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· **Moving Beyond 16-Bit Converters**

· **Computer-Controlled**

Audio Systems

· **Field Test: Alesis ADAT**

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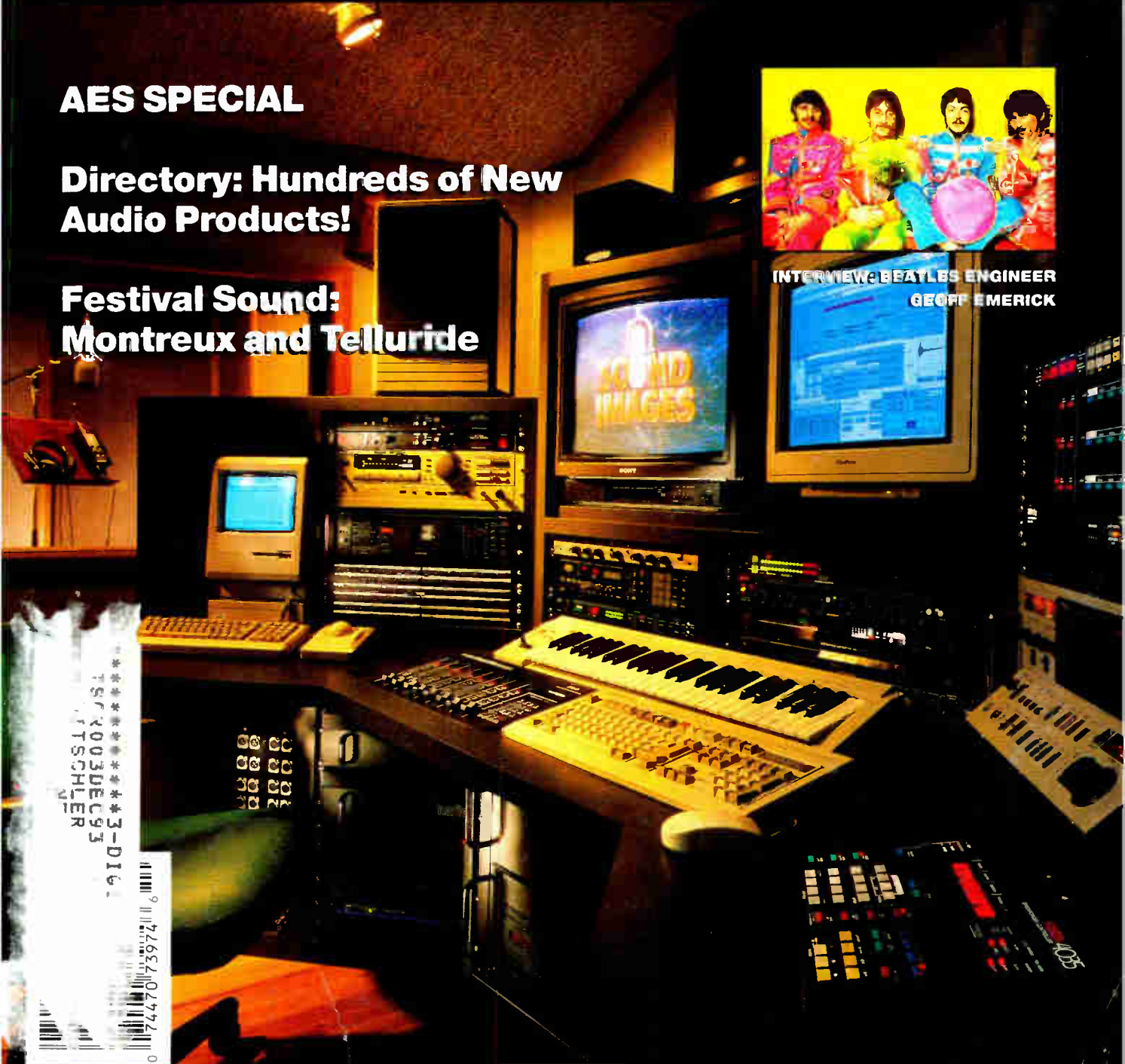
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Hard knee or soft knee, and peak or RMS compression. All the options you need to custom configure the 3630 for any recording application... especially necessary for digital recording.

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World Radio History



Bottoms Up



In recent years, the popularity of nearfield monitoring has become the mainstay of engineers throughout the industry. From midi rooms and home studios to major recording facilities, small-reference monitors are precariously perched atop consoles everywhere.

This current trend, however, presents its own unique problems, in terms of inadequate bass performance, particularly in the critical 40-100 Hz. region.

With this dilemma in mind, Tannoy now offers a compact and affordable solution in the PS-88.

The PS-88 is a purpose built nearfield sub woofer designed for under console placement, and represents considerably more thought and design than the average amplified bass loudspeaker.

The PS-88 utilizes a proprietary amplifier which takes advantage of a performance region not normally used in a loudspeaker system, the area below box resonance. The amplifier provides a correcting signal to overcome the natural 12dB per octave

rolloff of a woofer in a sealed box.

The result is a flat response from the point where the dynamic limiter takes over up to the system resonance of the speaker and an 18 dB per octave rolloff above system resonance. The amp eliminates the need for a passive crossover, which often performs poorly at high power levels.

The dynamic limiter constantly monitors the input signal and dramatically adjusts the correcting signal to give the deepest bass possible at that signal level, given the finite power and excursion limits of the system.

When utilized in reference mixing applications, a very useful and revealing picture of low frequency information comes into focus, offering well balanced, subsonic reinforcement, knitting seamlessly with the majority of today's small reference monitors.

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SOLO MIDI RECORDING. Available in 16, 24 and 32 input frame sizes. Automated MIDI Muting on all channel inputs, monitor inputs, group outputs, stereo effect returns and auxiliary masters. Four band EQ with two swept Mids, assignable to monitor inputs. Six auxiliary sends—four assignable to monitor inputs. Four stereo effect returns with two band EQ, balance and level controls. Raised meter bridge.

We wanted to list *all* of the features on SOLO consoles but we ran out of space. If you want to find out more about



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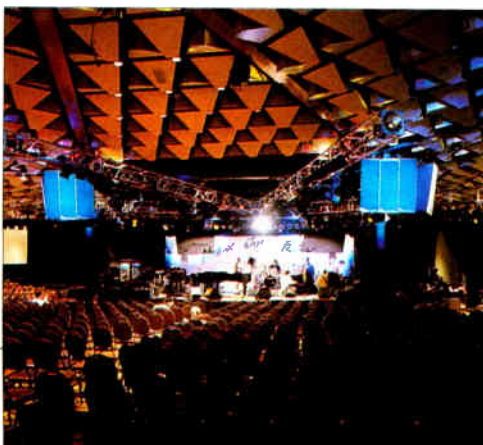
MIX

PROFESSIONAL RECORDING • SOUND AND MUSIC PRODUCTION

OCTOBER 1992, VOLUME 16, NUMBER 10

AUDIO

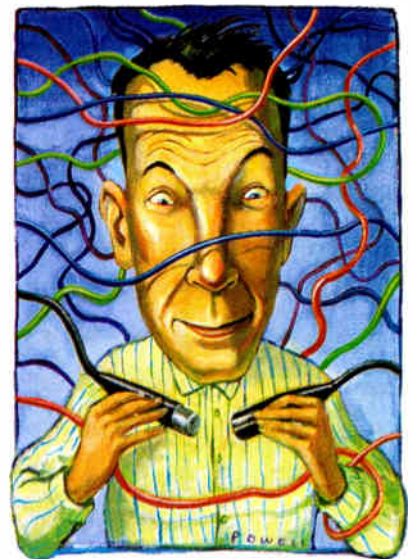
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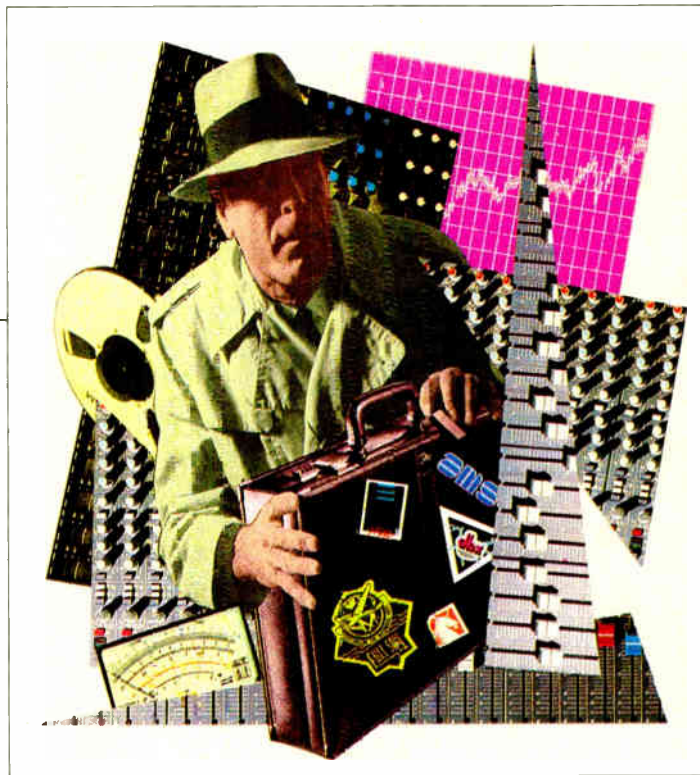
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Cover: Studio B at Sound Images Inc. in Cincinnati. One of two identical production suites featuring a tapeless, consoleless workstation based on a WaveFrame 1000 with 8-track disk recorder, 16-voice sampler, universal digital interface and a 16-channel onscreen mixer. Both suites are primarily used for audio post-production.
Photo: Mark Alexander.

DIRECTORY

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8 Tracks

RECORD
INPUT

1 2 3 4 5 6 7 8

POWER

1 2 3 4 5 6 7 8

Demos to masters. Creativity to tape. Dreams to reality. Magic phrases for those who want to make music that sounds as good as it feels.

The inspiration for these thoughts is the **Alesis ADAT Professional Digital Audio Recorder**, a technological revolution that tears down the walls to your creativity while delivering world class master recordings. Too good to be true?

Here's the concept. ADAT fuses a supersonic Alesis-designed very large scale integrated chip set with the proven reliability of an industrial grade S-VHS* tape transport and a logical, sensible user interface. The result is a digital tape recording system that exceeds the most demanding requirements of professional audio and that can be used by literally anybody. Hard to believe?

Here's some specs. Bandwidth 20Hz to 20kHz ± 0.5 dB. Total Harmonic Distortion plus Noise 0.009%. Wow and flutter unmeasurable. ADAT uses the professional standard 48kHz sample rate and delivers better than 92dB dynamic range.

Here's some features. ADAT uses the familiar tape recorder controls that you already know how to use so

recording is fast, intuitive, effortless. Connections are provided for balanced +4dBu levels on a single 56 pin ELCO** connector and unbalanced -10dBV signals on 1/4" jacks. And ADAT uses S-VHS tape because it's a proven, robust recording medium with wide 1/2" tape to solidly support ADAT's 8 recording tracks while delivering 40 minutes of recording time.

The best part. ADAT's Proprietary Synchronization Interface (Patent Pending) locks multiple ADATs, independent of the audio tracks, to single sample accuracy $\pm 5\%$ of 1/48,000th of a second! In other sciences this is referred to as 'air tight'. So multiple ADATs function in perfect mechanical and electronic unison: up to 16 ADATs without an external controller. That's 128 tracks!

More best part. ADAT's Proprietary MultiChannel Optical Digital Interface (Patent Pending) simultaneously sends all 8 tracks of recorded information out the Digital I/O for perfect safety tapes and perfect track bounces.

Even more best part. The optional BRC Master Remote Control opens a whole other door to the ADAT miracle. With it you can control up to 16 ADATs (128 simultaneous tracks) with full transport functions, track offsets, machine offsets,

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Also available: The AI-1 ADAT to AES/EBU and S/PDIF Digital Interface with sample rate converter.
RMB 32 Channel Remote Meter Bridge.
Call 1-800-5-ALESIS for information about the ADAT Worldwide Network.





To Megatracks™

digital assembly editing via the Digital I/O, SMITTE and MIDI Time Code, Video Sync and more.

What does all this mean? Here's just a few benefits.

It's commonly known that many hours are wasted during expensive album projects while the artist, producer and engineer work in vain to reproduce the rhythmic feel and tonal nuance of demos. Demos that couldn't be used because they suffered from noise, limited bandwidth and overall sonic feebleness. Those days are over forever. ADAT's Sync and Digital I/O perpetually link your demos to your masters making them all part of the same creative process. Every track you record on ADAT is a master track that can be flown into any other ADAT recording, at any time. The best part is that ADAT can be there at any time to catch you at your best, flawlessly stored in the digital domain...forever.

Need more tracks? ADAT studios can be expanded at any time. The cost of a single ADAT is remarkably inexpensive and new ADATs can be added as budgets permit. Add the BRC at any time for more control and advanced editing. Producers please note: with ADAT, Megatrack™ recording is a reality.

Your favorite sax player lives in Idaho? No problem. Send 'Supersax' a formatted tape with a guide track of your song. You'll get back 7 tracks of burning solos you can fly back into your production. All in perfect sync, all in the digital domain. All dripping with soul. Want more tracks? Just send more tapes.

ADAT is not only a new recording medium, it is the new recording standard. Imagine a network of ADAT users from bands, composers and project studios to professional studios, video editing suites and broadcast production studios. All recording master quality tracks with full compatibility and no barriers between their creative disciplines. In fact, we're launching the ADAT Worldwide Network™ multitrack recording group to facilitate communication between ADAT studios.

In time we'll all start taking these little miracles for granted. Before that inevitable event, unpack your first ADAT and track a minute of single notes and chords on your favorite instrument. Play loud, play soft. Play it back and listen really close. It's always a good feeling to have your mind completely blown.

See your Alesis ADAT Dealer today and start Megatracking on ADAT.

FROM THE EDITOR

The Audio Engineering Society's annual huddle happens this month in San Francisco, for the first time in the organization's 44-year history. We who make our homes in the Bay Area welcome our industry friends, both those who are familiar with the rare beauty and excitement of San Francisco, as well as those who've only experienced our city through TV shows and commercials.

As locals know, the San Francisco Bay Area has contributed greatly to the history of recording, going back well before the chipmeisters began farming the fertile fields of Silicon Valley.

The first professionally manufactured audio tape recorders in the United States came from Ampex, in nearby Redwood City. It was back in the mid-'40s when signal corpsman John T. Mullin discovered a German Magnetophon in an abandoned Nazi broadcast tower in France. A small motor building company of six engineers in the South Bay was intrigued enough by Mullin's find that they began manufacturing their version of the invention, and this was the birth of the Ampex Model 200.

A few years later, in the early '50s, a gifted young tweeker from San Francisco named Ray Dolby was working with Charlie Ginsburg and a team of Ampex engineers on a plan to record images onto magnetic tape. They spent several years of intense research and development in a little hole-in-the-wall lab that Alexander Poniatoff allowed them to use. Finally, in 1956 they demonstrated the first viable videotape recorder at the NAB in Chicago, launching *another* industry.

Some old-timers may try to convince you while you're in town that if you look on a map, the peninsula of San Francisco looks like a record head. Perhaps that explains the magnetic attraction certain people have had toward this city over the years. Perhaps not.

We'd be remiss if we didn't mention that the Bay Area also gave birth to *Mix* magazine, which began in a Marin County living room 15 years ago this fall. If you had told us then that in 1992 *Mix* would be the world's premier magazine for audio professionals, read in over 100 countries, we probably would have asked you what you were smoking.

All of us here at *Mix* hope you have an enjoyable and productive AES convention. And if you're not going to San Francisco, you'll still find our annual New Products Directory in this issue to show you what you'll be missing from a technical point of view. So crack some crab onto a piece of sour dough, stir up a latte and...



Keep reading,

A handwritten signature in black ink, appearing to read "David Schwartz".

David Schwartz
Editor-in-Chief



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David Schwartz and Penny Riker Jacob

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I’d say it was audibly superior.

I’d say it just *sounds* better.



Ampex 499.
It just *sounds* better.

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CURRENT

DCC LAUNCH DATE MOVED BACK

Admitting that the announcement of Digital Compact Cassette availability by September 15 was "a tactical mistake," Philips has moved the expected hardware launch date to "sometime before Christmas." Not-for-sale units were still expected in U.S. stores by September 15, according to Philips representatives, and software titles from Philips-owned PolyGram, Capitol/EMI, BMG, WEA and Sony are on schedule, but consumer availability has been delayed due to problems in the hardware manufacturing process.

Philips spokesperson Angelique Hoogakker said in *Billboard* that she expects a worldwide delay of only a few weeks, resulting in an October launch. (The company continues with its announced plans to ship to Japanese stores on September 15.) That still pits DCC more directly against the expected November/December introduction of Sony's Mini Disc format, which Sony executives say will take place November 1 in Japan, and "in time for the Christmas season" in the rest of the world. How a simultaneous debut will affect consumer choice and acceptance is anybody's guess, though the worldwide recession will likely keep initial unit sales for both new formats lower than originally expected.

The latest DCC problems, according to *Billboard*, were discovered

during a six-week test manufacturing period at the Tokyo Marantz factory, which is partly owned by Philips. The tape trays did not function properly, and there were difficulties with the command software.

WELCOME TO THE TEC AWARDS

The eighth annual Technical Excellence & Creativity Awards, sponsored by the Mix Foundation for Excellence in Audio and presented by *Mix* magazine, will be held the second night of the AES convention, October 2, at the Westin St. Francis in San Francisco. Up to 1,000 industry members are expected to attend the annual salute to those people, facilities and products that provide technical and creative excellence "behind the scenes" in the professional recording industry. For more information, including ticket availability, contact Karen Dunn at (510) 939-6149.

CORRECTION

Due to a printer's error, the illustration accompanying the August 1992 "Fast Lane" was not accurate.



Stephen St. Croix thought you would want to see what his cat really looked like.

DIGITAL F/X FORMS AUDIO DIVISION

Digital F/X Inc., manufacturers of integrated digital video post-production systems, has opened an audio division following the company's acquisition of assets from Hybrid Arts Inc., the Los Angeles-based developer of digital audio editing equipment.

Robert Pape, vice president of Digital F/X, will be general manager for the audio division. Christopher Pelzar, former president of Hybrid Arts, will become director of sales. Joe Fitzpatrick, former director of engineering at Hybrid Arts, will hold the same position with the new company.

Already the company has announced its first product, Digital Master EX, a disk-based recording and editing system. Consisting of three single-space rack modules and run in conjunction with an Atari STe, the 4-channel, 16-track Digital Master EX provides true graphic waveform editing, SMPTE synchronization with chase-lock, and four independent digital and analog inputs and outputs.

Digital F/X Inc. is located in Mountain View, Calif., and is best known for its Composium family of video post products. The company also makes and markets Video F/X for the Macintosh II, as well as TitleMan, a PostScript title generator. Hybrid Arts is best known for developing the ADAP digital audio editing system.

PRO AUDIO SALES DATA AVAILABLE

Loft Marketing, the Los Angeles

—CONTINUED ON PAGE 16

Now moving to digital is just sound economics.

Introducing The Sony PCM-3324S DASH Digital Multitrack Recorder.

Now you can get all the benefits of digital multitrack recording—superior performance, reliability and sound—for about the same price as an analog 24-track with noise reduction.

With Sony's new PCM-3324S DASH recorder. It incorporates a high-speed tape transport and 1-bit 64 times oversampling A/D and 16-bit 8 times oversampling D/A converters. It even provides 4 times play-speed pre-stripping.

The PCM-3324S operates with either a standard or an advanced remote control unit and offers plug-in board options for more flexible configurations.

If you're investing in a multitrack, Sony just made digital economically sound. For more information, call 1-800-635-SONY, ext. 3324S.



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SONY

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Multitrack Dyaxis II is both a multitrack and virtual track machine. Operate Dyaxis II like a multitrack recorder and you can record, edit, and playback up to 48 tracks in real time. Need to layer additional sounds? Dyaxis II can assemble any number of "virtual" sounds off-line, giving you an unlimited resource of playable events.

audio

Freedom Dyaxis II takes full advantage of optical removable media. On-board, state-of-the-art Dolby AC-2™ 4:1 data compression technology lets you *Plug & Play*™ optical disks like hard drives. Imagine, no back-up or restore bottlenecks!

