately, the storage buffer for incoming MIDI data is not overly large, maybe 100 commands' worth, so the queue never gets too huge, and as mentioned above, it operates in a last-in-last-out manner, so it doesn't slow things up *too* terribly.

The equalizers and effects behave rather strangely with program changes as well. Rather than changing smoothly over time like the faders, the equalizer and effects parameters jump immediately from the old value to the new. If there is signal going through one of the effects, it is unceremoniously dumped with a loud pop, and equalizer changes can also sound pretty nasty.

Similar to what happens when it receives a controller string, the unit goes dead for a period of 2.5 seconds after it receives a program change, during which it will accept no more MIDI data or front-panel instructions—including another program change—except for fader movements.

This philosophy of "faders first, everything else be damned" means that although the DMP-7 is an excellent fader automation

after you've moved it is nearly impossible. This also means that using the unit as a multitrack recording mixer is out of the question without some sort of external switching and pad arrangement.

These complaints aside, it must be said that the DMP-7 is truly a brilliant piece of engineering that will stimulate nearly everyone involved with music production to new ways of thinking, and will no doubt set a standard for mixers of all types in months and years to come. It doesn't quite do everything that you might want it to,

and even within its limitations, it could perform some tasks better.

Once you understand what it can and cannot do, you may find it one of the most useful tools you've ever encountered, especially for a synthesizer-based studio. It is certainly the first step for Yamaha (and, no doubt, others) on the path to completely redesigning the console. I'll bet anything there's a 32-input, 18-bit, 100kHz version of the beast with 48 MIDI cables running out of it on some test bench in Hamamatsu, just waiting for the next convention.

REP

***A few minutes of thought
will show that the
potential uses of the
DMP-7 are enormous.***

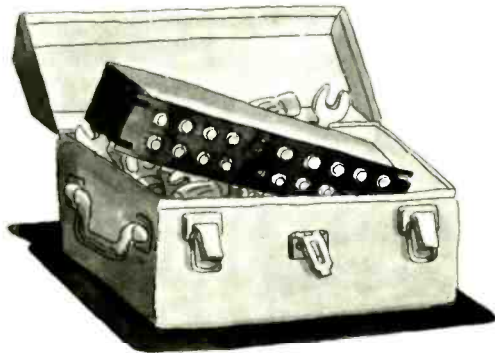
system, those who were hoping it would also be a real time super-MIDI-controllable equalizer and effects generator will have to wait a while longer. There are ways around the sluggishness of the response, if you have sequencing software that allows pinpoint editing of controller data, but no way around the glitches.

There are several other moans and groans of varying significance. Although you can assign two different controllers and/or notes to control a single parameter, you can't do the reverse—assign one controller to handle several parameters—which to my thinking would be a far more useful feature. The fade-time parameter is not calibrated properly: at the higher ranges, the actual fade time is about 30% shorter than what is indicated, while when the parameter is set for the shortest time, 0.1 second, the actual time is more like 15ms.

While the recessed buttons look sleek and elegant, they mean that resting your hands on the control surface is an invitation to disaster—they activate at a very slight touch, and have little or no tactile feedback. They also stick under summer weather conditions, sometimes in the "on" position, which can be maddening.

The input trim controls seem very flimsy, and except for the upper and lower limits and a center detent position, getting one of them back to a particular position

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Digital Audio Recording for TV Programming

By Peter Roos

Digital post-production facilities are now a reality with digital recording, editing and processing equipment.

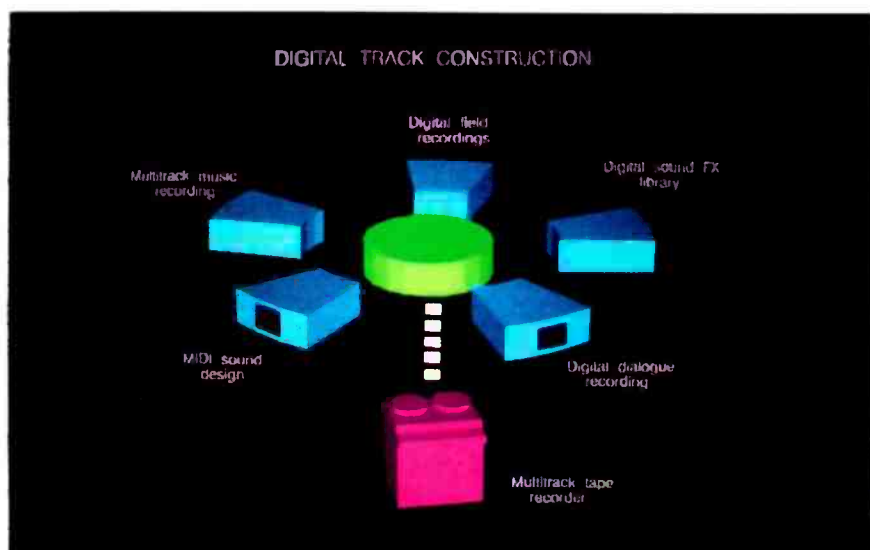


Figure 1. Representation of the hard disc recorder/editor and the audio networking capabilities.