Unleash your creative potential with the power of Dyaxis II. Call your Studer representative now for complete details.

STUDER

DYAXIS II

Options

60	251	1004	4012	16068
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3.28	3.28	3.28	3.28	3.28

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00:00:02:29

FADE IN 00:00:01 FADE OUT 00:00:01

TRK 3-4 COMMENT Drum

1 Track #1

2 Track #2

3 Track #3

4 Track #4

5 Track #5

6 Track #6

7 Track #7

8 Track #8

9 Track #9

10 Track #10

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INDUSTRY NOTES

Thorsteinn Thorsteinsson was promoted to Eastern regional manager at Studer Revox America (Nashville). In addition, Studer's New York office went uptown: The new address is 1120 Avenue of the Americas, 4th fl., New York, NY 10036. The telephone number is (212) 626-6734; fax is (212) 626-6735...The International Teleproduction Society elected three new members to the board of directors: Phil Keeling of Magnetic Enterprises (Toronto), Barry Knepper of Unitel (New York City) and Andy Streitfeld of AMS Productions Inc. (Dallas). Members re-elected at the same time were Ron Burdett, Rob Henninger, C. Park Seward and Fred Rheinlein. The remaining board members do not come up for re-election until 1993...API Audio Products (Springfield, VA) appointed Dan Zimbleman director of console sales for North America...Allen F. Jacobson, Robert C. Miller, James G. Treybig and Robert T. Wall were all recently elected to the board of directors for Silicon Graphics (Mountain View, CA)...Eastern Acoustic Works of Whitinsville, MA opened a Western regional sales office at 8855 Atlanta Ave., Suite 312, in Huntington Beach, CA 92646-7100. The phone number is (714) 374-0202; fax is (714) 374-0201. Greg Hockman will be in charge of the sales center, which will target Arizona and Nevada as well as California...D&R Electronics opened three new regional U.S. offices to provide product support. Bill Pearson will head product support for D&R West (phone [818] 291-5855), Rusty King will handle D&R Nashville (phone [615] 661-4892) and Carey Wise will be in charge at D&R Southwest (phone [409] 756-3737)...Galaxy Audio (Wichita, KS) reported some sales rep additions: AMH Sales serves all of California; Northshore Marketing covers

Alaska, Idaho, Montana, Oregon and Washington; Reflex Marketing handles New York City, Long Island and northern New Jersey; New England Technical Associates is responsible for Massachusetts, Maine, Vermont, Connecticut, Rhode Island and New Hampshire; and G.A.P. Sales and Marketing serves Utah, Colorado, Wyoming, New Mexico and El Paso, Texas...Woody Moran was named vice president of the professional products division of Generalmusic (Bensenville, IL)...Freed International (Ft. Worth, TX) signed a long-term export and O.E.M. distribution agreement with Shadow Electronics (Erlangen, Germany)...The Music Annex audio post-production branch (San Francisco) appointed Bruce M. Merley facility manager...Houston-based Whitenton Industries, makers of the Juice Goose, OnePower and Passac product lines, chose Darmstedter Associates as its New York state rep; Crescendo Associates as its rep in Florida, Puerto Rico and the Virgin Islands; Cambridge Pro Sales as its Ohio, West Virginia and western Pennsylvania rep; and MJA Marketing as its Missouri, Kansas, Nebraska and Iowa rep...Women's Technet is now online. The organization aims to improve opportunities for women in pro audio, video, broadcast, recording and related industries. Men and women are encouraged to participate via the non-profit telecommunications network, Institute for Global Communications. For more information, send a SASE (with postage for two ounces) to Women's Technet, PO Box 966, Ukiah, CA 95482...An education workshop and fair will be held Oct. 3 during the AES convention in San Francisco. "Issues in Audio Education" will be held at 9 a.m. in room 309 of the Moscone Center. The education fair will be held in the same room at 10. ■

—FROM PAGE 12, CURRENT

pro audio marketing company, and Diagnostic Research International, an international market research firm, have announced a joint venture to provide sales and market data to the professional audio industry.

The "L/DR Report" will provide subscribing companies with monthly reports showing sales and trends in seven different segments of the market. Those segments are audio mixing consoles, speakers, amplifiers, microphones, recorders, signal processing and digital audio workstations. Interested companies are able to purchase only the data they need.

For more information, contact Phil Moon at (714) 373-4893.

DIGITAL MANUFACTURERS ALLIANCE

To help alleviate some of the day-to-day problems of incorrectly designed digital interfaces, a group of audio and video professionals is now forming an industry organization, tentatively called the Digital Manufacturers Alliance.

The DMA will provide a forum for the exchange of information on every aspect of digital interfacing, initially concentrating on the following activities: establishing a central database of information for digital audio and audio-for-video interface standards and communications protocols; providing a central referral service for users who need to know more about specific implementations; serving as a focal point for discussions with standards organizations, trade associations and professional societies; and publishing a quarterly DMA newsletter.

The inaugural meeting will take place at the AES convention this month. For more information, contact *Mix* senior editor Mel Lambert at (818) 753-9510.

CONVENTION NEWS

The 93rd Audio Engineering Society convention meets this month, October 1-4, at Moscone Convention Center in San Francisco. This year's theme is "The

science of audio...with an eye on the present and an ear to the future." A record number of exhibitors—more than 275—are expected to show their wares. Contact the AES at (212) 661-8528.

The Society of Motion Picture and Television Engineers will host the 134th SMPTE Technical Conference and Equipment Exhibit November 10-13 at the Metro Convention Centre in Toronto. Among the audio highlights: Ray Dolby will receive an honorary membership at the special honors and awards luncheon. Call Carol King at (914) 761-1100 for more information.

FOSTEX FORMS U.S. R&D DIVISION

On August 17, Fostex Corp. of Japan announced the formation of Fostex Research & Development Inc., an R&D group based in Hanover, N.H. The site selection was based on the large pool of available talent in the New Hampshire and Vermont areas, including some engineering staff from

the recently closed New England Digital Corp., approximately ten miles away.

"This new R&D division represents our continuing commitment to digital technologies," said Fostex Japan CEO Hiroaki Shinohara. "It will enable us to continue to lead the industry in the development of man machine interfaces and computer control of recording, mixing and sound reinforcement devices."

MIX 1992 AUDIO PRODUCTION FACILITIES SURVEY AVAILABLE

The Mix 1992 Audio Production Facilities Survey closed on July 31 with a total response of 53.4% from a sample of 1,000. The survey includes information on geographic location, years in business and types of clientele, facility resources and equipment, computer usage, staffing and salaries, gross revenues, and expenditures on equipment, supplies and construction. A complete report will be published in an upcoming issue of *Mix*. According to the survey, 56% of respondents expect their facili-

ty's revenues to increase over the next 12 months, while 30% are very optimistic and 41% are somewhat optimistic about future growth in their respective segments of the industry. For further information, or for a copy of the finished survey report, please contact Elise Malmberg, 6400 Hollis St., #12, Emeryville, CA 94608; phone (510) 653-3307; fax (510) 653-5142.

STUDER RESTRUCTURES

Motor-Columbus of Baden, Switzerland, the parent company of Studer Revox AG, was expected to announce a major restructuring at their General Meeting on September 22. Motor-Columbus will assume full management responsibilities for the SAEG Refindus Group, holding company for Studer and other sister companies, and the management committee of SAEG Refindus will resign. Robert Lombardini of Motor-Columbus will take over the operative management of Studer Revox AG. ■

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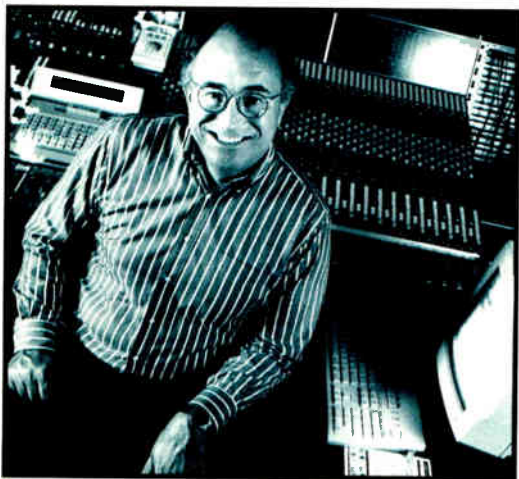
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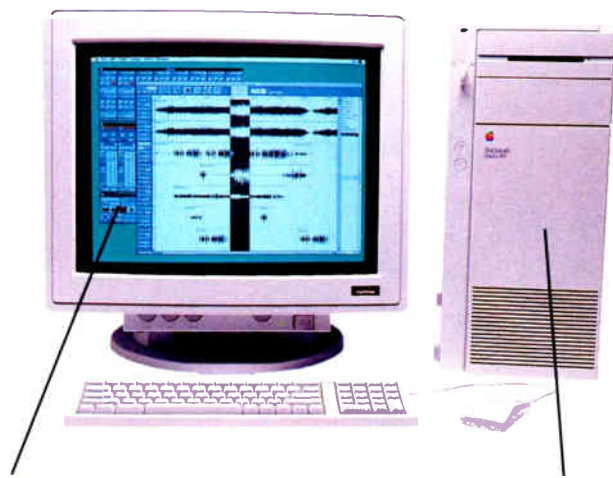
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by Ken C. Pohlmann

MULTIPLY- ACCUMULATE COMMANDS

THE MAC ATTACK

Look around the Audio Engineering Society convention, stroll through a high-end studio, or just thumb through the pages of *Mix*, and you'll find ample evidence that digital audio is now central to audio technology. Beneath the putty-colored plastic of computer workstations, and inside the battleship-gray cabinets of digital audio tape recorders, reside the tiny silicon brains that make it all possible: DSP. Digital signal processing is a powerful technology and in fact, without it, digital audio systems would not be a viable commercial reality. It is DSP that permits error correction, digital filtering, data reduction, low-bit D/A conversion and other crucial digital

quantization—but, instead of providing a storage medium, it is a processing method. While DSP is similar to the technology used in computers and microprocessor systems, the main difference is that a regular computer processes data, while a DSP system processes signals. For example, the names and numbers in a phone book are data, and would be processed—for exam-

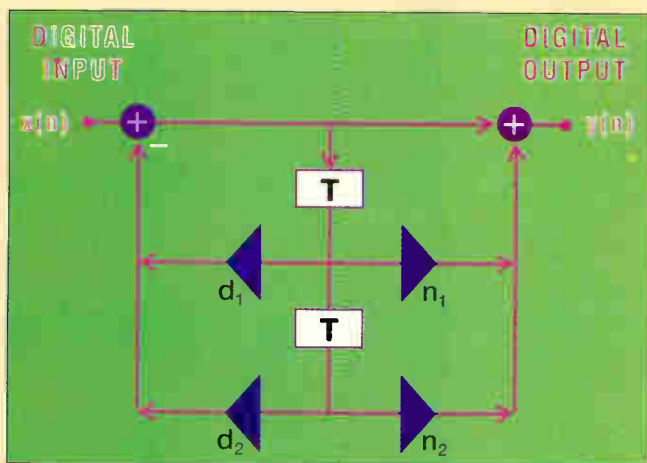


Figure 2: Same filter, represented as a DSP algorithm.

audio operations.

DSP is a technology used to analyze, manipulate or generate signals in the digital domain. It uses the same principles that make digital recording possible—sampling and

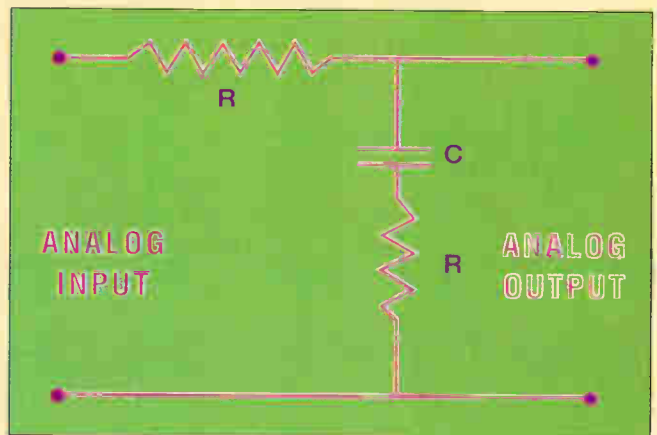


Figure 1: Typical analog lowpass filter circuit.

ple, alphabetized—by a computer. On the other hand, a signal is a time-based sequence in which the ordering of values is important. A digital audio signal only makes sense, and can only be processed properly, if the sequence is properly preserved. DSP is thus a special application of general data processing.

DSP is the workhorse of modern engineering. Its extensive applications in telecommunications include modems, cellular systems, data transfer between computers, vocoders and transmultiplexers. DSP

image processing is used to process photographs received from orbiting satellites and deep-space vehicles. Television studios use digital signal processing techniques for manipulating picture signals. Other applications include robotics, machine

be performed with digital signal processing. It is accurate to say that an audio DSP system is, in reality, a computer dedicated to the processing of audio signals.

In theory, digital signal processing, like digital audio in general,

technology to implement. The challenge becomes apparent when design engineers begin to amass the hardware and software needed to process the signal. Aside from the sheer volume of computations needed, a number of difficult problems can arise. For example, truncation errors occur when the numerical result of a calculation such as addition is limited to a certain number of bits without regard to the value of the number. If a number such as 2.88 were simply truncated to 2.0, a considerable error would occur, and the error would be compounded as many calculations take place, each using truncated results. The resulting numerical error would be manifested as distortion in the output signal. To avoid this, all DSP computations on audio signals must be of extremely high accuracy. This requires long word lengths: Many DSP chips employ data paths that are 24 bits wide (yielding a dynamic range of 144 dB), and registers that are 56 bits wide (with a dynamic range of 336 dB).

In addition, even simple DSP operations may require several intermediate calculations, and complex operations may require hundreds of operations. To accomplish this, the hardware must execute the steps very quickly. Because all computation must be accomplished in real time—that is, within the span of one sample period (perhaps 22 microseconds)—the processing speed of the system is crucial. DSP chips often must process 10 million or 20 million instructions per second; in fact, DSP chips are among the fastest processors in use.

Successful DSP applications usually require extremely sophisticated hardware and software. However, all DSP processing can be considered in terms of three simple processing operations: summing, multiplication and time delay. With summing, two digital values are added to produce a new result. With multiplication, a gain change can be accomplished by multiplying the sample value by another number. With time delay, a digital value is simply stored for one or more sample periods. Using these three oper-

Figure 3: Instructions needed to perform lowpass filtering using a Motorola DSP56001 chip.

```

; Difference equations for direct form II
; w(n)/2 = x(n)/2 - (d1/2) * w(n-1) - (d2/2) * w(n-2)
; y(n)/2 = (n0/2) * w(n) + (n1/2) * w(n-1) + (n2/2) * w(n-2)
move          a, x0          y: (r4) +,y0
mpy           y0,x0,a        x: (r0)+,x0    y: (r4)+,y0
mac           -y0,x0,a        x: (r0)-,x1    y: (r4)+,y0
macr         -y0,x1,a        x1,x: (r0)+    y: (r4)+,y0
mpy           y0,x0,a        a,x0          y: (r4)+,y0
mac           y0,x1,a        x0,x: (r0)+    y: (r4)+,y0
macr         y0,x0,a

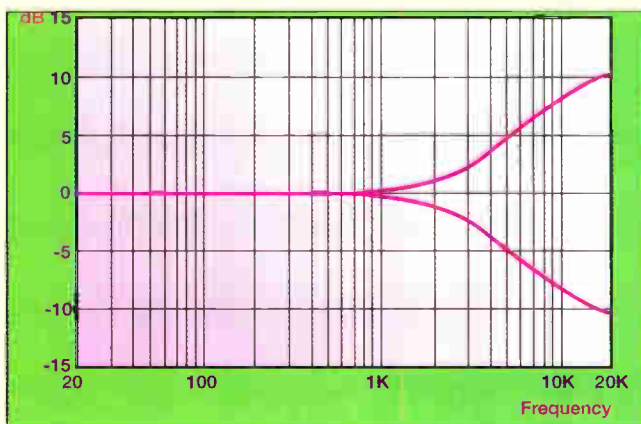
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vision, pattern recognition, digital television, computer animation, flight simulators, missile/torpedo control, vibration analyzers, navigation systems, automobile anti-lock brakes, active suspension, and motor and emissions controls.

Of course, digital audio systems also present rich possibilities for DSP. Error correction, multiplexing, sample rate conversion, speech and

provides many performance advantages over analog signal processing. Digital processing is more precise and repeatable, and it can perform operations that are impossible with analog techniques. Noise and distortion can be much lower with DSP, with the result that audio fidelity is much higher. In addition, whereas analog circuits age, lose calibration and are susceptible to damage in

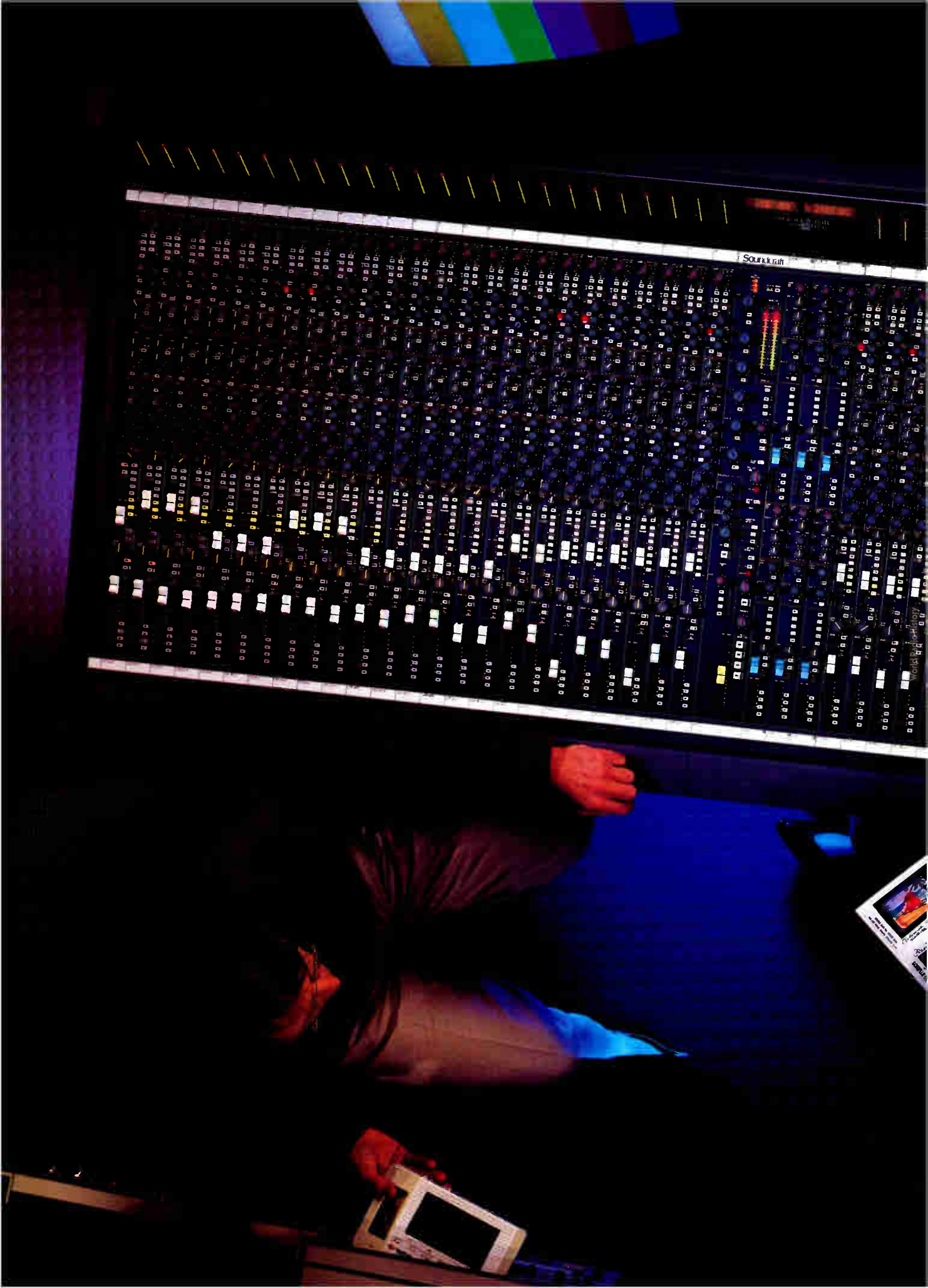
Figure 4: DSP is ideal for creating lowpass de-emphasis or highpass pre-emphasis curves such as these.



music synthesis, data compression and reduction, volume/fader/balance, filtering, adaptive equalization, dynamic compression and expansion, crossovers, reverberation, ambience processing, time alignment, acoustic noise cancellation, mixing, editing and acoustic analysis can all

harsh environments. DSP circuits do not age, cannot lose calibration and are much more robust. In that respect the technology is well-suited for tough applications where everyday use over long periods puts great wear on products.

However, DSP is not a simple



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Ben Mink, composer, arranger, producer, instrumentalist



“*Ingénue*” (Warner Bros.) recorded at Vancouver Studios, Vancouver, B.C. and mixed at Saylor Recording, Los Angeles, CA

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ations, any DSP procedure can be implemented.

An especially important operation that is central to DSP programming is the multiply-accumulate command, often called MAC. Many algorithms call for two numbers to be multiplied, and the result summed with a previous operation. Contemporary DSP chips, such as the Motorola DSP56001, feature a MAC command that lets you move two numbers into position, multiply them and accumulate the result, all in one operation. The ability to perform millions of MACs per second, with very high-precision numbers, constitutes the heartbeat of digital audio.

With MAC and its fellow instructions, virtually any analog processing circuit can be realized with DSP. For example, an analog lowpass filter using conventional analog components such as resistors and capacitors is shown in Fig. 1. Fig. 2 shows the same filter, represented as a digital signal processing algorithm. It employs the three basic DSP operators of summing, multiplication and time delay. In this case, an IIR (infinite impulse response) filter is used; in other designs, an FIR (finite impulse response) filter may be employed. For many applications, digital algorithms such as this are implemented directly in dedicated hardware as digital chips. For example, the digital oversampling filters used in CD players use such dedicated chips.

In some cases a programmable DSP chip is used to perform the application, using the general purpose instruction set contained in the chip. Fig. 3 shows the instructions needed to perform the same lowpass filtering functions shown in Figs. 1 and 2 using a Motorola DSP56001 chip. Although an understanding of the intricacies of DSP programming requires much study, a look at these software commands should make it clear that DSP and all of digital audio is inherently a numerical enterprise implemented by computing devices.

More importantly, these commands are more than frighteningly fast twitchings of a silicon brain: They produce meaningful and useful audio results. In this case, this

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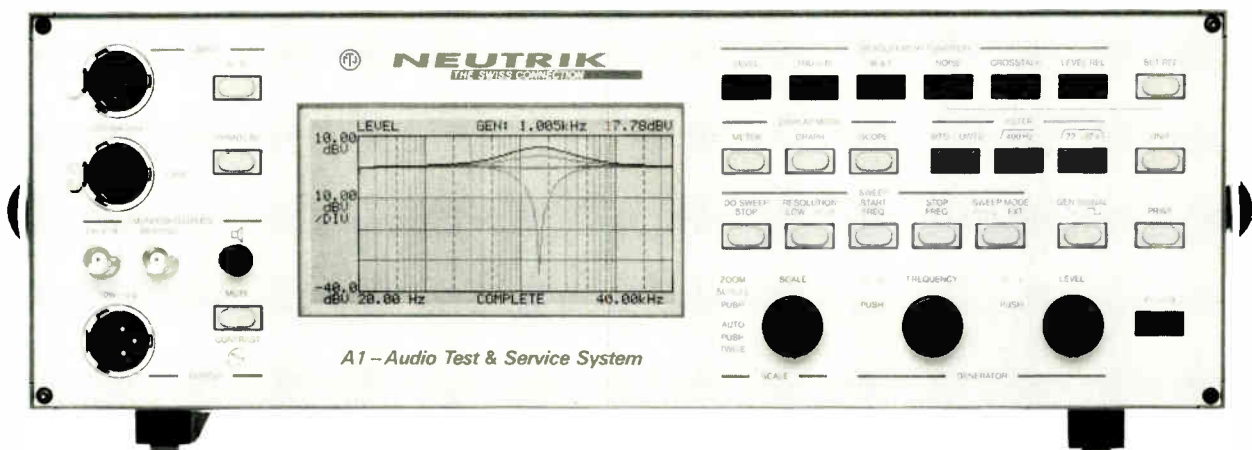
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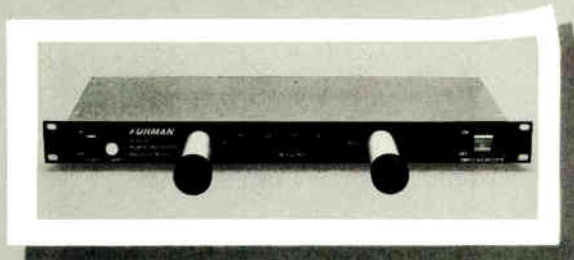
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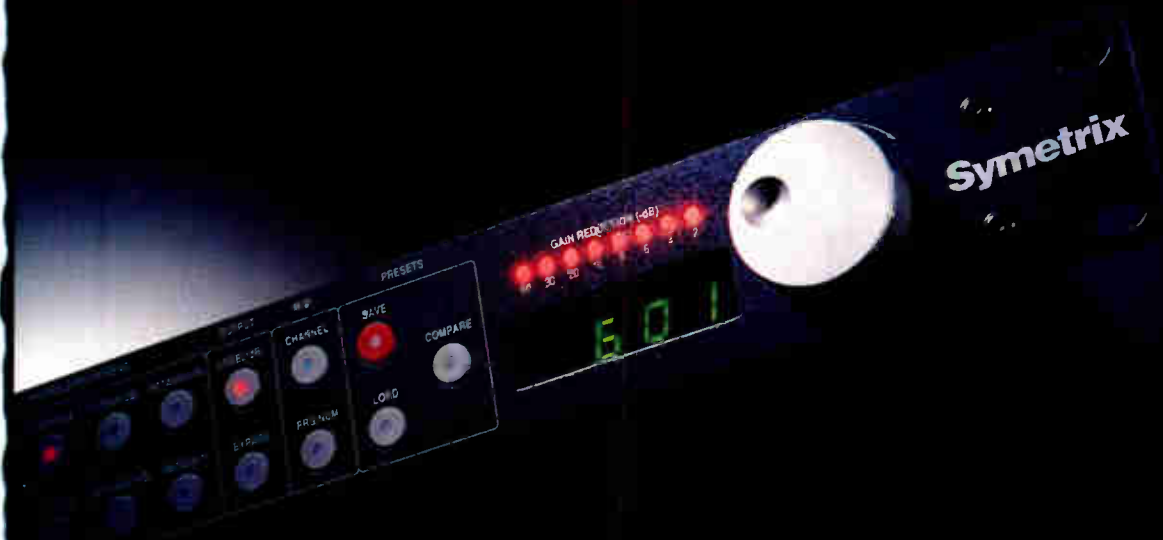
software program was used to perform digital de-emphasis, the same de-emphasis used in all CD players. It is interesting to note that the same algorithm can be used, with adjusted coefficient values, to generate either the lowpass de-emphasis or highpass pre-emphasis curves shown in Fig. 4 (curves courtesy of Robert Dunn). That's another advantage of DSP: Once you've debugged a bit of code, it often can be plugged into a number of applications.

A general-purpose software approach is often more expensive than dedicated hardware, but it is desirable because of the great flexibility its programmability provides for both DSP designers and users. The execution of software instructions in a DSP circuit is accomplished by the DSP chip; the DSP chip is like an engine, and the software instructions are the fuel. A DSP chip is a microprocessor that is designed to handle signals very quickly and accurately. This allows it to run a complete software program on every audio sample as it passes through the chip. DSP systems also need memory space to store programs or data, input and output ports to communicate with the outside world, and A/D and D/A converters to connect them to analog audio devices. In other words, like any brain, they cannot function without a body and limbs.

But the important part of any digital audio system is the DSP chip, whether it's a dedicated or general-purpose device, or a combination of the two. These chips, and the software commands they eagerly execute, are the essence of digital audio technology. Therefore, as the AES convention will attest, DSP has become the essence of the audio industry itself. So take a look around, but don't be fooled by all the putty-colored plastic. The really cool stuff is tucked out of sight in the silicon engines and memories filled with commands. ■

Ken Poblmann has recently labored mightily to bring forth the second edition of his popular Compact Disc Handbook. It is available from the Mix Bookshelf, complete with a spooky, surrealistic cover.

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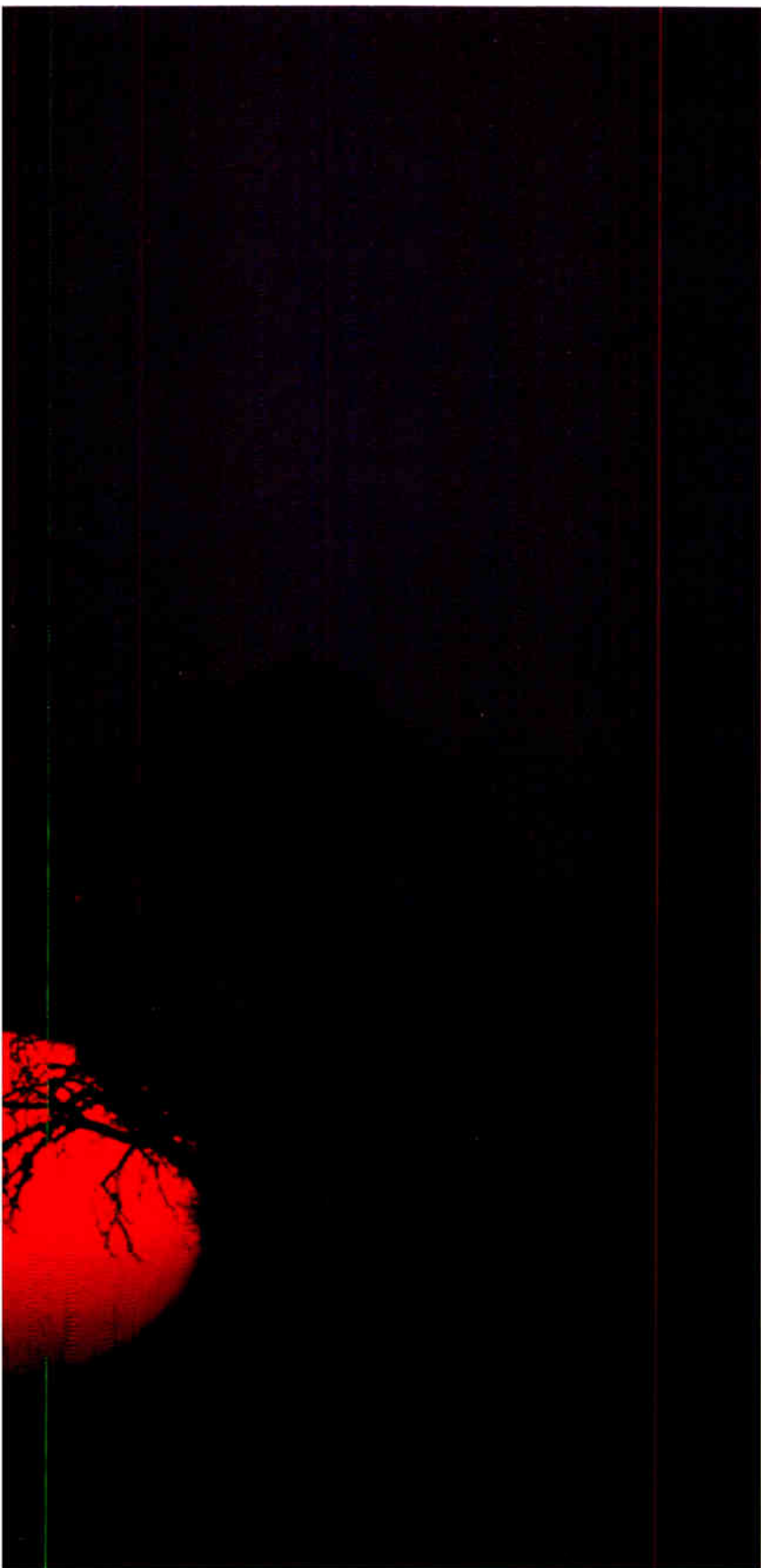
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by Stephen St. Croix

FORTY-FOUR THOUSAND, ONE HUNDRED PROBLEMS

I just returned this morning from a trip to Sweden. It has been quite some time since I have been in Stockholm (we're talking decades here, not months), and it was interesting to see what has changed and what has remained impressively unaltered.

There is a huge crystal fountain in the middle of a major intersection in the heart of the city. Its purpose is to assure that a never-ending mist is blown onto the windshields of all who travel near it and onto the glasses of all those silly enough to walk by.

The fountain stands in the center of a large, round pool of water (the intersection is a traffic circle). Several 4-foot circles are under the surface of the pool. They appear to have no real purpose.

After checking out this fountain (and wiping off my glasses), I went down into the subway system to see what was going on. Big surprise. It seems that this is a rather significant area of their underground system. I found myself in a huge circular room lit by several 4-foot, circular skylights. For those of you who haven't tumbled yet, the lights were the same disks that I saw in the fountain. Very nice. As you gaze up, you look through clear glass windows, about six inches of water, a fascinating pattern of droplets, splashes and ripples from the fountain above, and up to the sky.

Anyway, as I looked around, I realized that I had been transported to



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a time in the past; actually, another time and place in the past that never existed before. I mean, it was *like* the past, but from some parallel galaxy. Bands were playing American songs from the past, just not Earth's past. "Hit The Road, Jack" as a 160 beat-per-minute Swedish speed-metal march is really quite an experience, but it's even better when another band 30 feet away are doing a rap interpretation of Velvet Underground's "Heroin." Quite a place.

As I ran into the shadows to escape the free expression of Sweden's fine youth, I discovered several shops in the corners and passage-ways that led off to the tracks. In fact, there was an entire Underground-Alternate Universe-Metal-Blues-Fusion-Acid-'60s Rock Clothing-Accessory-CD Shopping Mall. With pizza.

I felt that this might be the chance to cop a certain CD that I had wanted for years; one that I had never actually *seen*, one that nobody I know had ever heard of, one that I had only heard *rumors* of actually existing. They had it. Ten bucks. I caught

my train and pulled away from the harmonious sounds of Swede-metal's very best version of "Louie Louie." I made it to my boat in time to sail into the setting sun (11:30 p.m.!) and actually made it to the airport in time to fly back to America.

By now I have been sitting on this CD, waiting to hear it, for over 20 hours, and I was looking forward to the otherwise dismal, ten-hour, anti-jet stream flight to the States with some measure of anticipation. You see, I had my Steinberger, my Zoom and all the cables needed to hook up to my CD player, so that not only was I going to get to listen to this gem of pure rock-ola, but I was going to get to play along as well. A bag of extra batteries for the player and the Zoom assured hours and hours of stereo rock ecstasy. I had acquired several adjacent seats so that I could be assured of not smacking my neighbor to my left in the face with the neck of the Steinberger and so that I could safely gyrate and duck-walk my way across the Atlantic [*a frightening image—ed.*] as I played my heart out to this CD from Galaxy Seven. I was set.

The plane took off, I unstrapped,

got all my gear out, wired it all up, knocked back a couple of \$4 beers, slipped in the CD and began.

The first song started. My heart raced as I discovered that it was *even better* than I had hoped. It was in my best key. It was the perfect tempo. Minor seventh; my favorite jam mode. It sounded *good!* I closed my eyes, felt the cool breeze from the four overhead vents that I had aimed at my head and prepared to jump in. I pulled the B string to a full one-and-a-half steps sharp. I wound open the volume on the guitar, squeezed the pick, and hit my carefully chosen first note.

Four airline employees of varying rank instantly descended upon me, pulling off my earphones and tapping me on various parts of my arms and shoulders.

As I reluctantly stepped down from the stage where only a moment before I was impressing 20,000 screaming fans, I found myself facing eight cold, piercing, Northern European eyes.

"Is that a CD player?" they asked in unison (but in four different languages). Okay, I have often been asked what it sounds like when I'm

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playing the friendly skies, and I carry an extra set of earphones to that end. No problem, I can share—they will be gone soon, or maybe that tall one might like to stay for a while and hear my best trick licks. (Please note that Editorial Policy of this magazine does not allow me to specify the sex of this individual.)

"Why, yes, it is a CD player," I answered innocently. That was pretty much the end of everything. I went from a cool guy to an international criminal in five seconds. I was turned off, unplugged, helped up, and transported to the cockpit in under two minutes. The tall one turned out to be surprisingly strong.

The pilot had a little something to tell me—it seems that you can't use CD players on MD-11s. Get this: CD players operate at a data rate of 44.1 kHz, right? Right. Here it comes: The most advanced commercial aircraft in use today, the MD-11—with its color LCD televisions, total fly-by-wire computer-automated flight deck, virtual color glass control panels (touchscreen city), live telemetry display of current flight position for the passengers, and a thousand other amazing tricks—operates at a data rate of 44.1!

It turns out that (according to the pilot) a SwissAir MD-11 ran into significant negative complications this past spring, and the problem was traced to a passenger listening to a CD player.

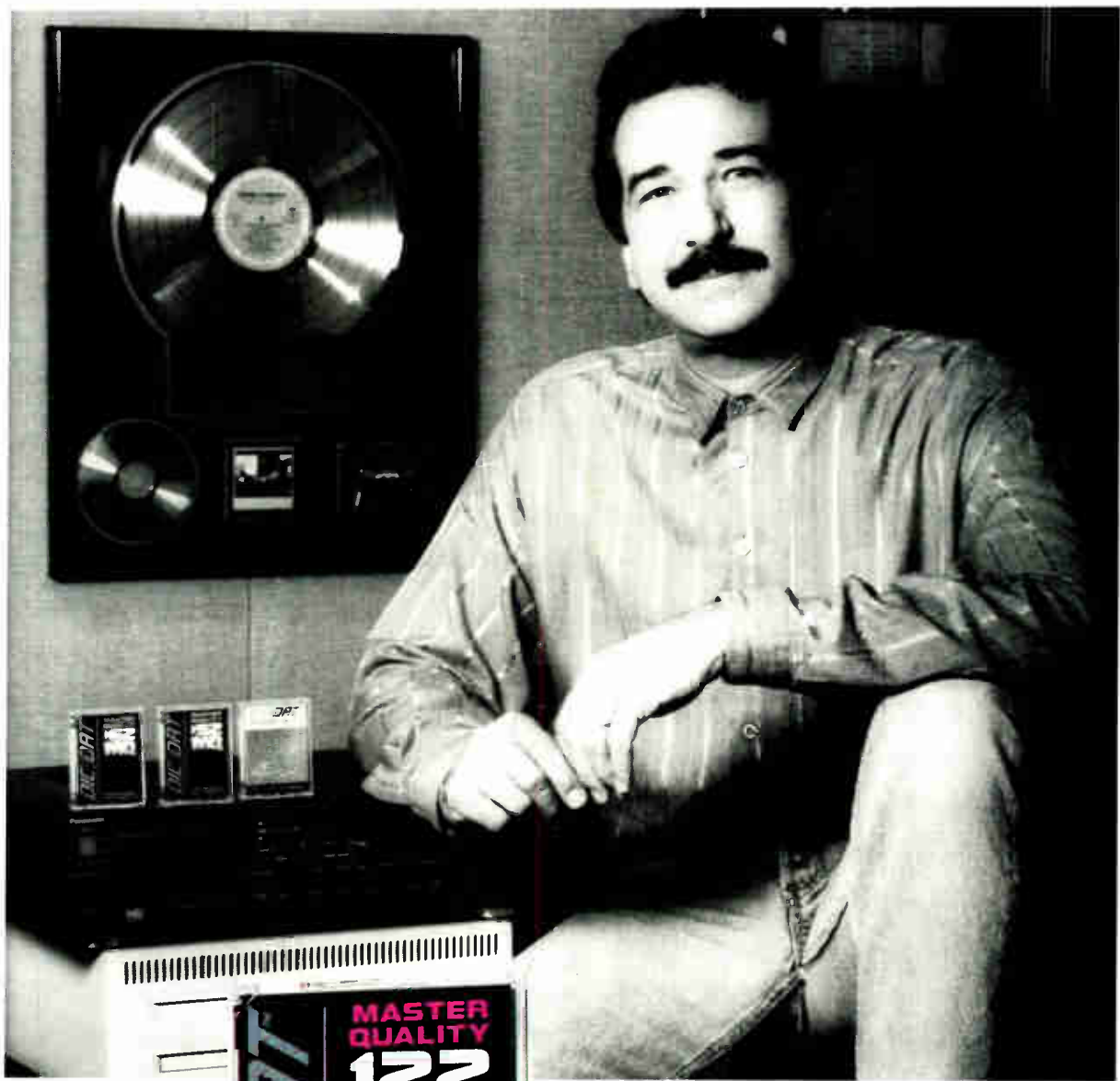
I don't know how many portable CD players there are in use out there, but I imagine there must be two or three, maybe even thousands. CDs have been around for a while now. The MD-11 is new.

If this is true, if everything that this captain told me is correct, then it is a pretty stupid state of affairs. I mean, my little CD player can't confuse any of my other 44.1 stuff, it can't glitch my computers, MO drives at the end of 15 feet of cable, my car's computers, my bike's computers, my cellular phones, video cameras, portable color TVs, portable computers, little wireless house phones, my RF light dimmers; I couldn't find anything that it could mess up at all. I even got all my really old portable CD players out of the Hopelessly Obsolete Technology

—CONTINUED ON PAGE 272

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ABOUT PRODUCERS & ENGINEERS

*A*braham Laboriel, studio bassist, sums up the job description of a session player most eloquently: "It's a service-oriented career. At least, that's the case with the musicians I respect the most. They are the ones who will lend their gift to help another's ideas come into being."

Should the musician have different ideas than the producer, reaching that goal can be both fulfilling (by the mere fact that the objective is accomplished) and frustrating. Laboriel, who has played on an endless list of records by artists such as George Benson, Elton John and Michael McDonald, says, "To choose to deny oneself is always painful."

In fact, one studio musician describes his job as that of a servant, another as that of a whore, and guitarist Tim Pierce says, "The nature of the job is that you are selling your soul."

This elite group of musicians must summon

BY ROBYN FLANS



inspiration on command, pour out their hearts through their instruments and often sublimate their full ideas, only to have their efforts scrutinized and criticized. And not always under the most optimum of circumstances.

One oft-encountered problem in the studio is the headphone mix. "It can be so bad that it actually inhibits your ability to organize a concept for the tune," complains drummer Vinnie Colaiuta, who has played live with Sting and has recorded with Frank Zappa, Joni Mitchell, Gino Vannelli and David Sanborn. "A lot of times, this could be remedied if the engineer would only put on a pair of 'phones to hear what the others are hearing. Then you've got the unplugging and plugging of instruments in the control room into the patch bay, so you get this excruciating sound in the headphones if they don't warn you to take your head-

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phones off. Those things can really be career-enders. Then you get an 'I'm sorry,' or 'What was that?' It was about 120 dB of a 9k tone with distortion is what it was!"

"It's a good sign when second engineers wear headphones most of the time; that shows they're listening," says Jeffery (C.J.) Vanston, who has lent his keyboard and/or arranging skills to records by Lita Ford, Boy Meets Girl, Poco and Kixx. "A

"When you're working with musicians who are specialists at recording, the best takes are usually the first and second takes."

—Michael Fisher

lot of people think that ambience in the cue mix is a total luxury because it's not going on tape. You've got to have it on the drums and different things. I think you can play too much when things are really dry. Sometimes engineers think in very literal terms as opposed to emotional terms, and musicians are very emotional people."


"But the engineer can only do so much, and after that, it's the gear," counters drummer Mike Baird (Billy Idol, Eddie Money, Michael Bolton's "Dock of the Bay"). "There are some studios where the headphone mix is terrible no matter what you do. They don't have the same caliber of equipment. And [ensuring good equipment] is as much a part of the producer's job as being able to pair the right players and pick the right engineer and studio."

Laboriel agrees that better equipment and conditions can make for sublime playing, but he says that the secret of great musicians is the ability to "still play with a whole heart,

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even when they can't hear themselves clearly. A lot of times we do sessions where the engineer says, 'Sorry, I only have one mix, and everybody will have to live with it.' If the singer needs a different mix from the drummer, the majority of other people have to adjust to the ones who are being catered to. At that point, I start playing by faith and trust that everyone will be pleased in the playback."

The playback can also be a source of aggravation, according to Laboriel. "Many times, it's very uncomfortable when engineers or producers in a playback situation start

soloing all kinds of things and checking for isolation for technical reasons. The continuity is interrupted by their concern that things are being recorded technically properly. I don't blame them for that concern, but, ideally, that could be done while we're recording in a way that doesn't affect our headphones, so that we listen to the playback strictly for musical reasons."

"Or how about producers on the phone during the playback?" Colaiuta asserts. "Maybe it was burning, but they didn't even know it."

Every musician mentioned disorganization as a primary problem.

"It's aggravating if people don't have their music and charts together when you show up at the session," says keyboardist Russell Ferrante, who, in addition to working with his own band the Yellowjackets, has recorded with artists like Joni Mitchell and Al Jarreau. "I've been on sessions where essentially we were writing the song as we went. If someone hires you to play on a song—not write and arrange a song—the bare minimum required is a chord chart and a really good idea of an arrangement. It can change as you play it, but it's not within the job description to write the tune."

"Producers who don't know what they want are annoying," Gerald Albright agrees. "You ask what kind of solo they want and they say, 'Well, I don't know. I was hoping you could give me some ideas.' I don't mind doing that, but when they don't have a clue as to what they want, I get a little exasperated. As a producer myself, I'm more sensitive to that. You get more out of the musicians you hire when you have your road map ready and can tell them exactly what you want them to do."

That lack of preparation can be responsible for the often grueling process of take after take, something the musicians like to call the "law of diminishing returns" or, as percussionist Michael Fisher puts it, "fishing expeditions." For bassist Neil Stubenhaus, endless repeats are the main potential problem in the recording setting.