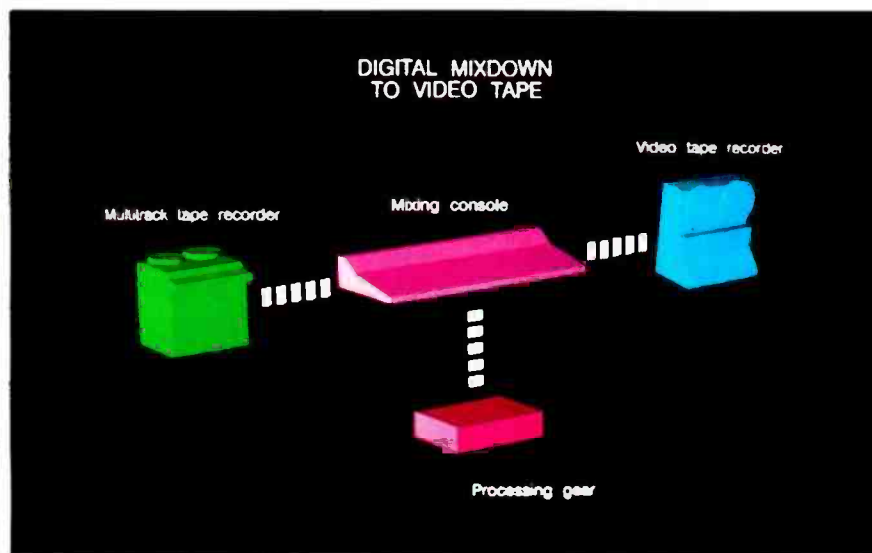


Figure 2. Display of digital interfacing and connection to mixdown equipment.

The proliferation of digital recording, editing, and processing equipment has turned the dream of a complete digital post-production facility into a reality.

By using industry standard digital-to-digital (D-to-D) transfer protocols, a studio can be interlinked across the full audio-for-video post-production spectrum. On another level, audio computers now allow sound transfers in the digital data domain as well as the use of computer applications software. Improved sound quality is yet another side benefit.

High-quality sound is a necessity for today's TV programming. Television sound has changed considerably with the advent of MTS stereo and enlarged audio/video systems. More importantly, home video hi-fi (i.e., VHS and Beta hi-fi, LaserDisc) is very much a high-end sonic reality and, for producers home video distribution is a very important cash resource.

The advantages of digital TV sound go well beyond improved sonics. A complete digital audio facility can provide speed and efficiency. The real payoff comes from letting you work more quickly and meet seemingly impossible deadlines.

As one of the last steps before distribution, audio-for-video post-production must happen fast. From a facility standpoint, if you complete the job quickly with high-quality, your clients will remain happy because they're spending less money.

Besides, deadlines are crucial in television. The medium works in a very

Peter Roos is vice president, operations of Transcom Digital, a New York-based television production and post-production studio.

demanding time frame, and there is no room for being late. Imagine seeing this announcement on your television screen one night:

"This show has been cancelled due to complications in post."

The digital audio advantage

In order to see how digital audio really makes a difference in terms of post-production speed, the following hypothetical digital audio studio has been designed. All the ingredients are technologically available and the general outline could very well be a blueprint for the audio-for-video post houses of tomorrow.

First, however, consider how sound is generally handled for television these days. Post houses either work with mag on flatbeds and Moviolas or with multitrack tape and SMPTE time code.

With mag you physically line up the magnetic tape with a work print of the film, sliding the two pieces of film and tape against each other until they match. You either cut the mag or you build your pieces to assemble all your tracks and you mix with all your mag tracks on interlocked dubbers.

The other option is working with analog multitrack tape. Generally this involves lining up tapes of effects, narration, music and building them onto a multitrack, coordinating all elements with SMPTE time code. You're actually constructing the soundtrack on the multitrack one element at a time. Despite its common link with music recording, this system has two basic drawbacks for television sound: you are either tying up the master, or you're losing a generation's worth of sound quality by recording the elements on a second analog machine.

The real payoff comes from letting you work more quickly and meet impossible deadlines.

Neither of these traditional TV sound systems can provide the random access/edit list building capabilities of a digital audio/video network—clearly the wave of the future for TV sound.

The audio/video network

At the heart of this ideal audio-for-television studio is the digital audio network. This is not a system built around a multitrack digital recorder. Instead, the digital multitrack or stereo recorder is but a single workstation in a digital audio network that resembles more the connected automation systems of an office PC network than it does a traditional recording studio. Processing power and storage are all shared.

The digital audio network is built around a massive hard disk storage system connected to a wide variety of workstations that either operate independently or interrelate for enhanced creativity and extra-fast, intra-facility information shuttling.

There are a variety of digital audio systems to choose from, but for television work that system must be able to store at least 10 hours of audio material. It must also offer flexible editing software and allow edit list generation, database management, time code sync reference, auto-assemble playback and random access.

The audio-for-video process begins

With the system in place, and the video cut already on 1-inch tape, the process begins. The first step involves duplicating multiple U-matic cassette workprints and recording each with time code.

These U-matic cassettes are duplicated for each in-house audio group. Thus, everyone can start building their own audio lists at the same time. Nothing is ever committed to tape. A virtual multitrack is being created of separate edit lists, organized by time code location and instantly accessible with a menu command.

You never really want that original time

code to change but invariably it happens. This is the nightmare of audio-for-video work but, fortunately, you can manipulate things rather easily with your hard disc audio system in place with the ease of manipulating paragraphs on a word processor.

The advantages of digital TV sound go well beyond improved sonics.