"Producers will get a perfect track, and they'll go for a *more* perfect track," laughs Stubenhaus, who has worked with Michael Bolton, Al Jarreau, Anita Baker and Bonnie Raitt and on a number of film and TV projects. "They go for something that isn't there. There is a natural progression, especially if you're tracking and have musicians together. Everyone has a peak and a peak performance. That peak is closer to the beginning than to the end."

"I've done sessions where we were running it down and they kept it, mistakes and all, because the vibe was good," Colaiuta says. "I recently talked with a group of musicians about the old Sly and the Family Stone record *Fresh*. We were freak-ing out about it because it's so great and raw and just so right. And someone said, 'I play this record for young engineers.' It's also good for

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There has never been a chance of mistaking a Jeff Porcaro drum track. If you listen to Boz Scaggs' "Lowdown" or "JoJo," Leo Sayer's "When I Need You," Steely Dan's "Gaucho," Michael McDonald's "I Keep Forgettin'," or any of Toto's music (most notably "Georgie Porgie," "Hold the Line" and "You are the Flower" from *Toto I*; "Rosanna," "Africa" and "I Won't Hold You Back" from *Toto IV*; and "Pamela," "These Chains" and "Anna" from *The Seventh One*) then you know that feel and groove are the key words that describe Porcaro. And if you were ever fortunate enough to see Jeff play live, you know he committed his body and soul to the feel of the music.

He was only 17 years old when bassist David Hungate discovered him playing at Leon Russell's house one night. A few months later, Hungate recommended him for a gig playing in the band on Sonny & Cher's popular TV show. Porcaro left high school and soon found himself earning \$1,500 a week for two seasons. He departed without a second thought, however, when Walter Becker and Donald Fagen offered him \$400 a week to play with Steely

—CONTINUED ON PAGE 47

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musicians and producers to know that it worked and it's great.

"You can't let the technology defeat you," Colaiuta continues. "It's progressing at a rapid pace. Most of the people who have it sussed have it under control. They aren't confused by how many options they have. It boils down to knowing how to focus."

Michael Fisher, who has lent his percussion to projects by Bruce Springsteen, Tracy Chapman, Eurythmics and many films, believes that the problem of too many takes is most evident in the live-to-2-track jazz record arena. "When you're working with musicians who are specialists at recording, the best takes are usually the first and second takes. That's when the energy is the highest, the concentration is the keenest and the enthusiasm is up. It's a problem when the arranger wants to make changes in the structure of the tune, or if they start changing the sounds, or want to mike things differently. If those aren't locked in before the session, things can drag out."

Assignments for saxophonist Ger-

ald Albright (Patrice Rushen, Whitney Houston, Anita Baker and many others) often are to overdub 8- or 16-bar solos with "some little tinkling in the vamp of a tune between the vocal." Albright thinks the problem of having to do things over and over again often stems from having accomplished his task too quickly.

"I've had some who really liked the first couple of tracks I soloed on, but they'll say, 'That was too quick. Let's do four other tracks, just to have them.' It's hard to blow a saxophone—that's a lot of air," he laughs. "And the repetition can defeat the purpose. I tend to think too hard whenever I do too many tracks. The spontaneity diminishes, as well as the creativity."

"People can grind you down and destroy the momentum and inspiration by not capturing what you have," says Pierce, who feels that it is his responsibility to stay fresh and creative, even if it means turning down some work to stave off the typical session burn-out. "On the other hand, if somebody wants something very specific and the thing grinds to a halt, you can al-

ways bring it back up if everybody really cares and is sincere. It can be positive because it can pull things out of you, and you can come up with something very creative."

A successful session also hinges on communication, which is yet another point of contention for many. "There was a producer I only worked for once who humiliated me in front of a whole group of respected session musicians," recalls Ferrante. "He felt the part or the sound wasn't right. There was a piece of paper with bar lines and chords, but no chord punches or melody. We played it down once or twice, went to listen to it and he said, 'What happened there? Where was that kick? Where was this?' I want to make it work, but when someone is being belligerent, it's very unpleasant. I would never work for that person again. Everyone deserves to be respected, no matter what. That's only happened once, but it makes you question your abilities for a bit."

"A lot of times, engineers have very short tempers," Albright says. "Sometimes they get offended if you say, 'The saxophone isn't EQ'd right,

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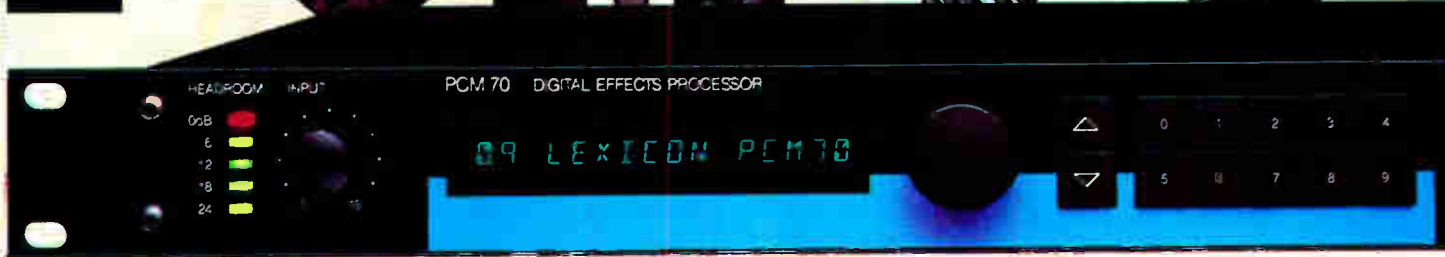
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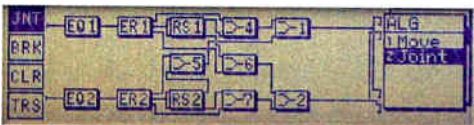
the chorus and go into the reverb,

maybe with a little compression along the way? No sweat."

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PreDly	T1	T2	T3	T4
10	13	39	108	178

The R-880 Reverb gives you an LCD "workbench" so you can lay out and interconnect functions until you have exactly the effect you need. And there's no need for you to dedicate separate DSP functions like equalizers or compressors to effects sends or returns, because these are built-in and user-configurable right at the controller.



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each recallable at the touch of a button. And the “660” is MIDI compatible!

And while we’re on the subject of doing things right, you should check out our SN-550 Noise Eliminator. First, it’s affordable. But it’s



Laboratory-grade construction, components, and grounding techniques deliver a flat frequency response from 20Hz to 20 kHz, a dynamic range greater than 94dB, and 0.015 THD. (The screen shown lets you reverse the polarity of either or both channels from the front panel.)

Not only can you control analog and digital levels separately (screen 1), but the E-660 Parametric EQ lets you store and recall a precise EQ history, from microphone to master, either as an exact numerical setting, or as a representative curve (screens 2 & 3).



also an extremely sophisticated, yet easy to operate, single pass unit that works in real-time.

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every stage. We even put a hum canceler in the “550” that *really* works. As one of *R-E-P* magazine’s testers put it, “Its hum cancellation capabilities are nothing short of amazing.”



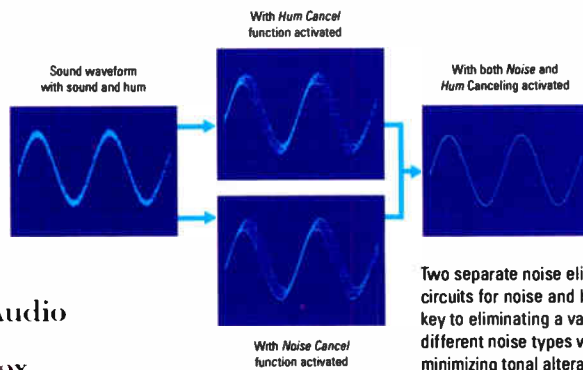
16-bit linear A/Ds and 18-bit D/As with 48kHz sampling frequency gives the SN-550 Noise Eliminator exceptional dynamic range and sound quality.

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it's not full enough, it doesn't have midrange, it doesn't have the bottom I need.' Sometimes they'll take a deep breath, and think 'Who is this guy?'"

Money was another controversial issue that arose. "It's upsetting when they renege on finances," Colaiuta says. "You agree on one thing, then you're at the date and suddenly it changes. Then you start getting asked for deals."

"When the date has gone 12 or 13 hours and they say, 'Can we just pay you for seven?' it's pretty upsetting," Stubenhaus adds. "The musicians will look at each other and say, 'Uh, okay,' and then they get out of the room and say, 'That son of a bitch, ripping me off.' There are a few of us who will say, 'No, that's not cool,' but we're the ones who won't get hired the next time, and the others will get the call-backs. It's their prerogative to ask you for the twenty-zillionth take because they think they want it, so they should commit to paying for it."

It was unanimous that if the producer hires the right mixture of musicians and lets them play without interference, the session stands the chance of being a success.

"The musicians get there and start jamming on something. Everybody will laugh and have fun and then look at the chart and hear the demo of the tune. Everyone is pumped to do it," Vanston says. "I recently watched an incredible song disappear. It was too much talk and not enough notes. The minute somebody would play something the producer liked, he'd stop the take and say, 'Now, that's what I like. This is working,' or 'I don't like this.' If he had let everybody play, he would have had his piece of music two or three takes later."

"An ideal session is when the music is inspiring to all the musicians," Stubenhaus says. "When they love playing it, and they respect the producer and the artist, then there is a mutual understanding of, 'I want to make this great.' I've been in situations where the music is fantastic and there's no money in the budget. That's when you assess all the times you've played and didn't enjoy it, and you say, 'I'll pay to play this.' It's the reason we got into this business in the first place—the love of the music." ■

—FROM PAGE 41, JEFF PORCARO

Dan after seeing him play at Dante's.

For Jeff, the bottom line was always the music. His session credits are too numerous to fully catalog here, but include stints with many of the best in the business: Rickie Lee Jones, Bruce Springsteen, Dire Straits, Warren Zevon, Elton John, Don Henley, Bonnie Raitt, Jackson Browne, George Benson and Hall & Oates, to name just a few.

In my 1983 interview with Jeff for *Modern Drummer*, he made one of the most ludicrous—and therefore most quotable—statements that anyone ever uttered to me: "My time sucks." Maybe he really just never knew that his time—his incredibly felt, deep-in-the-pocket, fiery-yet-soulful time—was much of the reason he was called to work for a music business gamut, from Barbra Streisand to Tommy Bolin.

But Jeff always preferred giving others the credit. His modesty never allowed him to feel comfortable with the attention, and he insisted that his playing was just a stolen combination of his influences: Jim Keltner, Jim Gordon, Bernard Purdie, John Bonham, Paul Humphrey. What he overlooked was that he had synthesized those influences into a style all his own: He had absorbed his heroes' playing, but what was born was an amalgamation complete with his own vital, vibrant, emotional personality—the animated way he expressed himself verbally, the contagious laugh he shared frequently, the sensitivity he possessed as a human being, the lack of pretense, and later on, the part of him that became a loving family man. All of that was infused in his performances and helped create a sound that will live forever.

—Robyn Flans

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When to Look and When to Buy at AES

by Chris Stone

A kid in a toy store never had it as good as we have it at AES! All the new toys are there, and everyone in the industry whom we trust has told us about a different piece of equipment that we “must have.” We go and look at each toy two or three times and are told by every manufacturer that we can “work out terms.”

Then we go back to our quiet place at night to separate truth from fiction and then to face the reality about what we want compared to what we can really afford to buy. Next, we may call our leasing company, our banker, our partner or the boss. Maybe we just look in the mirror and determine how much further we can leverage our meager assets and how much more per month it will cost. Then we really must get real!

These are questions to ask your-

self about whether you should really buy something that you have decided you cannot live without:

1. Is this a product that is going to bring me at least as much additional revenue as I need for my monthly payment? (If the answer is no, you'd better think again.)

2. Is this a product from the “emerging technologies” that I must have to stay competitive in my market niche with my clients? (Try to remain objective—temptation is in your path!)

3. Must I keep up with the competitors in my market who are bragging to my clients about having this gear, or is it all puffery? Is there something else I can do that is less expensive and has the same effect?

4. Have I really done my comparison shopping? What is the image of this product in the marketplace in general and specifically with my clients? Can I be objective? Is my choice really the best solution in terms of price and features, manufacturer tech service/warranty and return on investment, vs. the alternative less/more expensive product?

5. Have I negotiated the lowest

—CONTINUED ON PAGE 50

Barter Pitfalls and Making Deals

by Mark E. Battersby

Barter has gone big time. Two years ago, McDonnell Douglas Helicopter Co. bartered \$10 million worth of assorted nuts, bolts, washers and screws for trade credits to be used for hotel rooms and rental cars. Although it will probably take the Arizona-based company five years to spend those trade credits, small recording and sound studios should take note, since they, too, can safely—and profitably—employ barter in their own operations with immediate results.

Traditionally, barter has been attractive to smaller studios caught with excess time or services and a dearth of customers—in other words, caught between a rock and a hard place. Today, mid-sized and larger studios are beginning to find plenty of creative uses for barter transactions, not necessarily as a last resort

—CONTINUED ON PAGE 50

BUSINESS ISSUES

The Employee vs. Independent Contractor Dilemma

**by Frank Jermance and
Randi Perkins**

Recording studios, production houses, producers and other individuals who retain the services of freelance technical and/or artistic/musical talent are increasingly finding themselves the target of intensive Internal Revenue Service scrutiny. Everyone involved in this situation must consider for whom these freelancers actually work—themselves or the person(s) or businesses who retain their services. In other words, are these itinerant recording industry workers technically employees or independent contractors?

Typically, a production facility may employ a certain minimal technical and production crew as well as an administrative staff. This in-house crew and staff may be salaried employees with W-2 income. Common

industry practice dictates that additional technical and/or artistic talent be retained on an as-needed basis, not as employees but as independent contractors. The rationale behind this delineation was usually that in treating these occasional workers as independent contractors, significant savings could be realized because employers did not have to pay Social Security, unemployment tax or workers' compensation for those independent contractors. The employers of these independent contractors merely submitted 1099s to the contractor and the IRS, confident that they had fulfilled the reporting and tax requirements. But all good things must pass! When faced with an IRS audit, these same businesses learned (often with disastrous results) that generally the IRS considers these freelancers employees.

In the past, employment status often went unquestioned, but since January 1991, the IRS has been vigorously auditing employers who issue 1099s to workers. In conducting these audits, the IRS takes into consideration the degree of control the employer has over the worker—

—CONTINUED ON PAGE 53

Good Insurance Is the Best Policy **by Chris Stone**

One of the toughest challenges facing every facility owner is how to properly insure the studio. The operator knows it's a problem of too much or too little, and it always costs big bucks! Most insurance agents, like most bankers, have no idea what happens in a recording studio and must be educated before they can really help you. Some project studios are under the mistaken impression that a homeowner's policy will take care of everything. Here we will explore how to properly insure and suggest what is appropriate to limit your personal/corporate exposure without becoming excessive.

What You Must Have

To meet the requirements of all who use your facility or lend money or lease equipment to you, liability insurance is mandatory. Next comes fire insurance, workers' compensa-

—CONTINUED ON PAGE 60

—FROM PAGE 48, WHEN TO BUY AT AES

price, best delivery and terms that I will be able to get? Can the manufacturer or dealer give me a better price or better terms? Can I get free installation or extended service or, perhaps, another product free as a bonus? In essence, have I ground them down until they cry for mercy, just like my clients do to me, so that I am certain there are no more incentives left to offer me to buy now instead of later?

6. Is this a new market that I think I should enter? If so, have I really done my homework for the potential of this venture in my market niche? Do I have a marketing plan? Are the answers that I got from my peers, advisers and clients real or sugar-coated? What is the risk/reward ratio and what are my chances of losing? Can I really afford to expand my operations and take this chance at this time? Do I have a backup plan if it does not work?

7. Is it possible for me to get this equipment on loan (memo bill) from the manufacturer or dealer before I buy it? If not, can I rent it to prove to myself that I really need it and am able to pass on its additional cost to my client base, either through additional billing, time saving in an area such as editing, or in attracting additional clients who demand this equipment? Do I really need to purchase it at all, or should I just rent it when needed?

It would be wonderful to have an unlimited budget and be the first to buy all the new equipment you thought was innovative. Can you afford the risk of losing your investment if your guess is wrong? If you can, then it's like Las Vegas fantasy time. Place your bets and hope for the best!

But if you can't afford it, let someone else take the plunge and promise yourself that you will never buy anything that you have not seen working to your satisfaction, in your studio if possible, *before* you put your money down.

Investing wisely is one of our biggest challenges. The marketplace is littered with large and small recording studios; many of them bankrupted themselves because they bought expensive equipment that did not increase their sales or keep their clients. These are tough times, and restraint in business decisions is mandatory. "If it ain't broke, don't

fix it" is the order of the day, if you want to be around for tomorrow.

Advance planning is the final warning. If you cannot purchase the product from the cash flow and are thinking about leasing it, you need to review another set of long-term criteria with your financial advisers to determine if you can afford the lease. And by the way, good luck and have fun in San Francisco at AES! ■

Chris Stone, former studio owner, is president of Filmsonix, a consulting firm serving the professional audio industry.

—FROM PAGE 48, BARTER PITFALLS

but as an alternative source of financing.

Consider the surplus inventories of some recording companies, the excess capacity of many manufacturers, the excess time of many studios, the shortage of cash and the present credit squeeze, and it rapidly becomes evident why the ancient art of barter is becoming so popular. According to the International Reciprocal Trade Association (a barter trade group headquartered in Great Falls, Va.), 240,000 U.S. companies and businesses conducted barter transactions worth \$5.9 billion last year.

As a result of the emergence of many well-financed commercial barter companies, larger studios are increasingly able to execute complicated one-time transactions that would be too large or too difficult to be handled through a traditional barter exchange. Today, barter transactions—whether informal or formal, whether executed through a barter exchange or through one of the large barter companies—are an increasingly popular survival tool available to every professional sound and recording engineer.

Unfortunately, even the barber who swaps his periodic services for a meal at a neighboring diner faces a major complication: Quite simply, the tax collector wants a share. Under our tax rules, the value of bartered services and/or products must be included in gross income for income tax purposes.

Our good barber adds the value of his meal to the total shop income, and then the diner operator adds the

value of one haircut to her food operation's income. But what value does the studio operator place on his services? The Internal Revenue Service has long recognized that taxable income can be received in forms other than cash. If, for instance, income is received in property, then it is the fair-market value of that property that determines the amount of taxable income. The most common forms of payment (other than cash) are payment by note, property and bartered services.

The basic barter deal can take many forms. A distributor who offers a manufacturer a note is, in effect, bartering for the goods needed to sell to customers. An incorporated recording studio that offers a key employee shares of the business in lieu of back wages is similarly engaged in barter. But how are the values of services, stock, notes and other bartered property determined to the satisfaction of the IRS? In general, the unadjusted basis of property is its cost, unless the law prescribes a different basis or book value. The cost of property, according to our tax rules, is the amount paid for it in cash or in other property. Cost, at least for tax purposes, also includes amounts paid for state sales taxes, freight, installation and testing. Basis is, in some instances, the fair market value at which property is included in income, as in the case of dividends or compensation received in kind.

When property is acquired through the exchange of other property in an "arm's length" transaction that is not a tax-free or partially tax-free exchange, the cost of the property acquired is the basis (or book value) of the property transferred plus the amount of any gain on the exchange. This figure is the same as the fair market value of the property transferred.

The barter exchange is usually made, and both parties record the fair market value of the goods and services bartered. This is the amount included in income. The amount of profit is determined by the adjusted basis (or book value) of the property involved. That adjusted basis is normally its cost (plus freight, taxes, etc.) less any depreciation previously claimed. The difference between the income received (fair market value in this case) and its adjusted basis is profit. The fair market value

Heart In Motion

Engineers

Jeff Balding
Terry Christian
Brian Malory
Steve Marcussen
Bill Whittington

Producers

Brown Bannister
Michael Omaritan
Keith Thomas

Artist

Amy Grant

Studios

Bennett House
Cam-Am Recorders
The Castle
Lighthouse
Oceanway
Precision Mastering
Quad Studios
RBI Recorders
Schnee Studios
Sixteenth Ave. Sound
Soundhouse Studios
Soundstage

TEVIN.

Engineers

David Frazer
Nick Guzauski
Susan Rogers

Producers

Prince
Quincy Jones
Al B. Sure
Narada Michael Walden

Artist

Tevin Campbell

Studios

Lighthouse
Paisley Park Studios
Tarpan Studios

Diamonds And Pearls

Engineers

Keith Cohen
Tom Garneau
Michael Koppleman

Producer

Prince

Artist

Prince

Studio

Paisley Park Studios

Blue Light, Red Light

Engineer

Gregg Rubini

Producer

Tracey Freeman

Artist

Harry Connick, Jr.

Studio

BMG Studio A

Romances

Engineers

Benny Faccone

Don Hahn

Producers

Armando Mansinaro

Luis Miguel

Bebu Silveti

Artist

Luis Miguel

Studio

Oceanway Studios

Hush

Engineer

Chris Tergesen

Producers

Steven Epstein
Bobby McFerrin

Artists

Bobby McFerrin

Yo-Yo Ma

Studio

Dreamland Studios

As Ugly As They Want To Be

Engineer

Kyle Bess

Producer

Ryan Dorn

Artist

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—FROM PAGE 50, *BARTER PITFALLS*

of property (according to our lawmakers and the courts) is the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or sell.

As already mentioned, the value of bartered products and services must be included in every studio's gross income. If the individuals/engineers are members of a "barter club" and each agrees to exchange services, the value of those services received by each must be included in gross income. The same tax treatment applies to services rendered in advance for services to be rendered at some future date. "Credit units," equal to one dollar each and used by many barter clubs or exchanges to account for transactions, are also includable in gross income.

In one bartered services transaction, the owner of an apartment building, who permitted an artist to use one apartment rent-free in exchange for a painting, was required to include (in her gross income) the value of the painting. The artist, for his part, was required to include the

Traditionally, barter has been attractive to smaller studios caught with excess time or services and a dearth of customers—in other words, caught between a rock and a hard place.

fair market value of the apartment on his income tax return.

Further complicating the tax consequences of barter transactions is the problem of deductibility. When our barber exchanged a haircut for a

meal at a neighboring diner, it was relatively easy for the barber to add the value of a meal to his income and the diner operator to add the value of one haircut to hers. But what if one or both services or products were tax-deductible expenses, if cash had been paid?

Suppose, for instance, that the landlord of the building housing your studio offered you the opportunity of paying no rent for a period of time in exchange for your making much-needed repairs to the building? Obviously, the money spent for repairs was in lieu of deductible rent and remains an income tax deduction. But what if that same landlord offered you rent-free use of the building in exchange for your expertise, or the use of your facility or even the use of a business vehicle? Again, a value can be placed on all services or products involved in these transactions, making income reporting and tax deductions relatively clear-cut.

Barter transactions today run up against many of the same roadblocks that have discouraged so many recording engineers in the past.

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In addition to these numerous effects possibilities, the SDR 20/20 offers the ability to focus all processing power to a single "Ultra" effect. An example of this Ultra

World Radio History

Barter companies and exchanges, for instance, cannot guarantee an unlimited choice of goods or services. Also, trade credits issued in a barter transaction can often take years to use up—particularly in larger deals when there aren't enough goods and services for the recording studio or engineer to "buy" right away.

The trend toward company-to-company or studio-to-studio barter deals has been intensified by increasingly tougher enforcement of the IRS's rule requiring the filing of informational returns. Every barter exchange is required to file a Form 1099-B (or its equivalent on magnetic media) for each person or entity that exchanged property or services through barter exchange if the exchange had at least 100 members or clients.

Although it is unlikely that barter will ever become a major factor in corporate finance, it does occupy a sizable niche. And recession or not, barter will remain a potentially valuable tool for any studio. ■

Mark Battersby has written tax and financial features for more than two decades.

—FROM PAGE 49, EMPLOYEE VS. INDEPENDENT
that is, if sufficient control is present to dictate a "master and servant" or employer-employee relationship. The IRS has identified 20 factors that may be applied in a determination of the Common Law interpretation of "control" of a worker (see accompanying sidebar). These factors cover everything from whether the employer furnishes tools and materials to whether the work is done on the employer's premises. The relative weight of each factor may depend upon the type of occupation and the context of the worker's particular specialty. A quick scan of the 20 factors reveals that a recording studio or production business would be hard pressed to prove that its relationship with workers does not satisfy several of these control factors. Keep in mind that the interpretation and enforcement of these guidelines is left to those who may know little, if anything, about our industry.

The penalties for misclassifying employees can be formidable. Minimally, the employer will be responsible for workers' individual employment taxes. If income and Social

Security taxes were not withheld from the worker's wages, the employer may be held personally liable for penalties of 100% of the tax (the employee and employer share of the tax), as well as additional penalties of around \$3,200 for misclassifying the worker. According to the American Institute of Certified Public Accountants, "a firm paying \$15,000 to a contractor who the IRS finds to be an employee will owe \$6,485 in taxes, fines and penalties. Five contractors treated this way for three years will cost \$97,000."

What recourse may be available to the employer in this situation? Again, according to the AICPA, one option is to appeal the IRS decision citing Section 530 of the Revenue Act of 1987. Essentially, Section 530 protects the employer if the employer has a letter ruling from the IRS or some sort of judicial support for classifying the worker as an independent contractor. Further consideration may be given to the employer's appeal if the taxpayer has had an IRS audit that resulted in no additional taxes because of misclassification.

—CONTINUED ON PAGE 55

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effect is the "Ultra Reverb" currently included in the palette of selectable effects. With software upgradeability the SDR 20/20 can be customized to meet future studio requirements.

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—FROM PAGE 53, EMPLOYEE VS. INDEPENDENT
tion of similar workers. The employer's case may likewise be strengthened if independent contractor classification is a longstanding practice in the industry.

Another option is to reclassify the worker as an employee and file amended returns, paying the extra taxes owed. Subsequent interest charges may be avoided, and the employer may be able to offset tax liability by the amount already paid by the employee.

If you're a studio owner in doubt over the proper employment status of your workers (and feeling brave), the IRS will determine for you whether a worker is an employee. File form SS-8, "Determination of Employee Work Status for Purposes of Federal Employment Taxes and Income Tax Withholding," with the district director, and the IRS will conduct a sample audit.

It's not only workers who wish to keep the status quo, i.e., preserve the employer-to-independent-contractor relationship. Employers have compelling financial reasons for treating workers as independent contractors. In addition to withholding federal income tax from employees, employers must pay the following:

- Social Security and Medicare tax—15.3% total. Employee portion 7.65%, employer portion 7.65%.
- Federal unemployment tax—0.8% of the first \$7,000 in wages/year.
- State unemployment tax—1% to 5% of wages up to a certain limit per year. Amount and limit varies from state to state.
- Worker's compensation—varies from state to state and with worker classification, usually from 0.5% to 10% of gross wages.

When you also consider the extra administrative, accounting and book-keeping costs, the additional costs of maintaining employees can easily exceed the actual gross wages paid by 30%. For these reasons, employers may want to try these possible ways of upholding a contractor status:


1. **Independent contractor agreements.** Employers frequently have workers sign an independent contractor agreement, which defines in writing the work relationship as contractor to contractor, not employer to employee. These agreements often go to great lengths in

specifying the nature of the relationship as non-controlling. The independent contractor agreement will usually contain a boldfaced disclosure that the independent contractor is not entitled to unemployment insurance or other benefits and the independent contractor is obligated to pay federal and state income tax on any moneys pursuant to the contract relationship. These agreements often satisfy state unemployment insurance disclosure requirements, but you should *not* assume the agreement will appease the IRS! Also, because the parties now have a contractual relationship, contract law ap-

plies and one party may sue the other for failure to comply with the terms of the contract.

2. **"Business to Business."** Another tactic employed is to make every effort to identify the relationship as business to business, rather than employer to employee. If the freelancer can give evidence of having and maintaining an independent business, the employer's case may be strengthened somewhat.

3. **Personnel contract services.** A buyer of personal services may contract for the desired personnel from a company that actually hires the artist or professional and pro-



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—FROM PAGE 55. EMPLOYEE VS. INDEPENDENT
vides them to the buyer for a fee. The personnel company takes responsibility for all of the payroll taxes and benefits for the people being contracted. This relieves the buyer of any payroll tax liability for those individuals. The fees of the personnel company are usually set by applying a certain markup to the per-hour or per-project cost of the employee. Personnel contract services function somewhat like music or talent contractors; however, their services may extend beyond the typical contractor functions by acting as the talent and/or technical personnel

“broker,” while assuming “employer of record” responsibilities.

4. Payroll/accounting services. Companies that employ talent (ad agencies, studios, etc.) often retain payroll services that handle all payroll paperwork such as issuing checks, ensuring that contracts and union stipulations are being met, and so forth. Although the buyer of the talent is still considered the employer, payroll services are helpful in handling the additional accounting processes associated with employees. Broadcast Traffic and Residuals Paystar Inc. of New York City is one such service; there may be oth-

ers in your area.

Note: Regardless of your employment status with workers, most state laws require that employees and contractors without their own coverage be covered by workers' compensation by their employer. Some independent contractors may be covered by the payer of their compensation by statute even if the payer is not aware of it. Failure to understand the applicable workers' compensation laws could result in an employer paying thousands of dollars in claims out of its own pocket.

If you're a freelancer, indications are that the IRS will be placing pressure on workers who claim to be self-employed. With all of the above in mind, it is important to decide whether you wish to be considered an employee or an independent contractor.

A self-employed individual is able to deduct significant business expenses when determining his or her adjusted gross income. These expenses are disclosed on Schedule C, the statement of profit and loss of a business. The worker then pays self-employment tax (actually a form of Social Security/Medicare tax) of 15.3% (to a maximum of \$10,658 per year) on net business income of \$400 or more. Finally, federal and state income taxes are levied on net income after all business and personal deductions are taken.

In comparison, an employee is only responsible for half of the Social Security tax, with the employer contributing the other half. The employer is also responsible for withholding workers' compensation and federal and state income taxes. However, because of the additional costs involved in retaining employees, employees can actually take home *less* pay than they would if they worked as independent contractors. Employees will also find that one of the main benefits of being self-employed—the generous business deductions—are severely limited (to 2% of adjusted gross income).

The S-corporation Alternative

The IRS has determined that it will treat certain classes of receivers of compensation as employees. Unfortunately for workers in these classes, which may include individuals who provide certain types of creative

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Figure A. 27x27x10 in.



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Landy; *Timmy T* produced by Jon Ryan. **The Castle** *Lee Greenwood* produced by Jerry Crutchfield; *Ricky Skaggs* produced by Mac McAnally. **Chung King Recording Studios** *Run DMC* produced by Jam Master Jay; *3rd Bass* produced by Sam Sever, SD-50, KMD, Prince Paul & Marley Marl; *L.L. Cool J* produced by Marley Marl; *Nikki D* produced by Sid Reynolds. **D & D Recording** *Vanilla Ice* produced by Gail "Sky" King; *Big Audio Dynamite* produced by Jr. Vasquez; *Herb Alpert, Ziggy Marley* produced by Bobby Konders. **Electric Lady Studios** *Queen, West World* produced by John Luongo & Gary Hellman. **Emerald Sound Studios** *Hank Williams Jr.* produced by Barry Beckett, Jim Ed Norman & Hank Williams Jr.; *Alabama* produced by Josh Leo & Larry Lee. **The Enterprise** *Winger, Warrant* produced by Beau Hill; *Nelson, Trixter* produced by Mark Tanner; *The Fixx, Rebel Pebbles* produced by Tony Peluso; *Gladys Knight* produced by Michael J. Powell; *Henry Lee Summers* produced by Ric Wake; *Nia Peeples* produced by Howard Hewitt. **Mad Hatter Recording Studios** *Chick Corea Elektric Band* produced by Chick Corea and Co-Produced by Dave Weckl and John Patitucci; *Lee Ritenour, David Benoit* produced by Mike Abene for "Shannons' Deal." **Magee Audio Engineering** *Los Angeles Philharmonic Orchestra, Pacific Symphony Orchestra, Terry Trotter & Friends* produced by Joseph Magee. **Mobile Fidelity Sound Lab** *Igor Oistrakh Trio* produced by S. R. Britton & Edward Shakhnazarian; *Gennadi Rozhdestvensky & The USSR Symphony Orchestra* produced by Krieg Wunderlich & Tori Swenson. **Music Mill** *Eddie Rabbitt, Earl Thomas Conley, Oak Ridge Boys* produced by Richard Landis; *Anne Murray, Tanya Tucker* produced by Jerry Crutchfield. **One Up/TMF** *Mussingtons, Dumpa* produced by Dianne Norris; *Anita Baker* produced by Michael J. Powell; *Natalie Cole, Smokey Robinson* produced by Terry Marshall. **The Plant Recording Studios** *M.C. Hammer* produced by Felton Pilate; *Mariah Carey, Michael Bolton, Peabo Bryson* produced by Walter Afanasieff; *Tony!Toni!Toné!* produced by Tony!Toni!Toné!; *De Anna Eve* produced by Shake City Productions. **Royal Sound Studios** *L.A. Guns* produced by Michael James Jackson; *Art Laboe* produced by Art Laboe; *Festival Fountain at Caesar's Palace* produced by Champ Davenport. **Sixteenth Avenue Sound** *Ziggy Marley* produced by Ziggy Marley & Glenn Rosenstein; *Michelle Shocked* produced by Michelle Shocked & Glenn Rosenstein. **Studio 4 Recording** *Phil Collins* produced by Phil Collins; *D. J. Jazzy Jeff & The Fresh Prince, Schooly D.* produced by Joe "The Butcher" Nicolò. **For information on the SV-3700, contact Panasonic, 6550 Katella Ave., Cypress, CA 90632 (714) 373-7278. For more great music, listen to:** *Taj Mahal* produced by Skip Drinkwater. **Studio PASS** *Defunkt* produced by Bob Appel; *Nic Collins* produced by Nic Collins; *Paul DeMarinis* produced by Paul DeMarinis; *Tom Cora* produced by Tom Cora. **Keith Thomas** (producer) *Whitney Houston, Amy Grant, Carman, BeBe & CeCe Winans.* **Triad Studios** *Queensrÿche* produced by Peter Collins; *Michael Tomlinson* produced by Dan Dean & Michael Tomlinson. **Trevor Rabin** *Yes.* **Unicorn Studio** *Roger Hodgson.* **Unique Recording Studio** *Mariah Carey, Lisa Lisa & Cult Jam* produced by Robert Chivilles & David Cole; *Madonna* produced by Lenny Kravitz; *Lisette Melendez* produced by Carlos Berrios. **Don Was** (producer) *Bonnie Raitt, Glenn Frey, Paula Abdul, Neil Diamond, Lyle Lovett.* **And this is just the beginning.**