The in-house audio groups are broken down into the basic elements—each with its own, individual digital requirements:

1. Music recording, including synthesizers and MIDI sequencers.
2. Sound effects, either from compact disc or from a digitally recorded/sampled in-house library.
3. Dialogue recording, recorded and sequenced digitally.

Ultimately all the edit lists will be transferred to the digital multitrack tape recorder. An automated mixing console will contribute its own balance and mix. However, the important point at this early



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Robert Mandell, president of Transcom, [left] and Peter Roos, vice president.

stage is that all the work is being constructed and assembled in less expensive off-line suites using the hard disc editor. The elements never go analog and nothing you do involves dubbing down. All editing is non-destructive and involves nothing more than creating edit lists or sequences from the original material. With a 3/4-inch videocassette deck, a keyboard and monitor, the television equivalent of a Moviola is created.

Digital music making and scoring benefit tremendously from random-access recording.

Immediately, the speed of the system becomes evident. You can review an entire episode of the program with the producer and decide where to lay in all your music and sound effect cues by creating and rearranging a computerized list. In fact, you can virtually finish the project by the time you are through reviewing the program the first time. You never have to cue up reels from tape libraries and fast forward them until you reach the right spot. This is a much faster process. The elements you need have all been loaded onto hard disc. Cuing decisions or element changes can be made on the spot.

Making digital music

Digital music making and scoring benefit tremendously from random-access recording. You can work virtually by yourself, never worrying about over-recording

things on the tape. You can instantly tie into sync, grabbing time code right off the cassette. With the massive hard disc storage capacity there's instant access to an enormous sound effects library for sampling. Besides, all your own recordings can be mixed, matched, stored and accessed with limitless flexibility. Several companies offer combined synthesizer, hard discs for "tapeless" recording. However, the component system we've devised here allows for a flexible array of keyboards, digital sampler/recorders and sequencer programs. New components can be added as the technology advances.

The MIDI connection is an important element as well. As opposed to doing an original digital recording you have the option in this digital world of doing multitrack MIDI recording. Each MIDI track is a sequence, like an edit list, that tells your keyboards when they should play a particular note and when they should shut it off. What you do is actually build up multiple tracks of these note-on/note-off commands. You can control a group of synthesizers and individually work on tweaking each of those tracks one at a time. All track work is stored on a personal computer with MIDI sequencer software.

You can work that way first to get an idea of multitrack capability and then do a stereo mixdown to the digital domain. Or you can go straight to multitrack with the understanding that you are in an on-line situation which is much more expensive. You can also print-out your edit lists to use as music cue sheets.

Digital sound effects and MIDI-generated Foley

Digital sound effects, meanwhile, come

from a variety of sources. There are numerous CD libraries around that provide a growing number of digitally recorded sound effects. Otherwise, you might already have your own in-house archived sound effects, samples from your MIDI room, or sound effects you've collected in the field with a portable digital recorder—all of which can be digitally transferred into your hard disc system.

Sampling keyboards can now be used to create Foley effects. Instead of physically creating those footsteps or splashing sounds in the studio, for example, "live" sound effects can be simulated by the digital piano keyboard.

An important note to make at this point is that everything is organized with a database. You have all your elements notated by name and time code. Since the recorder is a computer, the database searches return the actual sound instead of a reference to the location of the sound on an analog tape. In the computer all the audio is randomly accessible and is a friendly way to work—especially with the high volume in a good sound effects library.

Each MIDI track is a sequence, like an edit-list that tells your keyboards when to play and shut off a particular note.

Digital dialogue recording

The final element in this TV audio triad is the dialogue, when done in the digital domain, offers you a quick alternative to standard ADR procedures.

Automatic Dialogue Recording (ADR) is often done with multitrack tape machines and videocassette reference or with film loops and mag. It may be a fairly smooth process in the hands of an experienced engineer but there is no real speed involved—especially when compared to how fast it can fly on the digital audio network (i.e., automatically cuing the actors at predetermined edit points). The advantages are manifold: it can also be used to create composites from several takes and can block movie dialogue to fit edits or to rearrange takes. Besides, there's virtually no lock up or rewind time involved and the ability to slide takes with pinpoint accuracy is an important edge.

You can't really slip and slide things effectively on multitrack tape. With a mag you can change the interlock but nothing could be simpler than adjusting sync via a keyboard stroke.

Digital layback

At this point the various audio workstations have created their individual edit lists on the master hard disk system. The lists can be called up at any time for comparison from any editing suite. Most importantly, the lists can actually be layed back onto the multitrack in an automated fashion without ever leaving the digital domain.

The digital element prevails because it is possible to uplink digital audio for distribution.

In this case, these transfers are accomplished by taking advantage of the Sony 1630 format. This format was originally created by Sony to make non-generation dubs between stereo machines. Other standards like the AES/EBU, Pro Digi and DASH could also be used. Still, the point must be made that, for this digitally-integrated track construction/mixdown situation to work, all equipment must share a common digital transfer protocol. With the proper digital interface, you can take advantage of all your off-line work and auto-assemble your tracks digitally onto the multitrack. You are ready for the mix.

Digital mixdown

We live in a world of the analog mixing console. However, in a hypothetical situation like this you can accept the fact that the digital console is a professional recording reality.

During the mixdown to a stereo format, digital processing is used to create specific audio effects. Here too you are staying in

the digital domain, though standardization of digital processing equipment is still needed to provide those absolute digital ins/outs that we ultimately will require.

The final stereo mix is relayed to video—either to an analog video machine with a digital audio track or to a digital videotape recorder (DVTR). Both machines are real world alternatives that allow you to keep your audio digital one step longer. However, most TV facilities don't have digital audio VTRs, and a 1-inch video dub with analog audio is generally required for playback. Then again, if you prefer, you can

uplink it all digitally to satellite.

Here again the digital element prevails because it is possible, though expensive and not really practical, to uplink digital audio for distribution. In fact, this process is particularly applicable to the Sony 1630 format. The 1630 processor not only turns analog audio to digital audio but takes it one step further by turning digital audio into video which can then be uplinked. You just uplink the video, which is an encoded version of the digital audio, and then capture it on the down side, converting it back to digital audio with the 1630.

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Control room equipment

The hypothetical digital audio studio we've designed is based upon Transcom Digital, a digital audio-for-video, production and post-production studio in New York. The system was created to post-produce a syndicated series, "Adventures of the Galaxy Rangers," which is currently being aired worldwide and in 65 domestic marketplaces. The studio is now open for rental to outside producers.

The digital audio network is built upon the CompuSonics DSP 2002 with the combined resource of 14 hard discs. The system is directly interfaced to a variety of video editing and music suites, as well as a

master control room that features a Sony 3324 digital recorder and a Solid State Logic SL 6000E console. A direct digital CompuSonics-to-3324 interface has been constructed for this suite.

The music scoring room is built around a variety of keyboards and samplers including the Kurzweil 250 and the Akai S900, along with Macintosh and Amiga personal computers running the latest MIDI controller software. Interestingly, the CompuSonics terminal has been removed from the suite. The user interface is accessed from a window on the Amiga, which can be pulled

up at any time. Customized adjustments have been made to the CompuSonics software to simplify many of the operational commands, particularly as they apply to dialogue recording. For instance, the system has been customized to automatically cue the actors and to easily make all time code adjustments.

Similarly, the CompuSonics software has been enhanced to auto-assemble all edit lists during digital layback. This feature is an industry first, and has been designed to replicate the process that is commonly handled during automated video editing.

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At this point you have taken digital audio for television as far as it can go, since a consumer digital TV standard is still years away.

However, it is apparent that the technological hardware exists to handle a TV sound totally in the digital domain. We have already spoken about the many advantages—primarily speed and the lack of generation loss. A digital audio standard, when it develops, will mean that even more equipment with D-to-D transfer capability will be produced.

Meanwhile, the parallel paths of digital audio tape recorders developing from

When a digital audio standard is developed, more equipment with D-to-D transfer capability could be produced.

videotape technology, and high powered micro computers evolving into hard disk record/edit workstations, converge neatly at the television sound application. Audio-tape machines designed to run on house video sync reference, couple with video-style time code list editors to create the audio analogy of video off-line/on-line editing.



Transcom's mix suite features the CompuSonics DSP-2002, Sony 3324 recorder and a Solid State Logic SL 6000E console.



Author Peter Roos at Transcom's digital audio network bank.



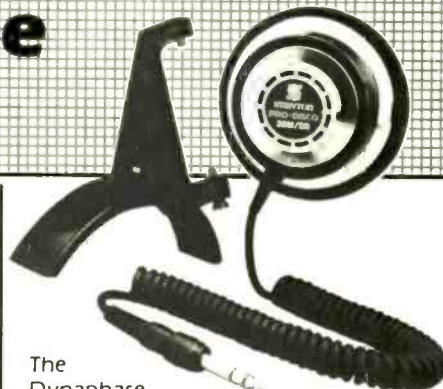
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State of the Industry: Future Trends and Observations

By Michael Fay, Editor

What is the pro audio industry going to be like next year? In five years? In 10?

Although predicting the future can be risky, some reasonable judgments can be made from the issues that have dominated the industry lately. Making accurate predictions is perhaps overall less important than stimulating new thoughts and ideas.

RE/P started this tradition of predicting future trends because an industry dialogue is necessary. The studio business continues to change and evolve at an ever-faster pace. To stay competitive, it's going to become necessary to anticipate changes, not just follow them.

The envelopes please: Here are some of the trends that I feel are going to be shaping the industry in the next few years:

1. Control room dimensions will get larger and monitoring will get smaller.
2. For large-scale monitoring, cone/dome systems will increasingly be used.
3. The cost of digital technology will decrease and seriously compete with its analog counterparts, perhaps causing a price war.
4. Studio owners will have to diversify their business even more broadly than they have in the past.
5. A new personnel position will evolve in the studio, broadening the job market.
6. Standardization between products will have to play a bigger role.

Now for the specifics:

Studio design

For years I've worked on conceptual designs, looking for the perfect balance between acoustics, ergonomics and sight lines. The future will be toward large control rooms. This is not a new concept, many designers are working on rooms having 600 to 700 square feet of unbuilt space. But, what I'm suggesting is a control room with 800 to 1,000 square feet of finished floor space.

The production control room of the future will incorporate enough space for the console and engineer, all signal processing and machinery not in isolated booths, the arranger/producer, a musician's workstation, clients and other peo-

ple involved in the production. Each person or group of people actively engaged in the project will have individual stereo audio monitoring, video monitoring, a communication and timing network, computer terminal, desk space for writing and direct eye-to-eye contact with key production personnel.