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—FROM PAGE 56, EMPLOYEE VS. INDEPENDENT and/or technical services, remaining an independent contractor may not be an option. One alternative for those who wish to remain independent is to create a separate business entity in the form of a corporation and become an employee of their own corporation.

You can create a corporation by filing the S-election form, 2553. Under the S-election, the corporation's net income will be taxed directly to its owner(s). The S-corporation files its own tax return, but the net income is reported to the owner on a Schedule K-1. The active owner will receive two types of income from the corporation: employee wages reported on a W-2, and the remaining net income (Schedule K-1) that is reported on Schedule E on the personal tax return. The net income reported on Schedule E is considered investment income and is not subject to self-employment tax. One of the main benefits of corporate status is that if you were still an independent contractor, the entire net compensation would be subject to self-employment tax.

Of interest to both studio owners and workers is the fact that because the payer of compensation is employing the corporation and not the individual, the independent contractor status is not an issue with the IRS. Studio owners should be aware that, currently, payers of compensation to a corporation are not required to file a 1099.

Legislation is currently being proposed to address some of the possible inequities in the treatment of contractors vs. employees. Suffice it to say that the situation will likely continue to intensify for employers and workers alike.

Note: Before undertaking any of the above, consult with a competent tax expert regarding the feasibility and application to your individual situation. ■

Frank Jermance, M.M., M.B.A., is a musician, writer and an associate professor of Music Management at the University of Colorado at Denver.

Randi Perkins, C.P.A., M.B.A., is a singer/songwriter and business consultant serving clients in the music and recording industries.

So Which Is It?

The 20 factors used in determining whether an individual is an employee or an independent contractor:

1. INSTRUCTIONS. An employee is given instructions about when, where and how to work. If the employer has the right to give instructions, the control factor is present even if no actual instructions are given.

2. TRAINING. An employee is trained to some extent by the employer to perform services in a manner prescribed by the particular company. Independent contractors use their own methods and receive no training from the purchasers of their services.

3. INTEGRATION. If an employee's services are integrated into the business operations, the employee is subject to direction and control.

4. SERVICES RENDERED PERSONALLY. An employee renders his or her services personally, indicating personal contact and supervision by the employer.

5. HIRING ASSISTANTS. An em-

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ployer hires, supervises and pays assistants to a given employee. An independent contractor functions under a contract that may require him or her to supervise and pay assistants and to provide materials and labor and to be responsible only for the result.

6. CONTINUING RELATIONSHIP. An employee's work is performed frequently for a given employer, indicating a continuing relationship. A continuing relationship may exist even where work is performed at repeated but irregular intervals.

7. SET HOURS OF WORK. An employee will have certain hours of

work established by an employer. An independent contractor determines his or her own work schedule.

8. FULL-TIME WORK. An employee normally works full time for an employer. An independent contractor may work when, where and for whom he or she chooses.

9. WORK DONE ON PREMISES. An employee works on the premises of an employer or works at a location designated by an employer.

10. ORDER OR SEQUENCE SET. An employee must perform services in the order or sequence set by an employer. This indicates that the em-

ployee is subject to direction and control.

11. REPORTS. An employee submits reports to an employer. This indicates that the employee is accountable to the employer for his or her actions.

12. PAYMENTS. An employee is paid by the hour, week or month. An independent contractor is paid by the job or on a commission basis.

13. EXPENSES. An employee's business and travel expenses are the responsibility of the employer. A contractor pays his or her own business expenses.

14. TOOLS AND MATERIALS. An employee is furnished required tools, materials and other equipment by an employer.

15. INVESTMENT. An independent contractor has a sizable investment in the facilities he or she uses in performing services for someone else.

16. PROFIT OR LOSS. An independent contractor can make a profit or incur a loss.

17. WORKS FOR MORE THAN ONE PERSON OR FIRM. An independent contractor can give his or her services to two or more unrelated persons or firms at the same time.

18. OFFERS SERVICES TO GENERAL PUBLIC. An independent contractor makes his or her services available to the general public.

19. RIGHT TO FIRE. An employee can be fired by an employer. An independent contractor cannot be fired unless the result of work produced does not meet the specifications of the contract.

20. RIGHT TO QUIT. An employee can quit his or her job at any time without incurring liability. An independent contractor usually agrees to complete a specific job. The contractor is then legally obligated to complete the job satisfactorily. Failure to do so may place the contractor in breach of contract. ■

—FROM PAGE 49, GOOD INSURANCE

tion, auto, equipment theft (usually with a huge deductible because of the high cost) and "fine arts" (which is the only way I ever found to assign an aesthetic, as well as a replacement value, to client tapes in the vault). If you rent equipment, you also need a rider to most of the policies mentioned above to cover the assets against theft and any possible dam-

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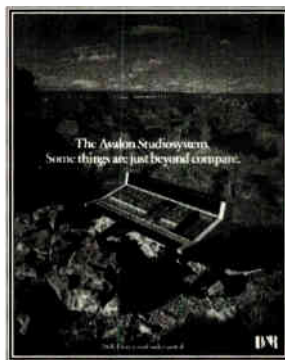
highly tangible ways.

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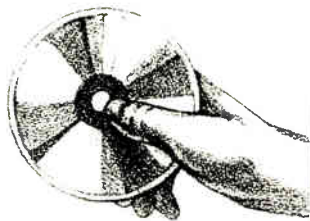
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age incurred off premises. You may not be able to afford this basic coverage, but to me it is optimum.

What You Should Have

Medical insurance with major, minor, pharmacy, and possibly dental; and minimal life insurance for you and your employees at a price you can split with them are major considerations. There are some good companies such as Aetna and the like, but here you must constantly investigate competitive prices to be certain you are getting the best price for your situation. Equally important is choosing an insurance company that will pay claims before you have to do so yourself. A low annual deductible for each covered employee helps a lot here.

What You Want

A retirement or profit-sharing plan in which your employees participate goes a long way toward keeping the good ones with you when the competition comes to call. Business-interruption insurance is wonderful if you can afford it: You'll only find out how good it is when you have a fire or other catastrophe and need those payments to cover fixed costs. Be sure to investigate this option because the prices differ as much as auto insurance by geographical area.

Travel and rental car waiver insurance is inexpensive if you have people who move around a lot. Disability and key man life insurance for yourself and your important people is also important and will probably be required by your lender or partner if they are at all conservative.

How Much?

Common sense tells us the larger the amount for which you insure something, the more it will cost you. However, there is a point where the cost of the deductible and/or the limits for any single occurrence will diminish to the point where the higher coverage cost is minimal.

There is also the alternative of liability umbrella coverage, which takes over only when your other policies exceed their limits. Many times you will be required by your partners or your lenders to maintain minimum amounts. (Car leasing companies, for example, usually require \$100,000 in property damage and \$300,000 in public liability. And

Most insurance agents, like most bankers, have no idea what happens in a recording studio and must be educated before they can really help you.

any building or even improvements that you have to cover must be insured for the replacement value or the amount of the loan/mortgage.)

The cost of other coverage such as workers' compensation and state unemployment insurance will depend on your location and the number of claims filed against you. You should always value assets at replacement cost for purposes of theft or damage, because some insurance companies have a waiver in their contract that says that if you fail to value an asset plus or minus 10% of replacement cost, they do not have to pay for its loss or damage! Because of this little surprise, you should revalue all assets once each year at insurance-renewal time. And if there are any items that are worth more or less than appraised value be sure to state so, in writing, to the insurance agent or company.

Final Tips

Liability and fire coverage often depend on the U.S. Department of Commerce "industry designation" that the insurance inspector assigns you and the condition of your premises. If the inspector has any suggestions for improvement, like an extra fire extinguisher or a brighter light bulb, be sure to abide by them, as they can make a big premium difference. Interview insurance agents and get bids for your coverage before committing. There are good and bad agents, and the difference in price between them for basically the same insurance coverage can be considerable, based on how they put the package together.

Finally, if you are really happy with your agent, share that information with your competitors. It will keep everybody's premiums down, because there are economies of scale in the insurance business, particularly if the agent understands just what you are doing when you play those loud sounds, and that there is more than one place in town that does the same thing. ■

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What's in a name? Plenty. Just ask the fine folks at Rand McNally. They're running three shifts a day trying to keep up with Central Europe's seemingly daily moniker swapping.

Names mean a lot in this business, too. For every studio and corporate appellation that appears to blandly reflect the nature of the operation contained within ("Welcome to Audio Recording Studios Inc.!"), there's one whose name is more vague, sometimes mysterious and enigmatic, often just plain wacky.

Herewith are a few favorites, secret origins finally revealed. The list is purely subjective and not meant to be comprehensive, just fun.

AKG: Acronym for the German Akaustische Und Kino-Gerate GmbH, meaning Audio and Theater Equipment, Inc. AKG started out making equipment for movie theaters.

Ampex: The first three letters are the initials of company founder Alexander M. Poniatoff; the "ex," we're told, stands for "excellence," according to Steve Smith. Imitation as flattery: The Memorex company is a spin-off by former Ampex employees, using a similar construction that couples "excellence" with "Memory" for their initial data storage media product line.

AMS: Advanced Music Systems, formed by former British aerospace technicians in 1976. First product: a flanger.

dbx: "That's been the subject of rumors over the years," says dbx corporate communications manager David Roudebush. Company founder David Blackner has been fond of saying it was his initials plus an "x for excellence" (see Ampex). The marketing department, on the other hand, maintains it stands for "deciBel expansion." Why the lower case on the letters? "No idea," says Roudebush. "It's a stylistic thing."

E-mu Systems: "Electronic Music." Originally the company name used the Greek letter Mu as part of its name. However, according to product marketing manager Marco Alpert, when the company incorporated in California in the 1970s, state law mandated the use of English letters for alphabetizing purposes, so the Greek was dropped. The name has nothing to do with mu-metal.

Eventide: Company president Richard Factor explains that Eventide is an old English locution for "evening." During college, while also working a job, he began building digital clocks. "The only time I had to work on them was at night, so I thought of Eventide Clockworks," he says. That eventually became the name of the electronics company he founded. The "Clockworks" was dropped in 1983. "It became too unwieldy," he explains.

Fostex: A variation of parent company Foster Electric's name.

Full Sail: A sailing term that means full canvas set to

BY DAN DALEY

ILLUSTRATION BY JAMIE HOGAN



gain the most speed and headway. According to Jon Phelps, president and founder of Full Sail Center for the Recording Arts near Orlando, the name signifies "using everything at your disposal to move ahead and succeed." The school's logo incorporates a classic Douglas DC-3 (a C-47 to you military buffs), which Phelps says represents the apex of the golden age of aviation, a pioneering industry he compares to professional audio.

Korg USA: Korg comes from the first letters of the last names of company founders Tsutomu Kato, a former nightclub owner in Japan, and Tadashi Osanai, an accordion player who wanted a rhythm machine for his act. Their first drum machine appeared in 1963. The "K" and "O" were combined with an abbreviation for organ,

their second product.

Lone Wolf: Yes, there really is a wolf involved here, sort of. Aside from the "apart-from-the-pack" evocation, company founder and president Mark Lacas says the name also represents a large black wolf-like Lapland reindeer shepherd named Wolfgang, a dog that been Lacas' companion for 14 years. The first incarnation of the name was as Lacas' music publishing company, before it became the moniker of the electronic music peripherals manufacturer.

Mark of the Unicorn: "It's a total mystery," says company controller Susan Patalano. The company started life as a business software developer; when the orig-

—CONTINUED ON PAGE 269



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World Radio History

by Sue Gold

RHETT LAWRENCE

WRITING HIS OWN TICKET



In the 1980s, Rhett Lawrence was known as a top session keyboardist and arranger, but in the '90s he has become one of the hottest producers in pop and R&B music. In the past few years he has produced songs for Mariah Carey; Whitney Houston; The Winans; Earth, Wind & Fire; Johnny Kemp and others. He earned a Grammy nomination for co-writing and co-producing Carey's smash "Vision of Love" and helped BeBe and CeCe Winans get their nomination this year for Best Contemporary Soul Gospel Album.

At 29, the L.A.-based Lawrence is one of the few producers who have come up through the ranks of gospel and R&B music to move onto the pop charts. It was this experience that paved the way for his work with Carey, since several techniques used to record strong gospel voices were helpful when Carey stepped up to the mic. "Because she has that force, I had to tell her to move away from the mic and ease off certain notes," Lawrence says.

"Some of the tube mics broke up if she got too close. She's broken quite a few mics while recording, but she's pretty good at working a mic. The other thing I tried with her was using different microphones or different compressors, depending on whether she was singing really hard or soft on a ballad."

Besides Carey, Lawrence's production skills have also taken BeBe and CeCe Winans off the R&B charts and into the mainstream with *Different Lifestyles*. Lawrence called in Hammer and Houston to do back-up vocals and lend more variety to the Winans' sound. The result was one of their most successful albums yet. "I had worked with Whitney on a song for the *I'm Your Baby Tonight* album," Lawrence says. "I asked her to sing on this, and she flew to Nashville, where the Winans live, and we cut it. She's got an awesome voice."

Lawrence loves working with R&B artists because of their "soulful voices," but when it comes to

recording the music for the tunes, he often relies on drum machines and computers. "I like the control you have with drum machines in terms of the sounds all the way up to the mix," he says. "It allows you to adjust the feel or how thick or loose the sound is. But I also use musicians. On a song for Mariah, I had live drummers playing into a drum machine using pads. We had live hi-hats, and then the drummer also played all the drum fills on the pads. That went right into the drum ma-

"I try to match the
engineer to what's being
mixed. If it's an uptempo song
with a hard groove, then I
want someone who's
great at that."

chine, so the best of the performance was there, and I could get a

really strong drum sound out of it." Lawrence is also a fan of sampling and strongly defends his use of the technology. "I generate a majority of them myself," he stresses. "If I do borrow, it's never more than two notes. I've never done anything like rap songs, where you have four to eight bars of a song. I've taken a horn hit, or a guitar stab, something like that."

As talented as he is, Lawrence doesn't deny that his studio also plays a part in his success. It's the relaxed environment where Houston, Andrew Strong and Michael Jackson have all spent time writing with Lawrence. Lawrence's pile of gold and platinum records are stacked in one corner rather than hanging on the wall, and it's one of the few studios in town that can boast a fireplace and orange tree.

Built about five years ago, the studio is partially soundproofed with glass, providing a view of the orange tree in Lawrence's yard and of the Hollywood Hills. A couch near the fireplace is a perfect place to record guitars, according to Lawrence. "After about four or five years of working in a cave with no sunlight, it was a nice change," he says. "I wanted to make a studio that was more convenient and fun to work in. I have a vocal room on one side, and a guitar player can sit near the fireplace to do a part while we put the amplifier in the other room. Also, I wanted to have a facility where I could write and get a song from demo to record. It's much easier if you have your own facility rather than trying to book time somewhere else."

Writing hit songs has helped Lawrence cross all musical barriers and move up quickly as a producer. "One of the responsibilities of being a producer is to work on good songs, to be responsible for the arrangements and to at least know when it's as strong as it can be," he says. "Being a musician also makes it easier to communicate with other musicians as far as what needs to be played."

Besides the atmosphere he creates for artists, Lawrence's ability to adapt to almost any situation and musical style has enabled him to take on a wide variety of projects and is a major reason why artists call on him when a track or single is