Instead of high-power soffit mounted monitors, this room would rely on multiple close field speakers with sub-woofer support for accurate full frequency range reproduction monitoring.

The small monitor package won't be for everyone, but it can have a significant quality and economic impact for those who are able to work with this format.

For those who need large studio monitors, the future may be in the development of all cone/dome systems. As the power handling capabilities of these systems improve, you'll see more of this type of product.

However, I recently spoke with a studio owner who mentioned he was going to replace his all cone/dome system with a popular coaxial configuration because his clients weren't hearing enough harmonic distortion, which is frequently misinterpreted as loudness and brightness. Most of us have been living with mid- and high-frequency distortion so long that these new cone/dome systems might take some getting use to.

In a year or two, multitrack random access recording machines will be at a price and performance point giving multitrack digital and analog tape machines serious competition.

Although some people may speculate that the random access competition will result in the demise of the analog format, it won't happen. The format will survive and find a niche in the market as have for example tube and ribbon products.

One of the more popular phrases these days is "digital audio workstation." These are powerful composition, production, and editing tools that when fully evolved may also be able to do the real time mixing and signal processing necessary to produce a master quality finished product.

These "workstations" will be ideally

suited for integration into the large control room environment, which will also include a main mixing console, audio and video monitoring, and some sort of acoustic space in which to record a live performance or sample for further processing.

But as Sting demonstrated at New England Digital's 10th anniversary celebration at the AES in New York, all-purpose "workstations" are wonderful tools, but as a real time performance system they will never replace live bands.

Diversification

Everyone is talking about audio for film and video. This is one viable way to diversify, but the video and film industries will not be the panacea many envision.

The amount of album work for national and regional distribution is dwindling, and the video and film markets can provide only so much new business. The key to survival is on the broadest level. When the telephone rings you should be able to say, "Yes, we can do that job."

In order to properly service the widest possible client base, certain business standards are necessary, such as:

1. Facilities should be operated by experienced professionals who work efficiently, and have flexible and constructive attitudes.
2. The studio equipment should be maintained at or above the manufacturers specifications both sonically and mechanically.
3. Provide the level of service that you would expect to receive if you were paying someone else \$50 to \$200 an hour or more.
4. Have a location that is convenient for your daytime clients. They are the ones who must fight traffic patterns and deadlines.
5. The environment should be conducive to creativity and productivity. Most clients would prefer too much light and elbow room, to too little.
6. Rates should be consistent with the quality of service.
7. The personal and the professional image of business should be compatible

with that of your clients. A good image will help to instill confidence.

These seven points are consistently beneficial in all areas of the audio production business.

In the next few years, a new position of responsibility in the recording studio control room will evolve. The title might be "systems engineer," and will be an alternative or perhaps an addition to the position of a second engineer. This position will be created because of the growing complexity of communication and control systems.

The operator will be responsible for all system communication between the studio's hardware and software. Such tasks as electronic audio patching, MIDI patching, voice editing, sound effects librarian, edit decision-list data entry, and interlock system control could be effectively handled by this person.

For the aspiring audio engineer, this is an area of opportunity, especially as it becomes harder to break into the business.

Imagine where the acceptance level of the digital tape machine would be today if manufacturers would have adopted a single sampling rate standard. Or, how much easier installation jobs would be if

there was a single standard governing which pin is hot on an XLR connector.

The professional audio industry would be improved by finding ways to implement certain standards for formats, connectors and communications protocol. The explosive growth of the electronic musical instrument industry is largely due to the universal acceptance of MIDI.

The desire to design new and uniquely superior products helps lead to progress. But time, energy and money are better spent focusing on improved sonic and mechanical operations than on attempts to corner the market by developing an incompatible format.

Publications

It is not enough to just look at the future trends as they relate to the manufacturers and users of equipment. We must also look at the future of pro audio publications.

The editorial criteria that served our industry in the 1970s is only partially adequate in the late 80s and on into the 90s. Today the stakes are high, and in order to serve the industry effectively pro audio publications will have to be actively involved.

For these publications, technology is

not only allowing us, but forcing us to be more objective, creative, and educational in editorial content.

A professional trade journal can and should help you do your job better. We are in a position to help our readers evaluate new developments by asking and answering questions on how will this product help engineers work more effectively and how will this hardware investment better service clients or make more money.

Obviously, there are other issues that will become important, and the importance of some of the issues mentioned here may not be apparent for some time. But it's undeniable that this is an exciting time to be in the pro audio industry, and despite some uncertainty, the future is definitely bright.

If you have any thoughts on what is going to be important in the future and want to share them with the rest of the industry, write to me at *RE/P's* Hollywood office. The address is 1850 N. Whitley Ave., Suite 220, Hollywood, CA 90028. The best responses will be included in the "Letters" department in future issues.

In the meantime, here's to a successful 1988.

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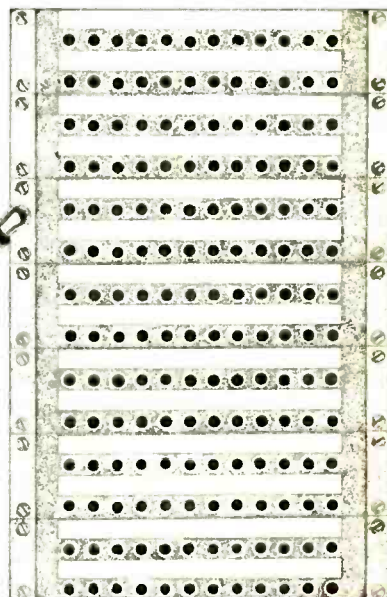
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New Products

Editor's note: This month, "New Products" focuses on the recent AES convention in New York—new products that were introduced, additions to a product line, or enhancements or revisions to existing products. Each entry has a Rapid

Facts number at the end. For more information on any of the products listed, circle the appropriate number on the Rapid Facts Cards at the back of the issue.

More products from the AES will be featured in the January issue.

Streeterville . . . The Class of Chicago



When you talk about class in recording studios there are two factors to consider – people and facilities. Here at Streeterville we have both. Creative engineering excellence plus support staff services with a 'family feel,' combine with state-of-the-art facilities for a studio atmosphere that is second to none.

Ask participants in Chicago's production community – the producers, singers, players and announcers – about "Streeterville People." You will unanimously hear that from session engineers to studio owners/managers Streeterville provides personable, energetic professionals who will draw upon the experience and resources of this 18-year-old organization all for one goal – to insure your project's success.

Facility-wise, there is only one word used to describe Streeterville: world-class. Streeterville is based around six 24/48 track studios with variable room acoustics, two Solid State Logic music systems, customized Neve desks, two Harrison consoles, an unimaginable array of outboard gear and a Synclavier Digital Audio System. Add to this unmatched sound-to-picture capabilities and international satellite services and you'll find yourself working in one of the nation's finest audio facilities.

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New England Digital Direct-to-Disk recorder

A stand-alone digital audio recorder, the unit features 100kHz, 16-bit recording and is used in conjunction with the company's Audio Event Editor software. The unit is available in 4-, 8- and 16-track configurations. Recording time up to one hour is available at the 100Hz sampling rate; in a 16-track system, up to 32 hours of time is available at 50Hz sampling.

Circle (100) on Rapid Facts Card

Studer A820 multitrack recorder

The A820 is a 1-inch, 8-channel version of the 820 series, and is aimed at the advanced production and video post markets. Optional plug-in noise reduction cards can be integrated into the machine, and reels up to 14 inches can be used.

Circle (101) on Rapid Facts Card

Optical Media International sampling discs

"Northstar Gold" is a CD-ROM disc pressed in 24-karat gold, and contains about 450 sound samples for the Emulator II and in-house sounds from the company. The gold pressing allows for higher reflectivity and a longer life span, the company says. "Universe of Sounds," Volume 1, contains 3,200 keyboard layouts for E-mu Systems Emax samplers.

Circle (102) on Rapid Facts Card

Yamaha DEQ7 digital equalizer

The rack-mount unit has 30 preset EQ configurations, with 60 RAM memory locations that allow settings to be stored. All signal processing is in the digital domain, the company says. MIDI, digital and analog inputs and outputs are also included.

Circle (103) on Rapid Facts Card

New Products

Leonardo librarian software

Professional Librarian software enables computerized search and playback of compact disc sound effects and production music libraries. Designed to run on PCs and compatibles, the system controls a Sony CDK-006 multiple compact disc player. Discs can be searched by category, description, tempo, length, instrumentation, sound types, key or mode.

Circle (104) on Rapid Facts Card

3M 8175 splicing tape

Featuring a synthetic adhesive that is said to prevent creep and drying out, the tape is designed for use with digital audiotape. A special black backing eliminates translucencies experienced with splicing tape with clear backing, and prevents a digital audio recorder from interpreting splicing gaps at the end of the tape, the company says.

Circle (108) on Rapid Facts Card

Four Designs rack

Son of FX is a mobile workstation that allows the organization of recording, computer and rack-mount equipment. Two adjustable shelves are included to hold such items as recorders or drum machines, while 10 units of rack space are provided. The unit is made of wood, which eliminates ground loop problems, the company says.

Circle (118) on Rapid Facts Card

Sunkyong chrome audiotape

Designated UCR, the chrome tape is an addition to its music and voice grade tapes, and is available in 10,500-foot pancakes.

Circle (124) on Rapid Facts Card

Digital Audio Research Soundstation II

For use in audio, video and film production, the unit combines multichannel digital audio recording, direct-access sound editing and digital signal processing. The basic configuration includes 4-channel recording and editing and can be expanded to eight channels. The unit uses 5¼-inch Winchester and WORM disks for audio storage.

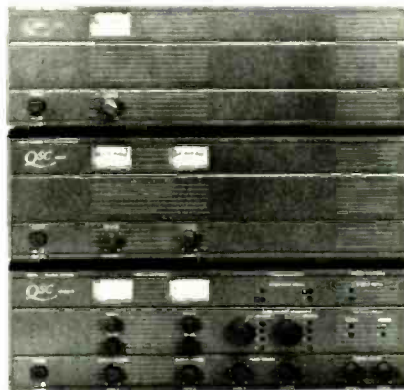
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QSC Series Two power amps

Consisting of the MPS 2300, the A2300 and the A2150, the series is designed for commercial sound applications. The amplifiers incorporate transformerless audio circuits and direct outputs, which the company says delivers flatter frequency response, lower distortion and better output regulation. The MPS 2300 is a music and paging system; the A2300 is a 2-channel, 150W per channel amp; and the A2150 is a single-channel, 150W amp.