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needed in a hurry. "A lot of times, they're close to finishing a project, but they need a single," Lawrence says. "It's exciting when you cut the one song and it goes out to radio right away."

For instance, the producers of the last Teenage Mutant Ninja Turtles film gave Lawrence 48 hours to record a song that he and Johnny Kemp had already been writing together. "I wasn't going to do it because the deadline was so short," Lawrence says, "but I talked with

some people with kids who said I'd better go for it because the kids love the Turtles. It ended up selling more than a million units."

Another soundtrack with a tight deadline was *Caddyshack II*. Lawrence had a week and a half to record a song for the film with Earth, Wind & Fire. "[EWF leader] Maurice White and I wrote the song here in the studio and played it for the music coordinator, who liked it. But the band had to leave the next day to go to Japan. I cut the tracks here and flew to Japan with a 24-track in my briefcase. I think Maurice and

Philip Bailey were doing two concerts in a row, back to back, and then they had to come into the studio and sing all night. I couldn't believe it. We recorded the vocals at CBS Studios in Japan and mixed it at Ocean Way [in Los Angeles], and they mastered it next door at the same time we were mixing it. That's how tight the deadline was. But we did make it. And I got to go to Japan—and see the studio and hotel," he laughs.

Lawrence's engineering capabilities are another factor that enables him to meet tight deadlines. "I actually do a lot of tracking and split the job between some other people and myself," he says. "Sometimes if I'm working on an arrangement I can track it myself or record some of the drum machine patterns myself."

Lawrence chooses his engineers based on their different strengths, rather than forming a partnership with only one or two. "I try to match the engineer to what's being mixed," he explains. "If it's an uptempo song that has a hard groove, then I want someone who's really great at that. Personality is important, too, especially when you're working with an artist. If the engineer's a drag or is making an artist feel uncomfortable, that's not going to work. They have to be fun and be able to keep everything flowing."

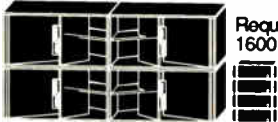
Lawrence credits his hard work and love for gospel and R&B for getting him in the door. It was his dedication and talent that made him one of the few successful white R&B producers today. Lawrence's unusual position in the industry was illustrated several years ago when he was producing Phoebe Snow. She walked into the studio, saw him and asked where Rhett Lawrence was. Once he introduced himself, she said he couldn't be Rhett because he wasn't black.

Snow wasn't the only one to make that mistake. "There was an article in the *Los Angeles Times* about record producers," Lawrence remembers. "They said there were various pop record producers like David Foster, and then there are black producers like Rhett Lawrence. I had a good laugh about it and sent it to my mom." ■

Sue Gold is a freelance writer living in the Los Angeles area.

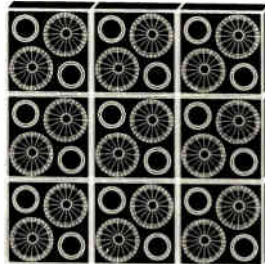
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Fostex

by Paul Potyen

AUDIO AND QUICKTIME

It's been a year since Apple's announcement of its QuickTime architecture for creating video on the Macintosh, and the release of the QuickTime software extensions in early '92 resulted in a blizzard of related tools and products (see "The Byte Beat," April 1992).

According to Rob Curry, QuickTime "guru" at Digidesign (Menlo Park, Calif.), "For the first time at Digital World, people were looking at QuickTime and multimedia on the Mac as getting close enough to be useful, as opposed to a toy with a postage stamp-size output." While there are still considerable limitations with the current state of the art, many professionals in media production are anxiously awaiting the next iteration of QuickTime.

Before launching into a discussion of the role that audio plays in all of this, I'd like to briefly describe the philosophy behind the technology and its current capabilities. First, QuickTime is *not* an application. It's

a software media-control architecture with provisions for both time-based media types—video, animation and audio—and still images into applications. A QuickTime movie can contain one or more of these media types. The appearance of digital video on the computer is made possible through the use of video compression (either software-based or via third-party hardware). QuickTime supports Apple's own compression scheme, as well as those of other developers.

Currently, QuickTime takes the form of a system extension (a software module that is placed in the system folder), but eventually it will become part of the Mac system software. If you want to play a QuickTime movie, you need a Mac II or LC with a minimum of 4 MB of RAM, a color graphics card, 32-bit QuickDraw (another software module that goes into the system folder) and System 6.0.7 or later. If you want to import your own video clips, you'll

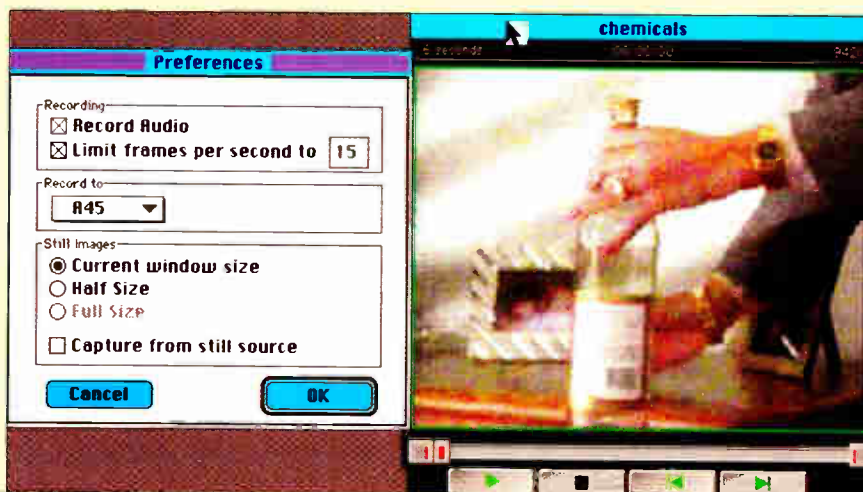


Figure 1: ScreenPlay is used to record and play back video, with or without audio. Clicking on "Record Audio" in the preferences window routes audio from the selected-audio-input device.

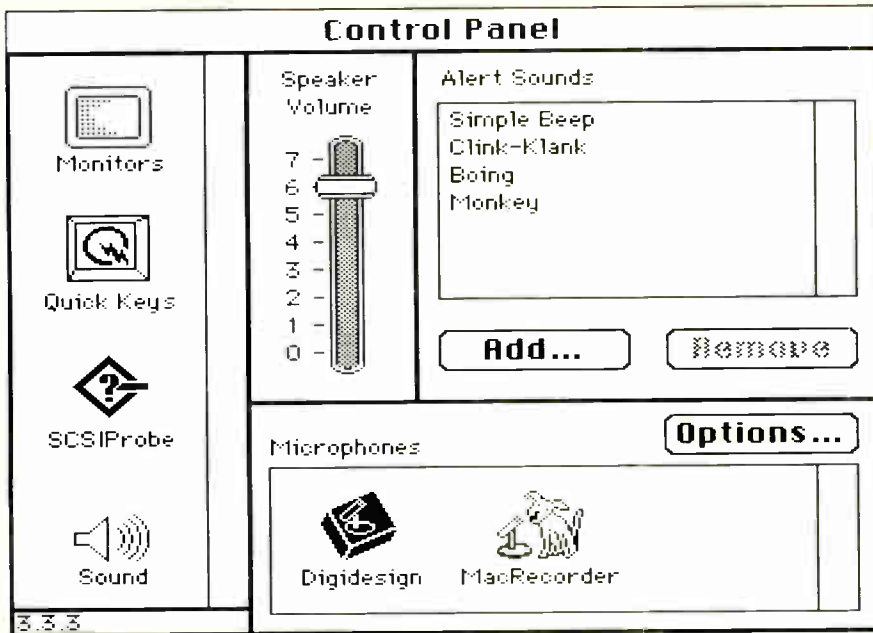


Figure 2: Audio-input devices are selected using the Sound Manager in the Macintosh control panel.

need to add a video-capture board and a camcorder or videotape deck to your setup. Even with the availability of video-compression techniques, storage of digital video is easily as intensive as with uncompressed digital audio.

Starting with System 6.0.7, Apple incorporated its Sound Manager for the Mac. Third-party developers such as MacroMind • Paracomp, which owns SoundEdit Pro, and Digidesign could write their own sound-input drivers. This is how an audio-input device is selected with a QuickTime recording application (Figs. 1 and 2).

Several companies are marketing hardware products that bring analog video and audio into the Mac and, in some cases, back out to your VTR. Among them are RasterOps (Santa Clara, Calif.), Radius (San Jose, Calif.) and SuperMac Technology (Sunnyvale, Calif.). The most interesting offering from RasterOps, in terms of integrated video and audio, is its MediaTime NuBus adapter. Priced at \$3,000, this card incorporates 24-bit, real-time video with CD-quality digital audio. The single card uses Digidesign's AudioMedia technology to record and playback 16-bit, 44.1kHz audio. On the video side, MediaTime is capable of S-Video and

composite (NTSC, PAL, SECAM) input, with interlaced output in NTSC and PAL for output to a VTR or monitor. Unfortunately, I wasn't able to evaluate this promising new prod-

uct for this article, but it seems like an excellent solution for those who don't already have a high-quality audio card in their Mac. Availability was expected this fall.

Radius' most recent entry into the fray is its Digital Film system. Demonstrated at Digital World in June, it features real-time capture of NTSC video at up to 30 fps with JPEG hardware compression and 10-bit, 44.1kHz stereo audio input, with the ability to output to tape. Digital Film was also expected this fall. For those who already have digital audio capability on the Mac, video-only boards are available from SuperMac (VideoSpigot) and RasterOps (24XLTV and 24MXTV).

And what results from this sizable investment? With a video capture board installed, video can be digitally recorded from an analog source in 8-bit or 24-bit color. QuickTime recording and playback can vary from 1 to 30 frames per second, with or without audio, in a window that ranges from 160x120 pixels to

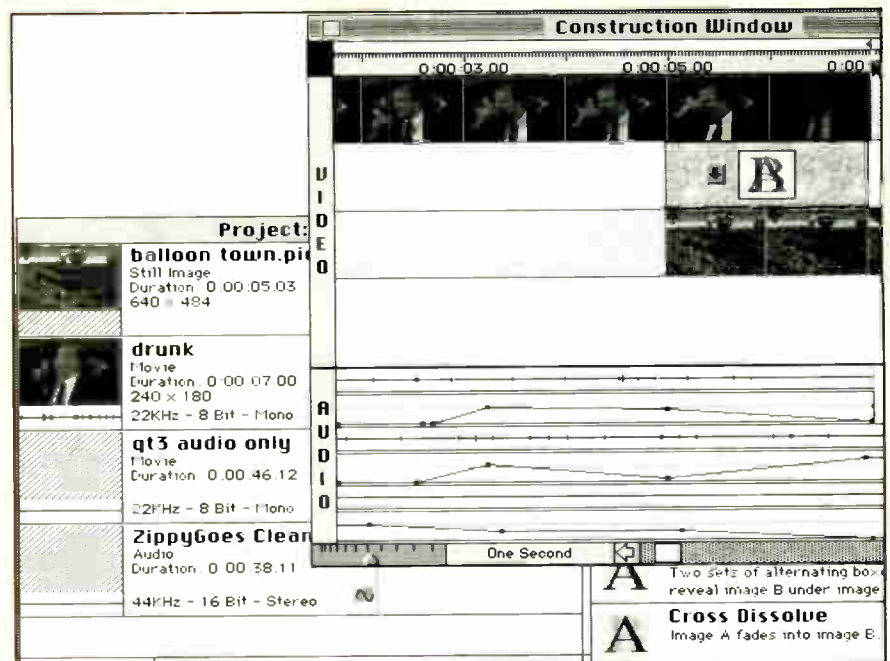


Figure 3: Premiere 1.0 allows you to construct a movie from elements imported into a database window of video clips, still images and audio elements (at left). The construction window lets you create transitions between two video elements (at top). Audio crossfades are possible among a maximum of three audio clips (at bottom).

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320x240 pixels. (The addition of more hardware can boost the output of a Mac Quadra 950 to full-screen 640x480 pixel resolution at 15 fps.) Once on the Mac hard disk, movies can be edited using any number of programs, the most popular and powerful being Premiere from

Adobe Systems (Mountain View, Calif.), as seen in Fig. 3, and VideoShop from DiVA (Cambridge, Mass.).

Digital video is, in many ways, the last frontier on the Mac desktop, and the technology continues to advance like a tidal wave. With so much action on the video side, digital audio has generally been buried in the surf,

so to speak, with comparatively little discussion. The truth is that while QuickTime 1.0 is designed to synchronize the video and audio components of movies—a nasty problem in the pre-QuickTime era of Macintosh computers—it does not resolve down to the single sample, and the audio support is 8-bit mono. Also disappointing is the fact that QuickTime

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Designed for audio post-production, high-end music applications and multimedia authoring, the Emulator IIxp is a MIDI-based, three-rackspace, digital sample-playback system from E-mu Systems (Scotts Valley, CA). The EI-IXp is compatible with the entire 16GB EIII library of sounds, and it features up to 32 MB of RAM, 32 mono voices (16 stereo) AES/EBU digital I/O and four pairs of XLR stereo outputs.

The EIIXp is available in two models: Standard units contain 8 MB of RAM and a 3.5-inch floppy drive; the turbo models feature 32 MB of RAM and an internal 105MB hard drive loaded with a variety of EIII sounds. The standard unit is available at a suggested retail price of \$3,995.

Circle #201 on Reader Service Card

TOUCHVISION SYSTEMS D/VISION NON-LINEAR EDITING SYSTEM

TouchVision (Chicago, IL) has announced an IBM PC- and PS/2-based software/hardware package for random access digital video and audio editing. Sold as a turnkey package or by component, D/Vision uses an IBM/Intel ActionMedia II DVI board with video capture to record and play back approximately one hour of "near-VHS-quality" video per magnetic or optical SCSI disk. Up to 21 drives are supported. The turnkey system includes an Intel 486 CPU, an ActionMedia board and editing and special effects software, two monitors and a pair of self-amplified speakers. It sells for \$15,990. Storage devices are not included.

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STUDIO AUDIO SADIE DISK EDITOR

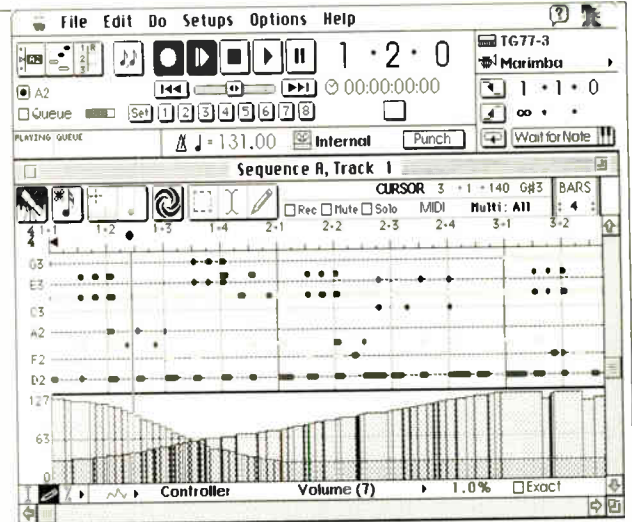
SADIE Disk Editor is a professional audio editor for the IBM PC/compatibles that uses Windows 3 to record, edit and playback two channels of digital audio via AES/EBU and S/PDIF. Options are available for four outputs, analog I/O and time code interface. Developed by Studio Audio and Video Ltd.

(Cambridge, UK) and distributed in the U.S. by A.R.A.S. (Ann Arbor, MD). Version 1.5 features scrub editing, varispeed waveform editing and continuous resync mode. It was expected to be shipping by September.

Circle #203 on Reader Service Card

PALTEX INTERNATIONAL EDDI

Another UK-based developer, PALTEX International, is shipping its EDDi Desktop Video system for Microsoft Windows. Two versions of the system are available: EDDi, which



Vision 1.4 screen

is capable of controlling two VTRs; and EDDi Pro, which features full A/B roll capability and serial switcher control. Both configurations can take advantage of PALTEX's optional *vision* video overlay option, which puts full-motion and real-time video on the user's PC display, and incorporates EDI-linked SceneLog software to facilitate source-tape logging and scene cataloging. American sales and manufacturing offices are located in Tustin, CA. List price for EDDi Pro *vision* is \$4,995.

Circle #204 on Reader Service Card

OPCODE SYSTEMS VISION 1.4

Opcode Systems (Palo Alto, CA) has released Vision 1.4, a major update of its MIDI sequencing program for the Macintosh. New features include real-time editing, a redesigned control bar with fast forward/rewind shuttle and locator buttons, and numerous other improvements. Vision 1.4 retails for \$495, with upgrades for earlier Vision users available for \$49.95 plus shipping. Registered users of Vision can also upgrade to Studio Vision 1.4 for \$500.

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World Radio History

1.0 ignores MIDI. Manufacturers and users alike are increasingly trying to persuade Apple to eliminate these shortcomings with its release of QuickTime 2.0. I hereby add my voice to this group. Are you listening, Apple?

Currently, QuickTime offers only a glimpse of what will ultimately prove to be a powerful high-level tool for video and multimedia producers. The big question is not if, but when that will happen. Here are a few encouraging recent developments. First, Apple released its QuickTime Starter Kit in May. Available through all Apple product resellers and many software vendors for \$169, the Kit includes applications, installation software, a CD-ROM with clip video, animation and still images—everything you need to make a Mac QuickTime-savvy. Apple expects to have more than one-third of the installed base of 3.5 million color-capable Macs playing QuickTime movies by the end of the year.

Silicon Graphics also made industry news in May with plans to integrate QuickTime into the IRIS Indigo (see "The Byte Beat," August 1992). With the incorporation of QuickTime into the SGI operating system, it was expected that files could be shared between Mac and Indigo users. This could bode well for Apple, which no doubt would be pleased to rub shoulders with the high-end SGI user base.

The July announcement from Adobe of Version 2.0 of Premiere boasted enhanced video editing capabilities—for example, export of EDLs to high-end systems like the CMX 3600. Other announced improvements include internal support of 16-bit, 44.1kHz audio and SMPTE; control of multiple decks through third-party controller boards; and an open architecture, which has already resulted in an announcement by Digital F/X (Mountain View, Calif.) to allow export of EDLs to its own QuickTime-compatible Video F/X editing system (see "Chip Shots," August 1992).

According to Tim Meyers at Adobe, initial tests have indicated that the new version of Premiere will result in frame-accurate synchronization. Even though Premiere 2.0 (and the above-mentioned RasterOps

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MediaTime board) can incorporate CD-quality audio into a QuickTime movie, when you play the movie, QuickTime truncates the audio to 8-bit, 22 kHz. However, that same movie played back using a future version of QuickTime that supports CD-quality audio will take full advantage of the embedded CD-quality audio data. Premiere 2.0 was expected to be shipping by September.

Back to audio. Apple's 8-bit internal recorder for the newer Macs and MacRecorder are not the only

audio input options available today. Digidesign has written a sound-input driver that works with all its 16-bit sound cards. According to company spokesman Rob Curry, "It allows you to record audio into a QuickTime application. In the case of Adobe's Premiere 2.0, it allows you to record at 16-bit, 44 kHz, as well. We have demonstrated a prototype of a high-quality, sound-output architecture with Apple at the Seybold Digital World Conference. It included Apple's new version of its Sound Manager system software and a new version of QuickTime that supports

device-independent output as well as input. Apple has told us that they will release the new software 'sometime between now and next spring.'"

If Sound Tools or AudioMedia owners are interested in getting the sound-input driver to achieve QuickTime compatibility with their cards, they can contact Digidesign. However, as mentioned, QuickTime in its current state can't take advantage of 16-bit audio playback. And it's not essential to have the driver in order to create audio for a QuickTime app. You can make AIFF files at any resolution, independent of QuickTime, and then import them into Premiere, VideoShop or any other QuickTime authoring tool.

In preparation for this article, I used SuperMac's Spigot & Sound Pro, which included a VideoSpigot card, a separate graphics card that allowed my Apple 13-inch monitor to display 24-bit video, and SuperMac's ScreenPlay record/play software. Spigot & Sound Pro is bundled with Premiere and MacRecorder/SoundEdit Pro. (VideoSpigot Pro does not include MacRecorder/SoundEdit Pro, and those who already have 24-bit video capability or are content with 8-bit color can purchase the VideoSpigot card separately.)

Hardware installation was easy, and the software tools were well-designed and intuitive. While I enjoyed making and editing QuickTime movies, I suspect it will be a while before you see any of my resulting work on MTV. SuperMac has reportedly sold more than 19,000 VideoSpigots to date, an indication that despite its fuzziness, low frame rates and long compute times, QuickTime is the right food for an eager market that can only get bigger.

The two technologies that will turn QuickTime from a toy into a useful tool in the next year are JPEG compression hardware from SuperMac, RasterOps and Radius (which will allow full-screen video) and high-quality audio, where we find ourselves at the mercy of Apple. When that happens, QuickTime will become an important technology for Mac users on all levels, from hobbyists to professional producers of audio and multimedia. ■

Mix associate editor Paul Potyten has been on the cutting edge for so long he wears designer tourniquets.

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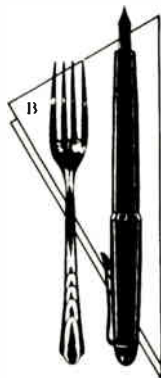
by Mr. Bonzai

GEOFF EMERICK

BEATLES MASTER



gatefold, in this case emblazoned with a portrait of the band in their self-created alter egos. Today *Sgt. Pepper* still stands among the most memorable works in the annals of recorded music. It's certain that George Martin will be remembered as one of the most influential producers in history and Geoff Emerick as the engineer who helped shape the modern art of recording.



Twenty-five years ago, the Beatles rocked the world with a daring album that shook the foundations of pop music. "It was like writing a novel," recalls Paul McCartney, "instead of looking for catchy singles."

Indeed, *Sgt. Pepper's Lonely Hearts Club Band* was much more than just a collection of songs—it was a *concept* album of interwoven material and provocative sound effects. The album sleeve was among the first to feature printed lyrics, and it was also one of the first to have a

staff at EMI in 1962 and first worked with the Beatles as second engineer under Norman Smith in 1963. On April 6, 1966, he began his work as first engineer. The song was tentatively titled "Mark I," eventually becoming "Tomorrow Never Knows." The album, *Revolver*, was the first of Emerick's Beatles albums, followed by *Sgt. Pepper* (Grammy/Best Engineer), *Magical Mystery Tour*, *Yellow Submarine*, *The Beatles* ("The White Album") and *Abbey Road*.

Emerick's producing and/or engineering credits also include Badfinger, The Zombies, Jeff Beck, America, Split Enz, Supertramp, Elvis Costello and Kate Bush. He's engineered a number of McCartney albums, including *Band on the Run*, *Tug of War*, *Pipes of Peace*, *Flowers in the Dirt*, and most recently, *Unplugged*.

Let's join Emerick now in the garden outside his home in the hills above Los Angeles...

Bonzai: You were partners with George Martin and John Burgess in