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Professional Audio Systems Studio Monitor 1

The monitors feature Time Offset Correction and use beryllium diaphragm compression drivers, allowing extended HF response to 20kHz, the company says. The 2-way, biamped system has 10W power output and nominal impedance of 8Ω, high and low.

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TMB/Mogami Definition series cable

Definition series multicore cable is designed for speaker systems with electronic crossovers. Each conductor comprises 224 strands of pure, oxygen-free copper, enabling greater sound clarity, the company says.

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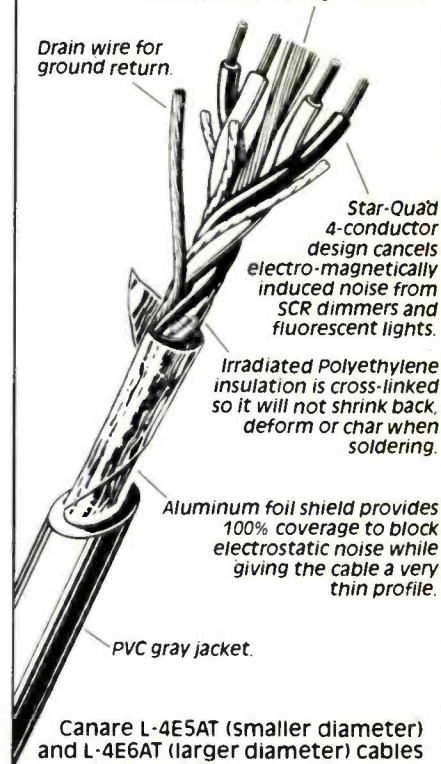
Ampex cassette shipper

An optional shipper/hanger box for Ampex 467 digital audio cassettes features injected molded plastic, a dust seal and vertical stabilizers. The shipper allows cassettes to be stacked easily for shipping and storage.

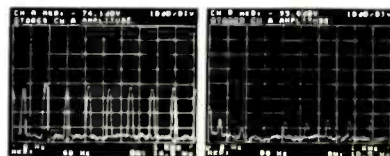
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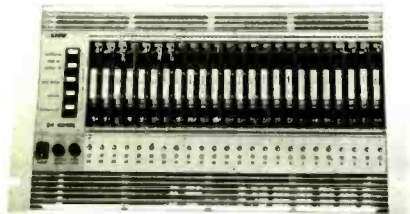
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New Products



ANT E413 multitrack NR

The noise reduction system is a 24-channel unit and is the latest member of the company's telcom C4 NR system. Based on the company's C4 E card, the unit is claimed to be smaller, lighter and more energy efficient, with a dynamic range of 118dB.

Circle (106) on Rapid Facts Card

Teldec Direct Metal Mastering for CD

Previously used for vinyl records, DMM can now be used to master compact discs without a clean room environ-

ment. The process is a mastering lathe that generates CD pits by embossing in real time, which allows the results to be checked immediately. The lathe is small and lightweight, allowing it to be used in a studio, and lets artists monitor a CD master during the recording process.

Circle (117) on Rapid Facts Card

Sennheiser RF mic monitoring system

The computer-based monitoring system monitors and displays the signal strength, audio output and frequency error of wireless mics on up to 27 individual channels. Each channel is identified by number, frequency and the individual performer's name. The system is designed for large-scale theater, film and television productions.

Circle (116) on Rapid Facts Card

Agfa-Gevaert PEM 291D master tape, R-DAT cassette

The master tape has been designed for

the current generation of DASH and PD digital recorders and is claimed to have an exceptional carrier-to-noise ratio, ensuring low error rates. It is available in ¼-, ½- and 1-inch widths, and in 5,000-, 7,500- and 10,000-foot lengths. The R-DAT duplication cassette is available in 60-minute lengths.

Circle (121) on Rapid Facts Card

KABA Cool Power Tower

The oak equipment cabinet is fan cooled, equipped with castors, and accommodates rack mounts or stacked equipment. The unit also comes with 12 surge-protected outlets, an 8-foot power cord and a spare convenience outlet.

Circle (132) on Rapid Facts Card

Milab LC-28 microphone

A new version of the LC-25 transformerless condenser mic, the LC-28 has a switchable high-pass filter, and 10dB and 20dB pads. Sensitivity has been increased by 5dB, and maximum SPL is 145dB.

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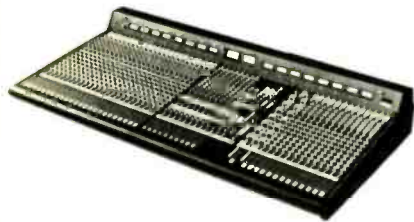
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New Products



RAMSA WR-S840 series console

The line of consoles is designed for sound reinforcement mixing and features 40 input modules, eight group and eight aux buses, and an 8x11 output matrix. Options include a submix input module that configures the console to accept up to 160 mic or line inputs, and a configuration that converts the console into a stage monitor mixing console with 18 discrete sends.

Circle (113) on Rapid Facts Card

Sony enhancements for MXP-3036

New options for the recording/remixing console include vacuum fluorescent light meters for more readability, a wild fader option to increase the number of effects in a mix, and software enhancements for the console's automation system to provide greater storage capacity, greater user interface and new features.

Circle (129) on Rapid Facts Card

Otari TC-50 time code/FM processor

The TC-50 is a retrofit for Otari 2-tracks such as the BII, MKIII-2 or 5050, and adds center-track time code. Two-track, 1/4-inch machines can be synchronized to a videotape or film machine with stereo audio, eliminating the need to purchase a 1/2-inch, 4-track machine.

Circle (125) on Rapid Facts Card

Studer A721 cassette deck

This pro cassette recorder replaces the A710 and is a 4-motor, dual capstan unit with a die-cast transport and headblock. Dolby B and C NR is available, as well as Dolby HX headroom extension.

Circle (138) on Rapid Facts Card

CADD DL-1 crossover system

The DL-1 is a digitally based audio system control unit. A crossover can be configured in a stereo 3-way or stereo 2-way mode. In addition, the unit has a digital compressor/limiter on each output for loudspeaker protection, and a digital delay circuit for each frequency band to fa-

ilitate time correction between drivers in a loudspeaker cabinet.

Circle (111) on Rapid Facts Card

Lenco MPA-2100 and -2300 power amps

The MPA-2100 is designed for close-

field and cue systems, while the 2300 is for dedicated monitors and concert sound reinforcement. Both have extractable channel power modules, a front-side cooling system, and no wire used in the audio pathways.

Circle (112) on Rapid Facts Card



New! Inexpensive Center Track Time-Code for Non-TC Audio Machines.



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Continued from page 81

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	Page Number	Rapid Facts Number	Advertiser Hotline		Page Number	Rapid Facts Number	Advertiser Hotline
A/T Scharff Rentals	103	85	212/582-4400	Klark-Teknik PLC	59	45	
AKG Acoustics, Inc.	45		203/348-2121	Kurzweil Music Systems, Inc.	37	22	617/893-5900
Alpha Audio	65	36	804/358-3852	Lenco	46	42	800/325-8494
Amek Systems & Controls Ltd.	27	16		Littlite/CAE, Inc.	64	34	313/231-9373
Ampex Corp.	11	9	415/367-3809	Magnetic Reference Laboratory, Inc.	74	57	415/965-8187
Aphex Systems Ltd.	61	47	818/765-2212	Martin Audio Video Corp.	62	49	212/541-5900
Applied Research & Technology	25	15	716/436-2720	Micro Audio	75	65	800/445-1248
Atlas/Soundolier	43	40	314/349-3110	Micropoint	93	74	914/241-4439
Audio Accessories, Inc.	97	63	603/446-3335	Musically Intelligent Devices Inc.	68	51	516/864-1683
Audio Control	70	54	206/775-8461	Nakamichi USA Corp.	29	17	213/538-8150
Audio Kinetics Ltd.	76	66		Neve Inc.	13	8	203/744-6230
Audio Precision	81	59	800/231-7350	Opamp Labs	103	86	213/934-3566
Bridgewater Custom Sound	102	80	312/596-0309	Otari Corp.	3	4	415/592-8311
Bruel & Kjaer	35	21		Otari Corp.	101	77	415/592-8311
Canare Cable Inc.	99	76	818/840-0993	Patch Bay Designation Company	85	71	818/241-5585
Capital Magnetics	50	29	213/461-2701	Peavey Electronics Corp.	31	18	601/483-5365
Carver	51	43	818/442-0782	Polyline Corp.	62	48	312/298-5300
Cetec Gauss	69	53	213/875-1900	Pro Sound	103	84	800/421-2471
Cipher Digital Inc.	21	13	301/695-0200	Professional Audio Systems	47	27	213/534-3570
Community Light & Sound	77	67	215/876-3400	QSC Audio Products	17	11	714/645-2540
Cooper, J L Electronics	94	75	213/473-8771	Quantum Audio Labs	60	46	714/838-8833
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D & R USA	71	38	817/548-1677	Saki Magnetics, Inc.	78	68	818/880-4054
Denecke Inc.	68	52	818/766-3525	Solid State Logic	IFC-1		212/315-1111
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Electro-Voice, Inc.	33	20		Standard Tape Laboratory, Inc.	103	82	415/786-3546
Elmar Plastics	100	81	213/327-3180	Stanton Magnetics Inc.	95	62	
Europadisk, Ltd.	78	69	212/226-4401	Stewart Electronics	85	70	916-635-3011
Eva-Tone Inc.	103	83	800/EVA-TONE	Streeterville	98	64	312/644-1666
Everything Audio	15	10	818/842-4175	Studer Revox/America	BC	3	615/254-5651
Fostex Corp. of America	53	44	213/921-1112	Switchcraft	39	23	
Future Disc Systems	40	24	213/876-8733	TAO Logic	103	87	714/997-7165
Gentner	79	58	801/268-1117	TASCAM Div./Teac Corp.	7	6	213/726-0303
GML	89	61	213/453-5350	Telex Communications, Inc.	57	32	612/887-5531
IAN Communications Group, Inc.	91	72	617/658-3700	Thermodyne International Ltd.	67	50	213/603-1976
JBL Professional	5	5		Trident USA Inc.	9	7	213/533-8900
Jensen Transformers	32	19	213/876-0059	Valentino Music Library	102	79	212/869-5210
JRF Magnetic Sciences, Inc.	101	78	201/579-5773	Washington Music Center	72	39	301/946-8808
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KCC Audio/Video	40	25	212/228-3063	Westlake Audio Professional Equip. Sales Group	55	30	213-851-9800
Klark-Teknik Electronics Inc.	19	12	516/249-3660	Yamaha Intl. Corp.	41	26	

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