Left: Assembled by Emerick, the legendary—and still unreleased—Beatles Sessions album.



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—Bernie Grundman

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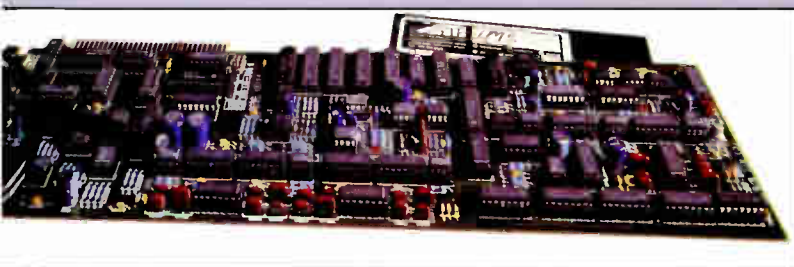
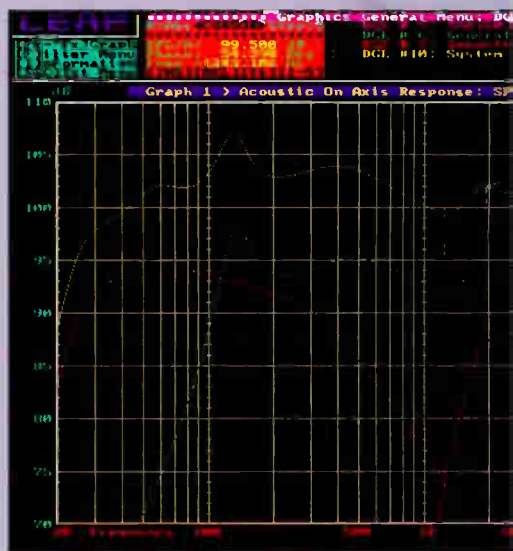
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AIR studios on Montserrat?

Emerick: Yes, and my wife and I bought a house on the island—such a paradise. We worked there for seven or eight years, and then the hurricane hit; had to rebuild our house.

Bonzai: If making a record is like building a house, what is the foundation?

Emerick: The foundation is obviously the band. The cement and mortar would be the bass player and the drummer. When I left school and entered this business, I was taught by Norman Smith, who was the original Beatles engineer. He always said that the basic backbone is the bass and drums. If that tightness and feeling are there, then you can build anything.

Bonzai: How about the framing?

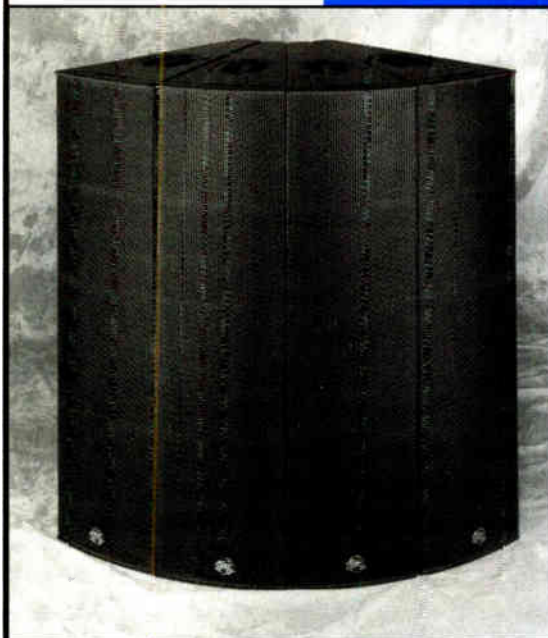
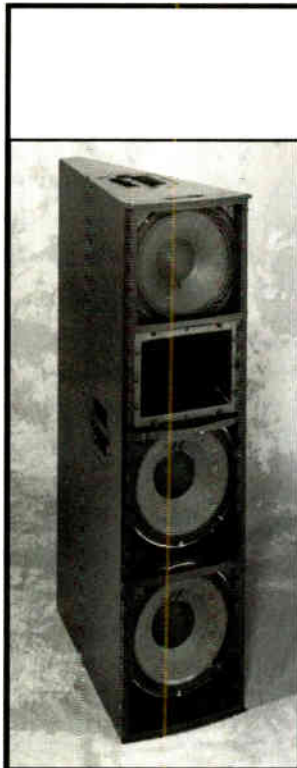
Emerick: That's up to discussion. How much will the producer play in the framing? What is he offered, and what is he allowed to do? In the early days, the producer actually picked the material, the arranger, the musicians and so forth. Nowadays, you may have to put some cement in, and take a brick out here and there.

Framework would probably come down to the song itself, and the melody. While I was learning, I was always told that you could put a couple of microphones out in the studio, and if the song and the feel were there, you could record a hit. A lot of the hits in the early '60s were done like that. There was nothing clever in it. Stick a couple of mics out there and start recording.

Bonzai: You took over from Norman Smith on Wednesday, April 6, 1966. You were 20 years old.

Emerick: You've been studying the official Beatles *Sessions* book—yes, that would be correct. I'd started at EMI in 1962, the same month that the Beatles went in for their recording test. I was a second engineer, which meant that you just operated the tape machines. I believe my first session as a second with Norman was for "She Loves You." And then I did a lot of Manfred Mann records with him.

The reason I was named as the Beatles' engineer was because Norman wanted to become a producer.



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I got along well with George Martin because I could keep my mouth shut. As a first engineer with the Beatles, I started with *Revolver*.

Bonzai: You were previously working as a disc cutter?

Emerick: Well, that was part of the training. You were second engineer, which meant that you didn't plug in leads or anything. You polished the tape machines, made sure there was tape ready, wrote out the information on the tape boxes, pressed the record button and so forth. It's not like today, where a second does so much more.

My promotion from that position was to cut playback lacquers, because there were no cassettes back then. For instance, if a band like The Shadows were recording, perhaps three or four tracks in a night, the following morning you would have to cut listening discs of each song, manually.

A step up from there would be mastering. I was told that maybe when you were 40 years old, you *might* become a recording engineer. I was only 17 when I started, and

this gave pause for thought, but things began to change drastically.

Bonzai: You were well known for getting a lot of material on vinyl. Did your disc-cutting background help you in this?

Emerick: It was incredible training. If we were recording something and watching the meter and there was one funny thing that went one-and-a-half dB in the red, you knew that your entire album would end up one-and-a-half dB quieter. You had to work around the limitations.

Bonzai: You were known for being able to get more bass than just about anyone. You used the ATOC—Automatic Transient Overload Control?

Emerick: That would be an Abbey Road invention, a synthetic device that felt out the bass frequencies, which were the hardest range to get on record. If it registered that you were down to 30 cycles, it would obliterate the 30 and lift it up to 50. It was basically a filter box.

There were certain directives from EMI that were a challenge, you see, because of uncomfortable occasions early on with the Beatles. When cutting a master record, you really had to work on the bass. EMI

was afraid the records would come back—on one occasion *two million* records came back. I think "Please, Please Me" was rejected because the needle jumped. From then on we had to slash all the bass.

There was an incredible amount of product that was actually pressed. The directive would come back to us to slash all the bass below 60 cycles, with filter boxes, no matter what tape we were given. At that time, we were listening to American records, especially the Motown stuff, and knew they cut at twice the depth, but EMI was like the BBC. It was like fighting a body of people that would not change their ways from the past.

Bonzai: Do you feel that limitations can sometimes be a challenge that enhances creativity?

Emerick: You couldn't put forward a better question. I would go into the studio and sit on a chair while Ringo played, listening to the tonalities. You know the microphones that can enhance, or capture, the different tones you are hearing. It was a challenge, and there were certain things I couldn't do. I had to find other ways to make it work.

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It made it harder for me, but with the Beatles we weren't under too much pressure; we had all the time we wanted. If it was a complete session with another artist, like Cilla Black, we'd do three tracks in the morning, three tracks in the afternoon, three in the evening, three the following morning. Vocal overdubs afternoon and evening. Mix it and you'd be done in a few days. With those time constraints there were certain things you could do and couldn't do.

Bonzai: With Ringo's drum sound, you were miking much closer than had ever been done before. And it's said you stuffed the famous four-headed sweater in the drum and sent the signal through a Fairchild 660 tube limiter?

Emerick: Yes, that's true. To get that sound, I'd first go down and listen to Ringo's drums. Put my ear next to the top skin, or to the bottom, looking for the resonance from the skins. We took the bottom skins off the tom-toms, and put the mic up inside. This gave us the slap of the top, with no resonance of the bottom skin—what a thought. In my opinion, *Revolver* was the album to

change all sounds. Better than *Pep- per* from a sound point of view.

Prior to that, you probably found one overhead mic, one bass mic and one snare mic on the drums. Recording mixers only had eight inputs, so we didn't have enough feeds into the board to do much more. We built little pre-mixers and had all sorts of stuff going on.

Bonzai: Was "Tomorrow Never Knows" the first song to use tape loops?

Emerick: For the Beatles, yes, but I believe George Martin had used tape loops before—probably on a Goon Show album or a Spike Milligan record. Basically, that was our first use of a primitive "synthesizer." Each of the Beatles had their own Brennell tape recorders to play around with, and you could actually block off the erase head on those machines. The tape could pass the record head without it being wiped.

If Paul wanted to play a guitar through it, he could build up a strange new sound. He knew that if you recorded on the loop more than a few times, without the erase head connected, you would whack the original sound. You had to do it

quite quickly to get the image you wanted. If you went on too long you'd just get a mess.

That seagull sound on "Tomorrow Never Knows" was just a looped guitar strum, but when we put the loop backwards that's what it sounded like. You have to remember that our tape machines then were about three feet wide and four feet high, and we had to put one loop on each machine. For that song, we must have used about eight machines. You had to lace up the machine, and then hold the loop out with a pencil to keep it going around. We had the engineers from the maintenance department just holding the loops, and then we put the feeds on faders. You just played the tune, and because we knew which loops had which notes you could just blend them in.

Bonzai: Are we going to hear more recordings from that period?

Emerick: My wife, Nicole, and I worked on the famous Beatles *Sessions* album, which has been bootlegged. It was going to be an issue from EMI, with lots of outtakes. We worked on that in Montserrat, but there was never final permission to



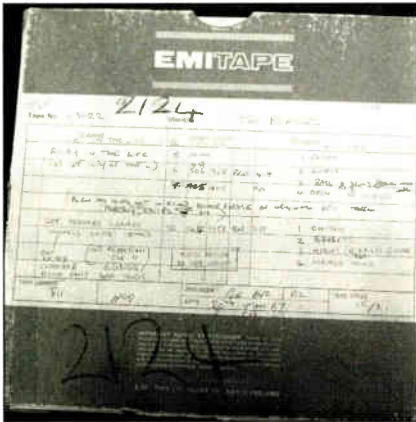
release it. The album does exist, with a really good alternate version of "My Guitar Gently Weeps." It was a good album, and one day I'm sure

have been transferred. The textures and tonal qualities on the CDs, though, are so different that they don't even resemble the original records.

Bonzai: One of your last Beatles

together in about two days. Malcolm Davies, the cutting engineer at Apple, phoned up and told me he couldn't believe that track. We were always into the sounds, the top on the snare, the bass. Malcolm used to

PHOTO: JEFF TURNER

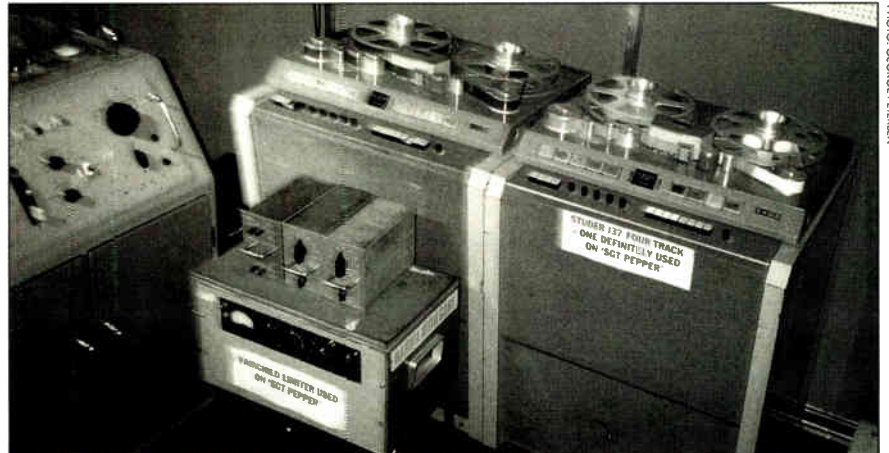


Engineered by Geoff Emerick on Jan. 20, 1967, this 15 ips, 4-track master from "Day in the Life" and "Sgt. Pepper's Lonely Hearts Club Band," was recorded on EMI brand tape.

it will be issued.

Bonzai: Have all the original Beatles tapes been archived on digital?

Emerick: Yes. The original master tapes sit in tins, you know. But they



One of the Studer J37 1-inch 4 tracks used on Sgt. Pepper's.

PHOTO: GEORGE PETERSEN

sessions as engineer was for "The Ballad of John and Yoko," which was also the first Beatles stereo single in Britain. It's interesting that it was only John and Paul playing, because Ringo was making a film and George was out of the country.

Emerick: Yes, that session was put

work at EMI and Abbey Road, and then at Apple, and when he got the tape, he couldn't believe the sound on the snare. I had used a different mic on the snare for the first time, because it lent itself to the sound of that record. It was an AKG KM-56, a condenser, which I had never done put before.

Bonzai: Since you worked mainly with 4-track machines with the Beatles, did you have to do a lot of ping-ponging?

Emerick: Some, but not a lot. I was talking with George Martin, and he was recently listening to some of the old tapes. He couldn't believe what we were actually laying down on one track—bass, drums, guitar, voices with and without echo. It was just live recording, with all the finished embellishments. That's the way we worked.

Bonzai: What about all the rumors that the Beatles were putting subliminal messages on their records?

Emerick: Nonsense, not true.

Bonzai: It seems to me that it was *Revolver* where all the Beatles' weirdness began.

Emerick: *Revolver* was the first album I'd engineered. It was, "Well, Geoff's the engineer. We don't want the piano to sound like a piano. We don't want the guitar to sound like a guitar, and we don't want the drums to sound like drums." This was mainly coming from Lennon.

Bonzai: Was this irritating at all?

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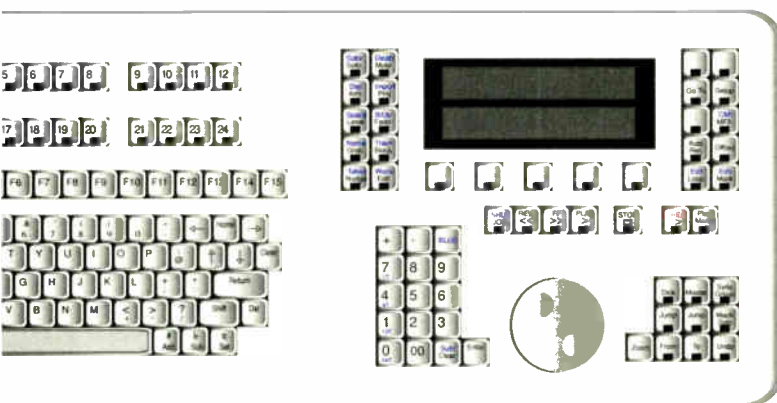
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Emerick: Not really—it was a challenge. That's when we started using the Leslie speaker. When we first put a voice and a guitar through those speakers it made the most amazing sound ever. It was so tuneful and melodic. Wow, let's make a whole album of this! We were creating all these sounds without magic boxes. All the plug-in boxes now are derived from what had to be done mechanically, or by stretching tapes, or chopping tapes up, slowing tapes down.

Bonzai: Is it true you actually had John suspended from the ceiling, swinging around for a vocal?

Emerick: It was his idea, but it didn't really work out. He'd gone through a funny stage at that time. We'd put the voice through the Leslie, and the speaker revolved around. I think he once asked George if he could just plug a voice feed from himself and swing around from the ceiling to get a similar effect. George explained that he would have to have an operation to put a voice box in his throat and have a jack plug attached to his neck.

Bonzai: You and George Martin must have spent a lot of time together on your side of the glass, observing the antics.

Emerick: Yes, a lot, but the antics weren't too bad, really. Experimentation and playfulness went into the making of those records, which you don't find a lot of now.

Bonzai: Were you part of the raids on the tape libraries for "Revolution 9"?

Emerick: Oh yes.

Bonzai: Were you actually taking library tapes and cutting them up?

Emerick: It wasn't as bad as that. We were just taking tapes from the EMI sound effects library. You were allowed to use the tapes, and we did.

Bonzai: *Abbey Road* was your final album with the Beatles...

Emerick: Yes, and that was the first time we used a transistorized recording console. EMI made it, and at that point I could not re-create the bass drum or snare drum sounds, guitar sounds. Previously I had used tube consoles and tube tape machines. And then we got the new batch of Studer tape machines, which were

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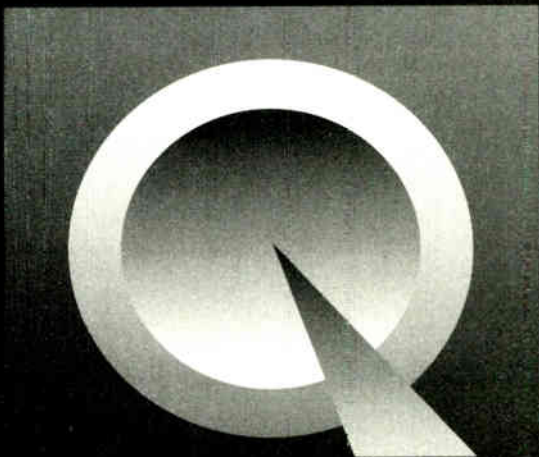
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half-tube and half-transistor.

If you listen to "Paperback Writer," a good example, you really hear the kick of that bass drum. There was no way you could re-create that through a transistorized desk. There are many theories—unnatural harmonics, distortion, whatever—but we couldn't create those sounds anymore. The new desk was a lot smoother, a lot mellower, which gave *Abbey Road* its texture. It's still a great album.

Bonzai: Let's talk about some of your recent projects—the McCartney *Unplugged* project for MTV, which was also released as an album. What technical tools did you employ?

Emerick: Well, it was very simple. First of all, Paul phoned up and asked if I would like to work on this MTV acoustic project—mics into desks and so forth. There is one particular mixing console I really like, the old API board. Record Plant's remote truck had one, and we used it for the America albums here in Los Angeles. There's another in a mobile truck in England—it still sounds so clean and so good. Paul

wanted to rehearse at his studio for three days. I suggested that we do that with the mobile, get all the sounds and EQ, and just go down to the television studio in London with the truck and away we go. That's what we did.

There were no overdubs. We took it down to multitrack, and also to DAT. The actual issued album came from the DAT.

Bonzai: You were pleased with the results?

Emerick: Sure I was—sounds superb. It meant, of course, doing all the echoes at the right time, and taking them off. I wasn't under any great direction from Paul; just do it. What you hear on the album is exactly as he sang it. No overdubs on vocals or instruments.

Bonzai: What vocal mic did you use?

Emerick: I used an AKG 414. I wanted to use a U47, but it was too big for the camera, and it's prone to cutting out due to condensation.

Bonzai: Of all the sounds you came up with for the Beatles, is there any one that you are especially proud of?

Emerick: I guess it would be "A Day In The Life." The gradual long

fade, done manually, was monumental. To make that end crescendo loud—it wasn't written, the orchestra was told to go from A to E in 37 bars and do the best they could. I was playing the faders as the song progressed and realizing that what I wanted was another 6 dB by the time I got to the end. I pulled the whole thing way up. I'm proud of doing that—how else could you have done it?

Bonzai: When did you first know that you would be a recording engineer?

Emerick: The intention was never to become a recording engineer. When I was at school I used to love music and listened to all the hit records. I used to say to myself, homing in on the selling point of the record, if I was to be involved I would have done something different to make it better. As a kid, I was into the music more than anything else.

I wrote letters to all the record companies...in England we left school at 16 then. I wrote the normal letters and was rejected by everyone, and finally I got a reply from EMI in

—CONTINUED ON PAGE 147

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**AN
INTERVIEW
WITH**

FRANK PAUL COMENTALE



by Mel Lambert

Most of us who work in commercial or project studios usually take the acoustic and electronic environment pretty much for granted. Without that basic trust, how can we feel safe with the knowledge that what we are hearing is exactly what's being recorded?

The responsibility of providing a controlled, reliable production environment where we can perform our creative magic is the lot of a small group of talented individuals known as studio designers. Conventional wisdom has it that designers are more conversant with the acoustical and electronic nature of the recording space than they are with the day-to-day production demands of the people who run sessions in that space.

It is refreshing to come across a designer who has mastered both worlds. Frank Comentale has been working in recording studios for the past 19 years—primarily at New York's Hit Factory, where he served as chief engineer for a decade—and designing/building rooms for the past 14. His formal education was in both architecture and electronic engineering, so he knows a thing or two about the nuts and bolts of production spaces. He also spent his younger years as a professional musician.

Comentale's recent studio design assignments have included tracking and remixing rooms at the new Chung King studio complex, Manhattan; Filmus Recording, New York; Glenn Frey's Mad Dog Ranch, Aspen; personal-use studios for Eddie Farrell and Jose Feliciano; River Sound Studio, New York, for Donald Fagen and Gary Katz; Hoops Recording, Detroit; plus upgrades for Platinum Factory, New York, and RPL Studio, Camden, N.J.



Comentale designed Glenn Frey's Studio, Mad Dog Ranch, in Aspen, Colorado.

Mix: What makes your rooms different from those of other designers?

Comentale: For one thing, I actually work in the rooms I design as an engineer and/or producer. And I have a lot of hands-on knowledge of building studios and how they are physically constructed, which provides an edge when it comes to building new rooms at the right price. I try to cut out a lot of the red tape and a lot of the waste. I don't know many other designers who have almost two decades of active work in recording studios.

I try to treat each design as an individual entity and to produce a finished environment that is not only technically functional and acoustically accurate, but one that is conducive to creativity.

Mix: How do you avoid the temptation of designing the space for yourself, rather than a room where other engineers/producers would feel comfortable?

Comentale: I design all the rooms for myself.

Mix: Isn't that a rather egocentric attitude?

Comentale: Most of the people I deal with come from a similar back-

"I actually work in the rooms I design as an engineer and/or producer. And I have a lot of hands-on knowledge of building studios and how they are physically constructed."

ground. For example, when I met Glenn Frey I said to him, "You, like me, are a musician, and I always wanted my own studio." Some clients, when they get the chance to build their own rooms, are almost reluctant to express what they want. I tell them, "You've worked in many rooms. What are the things that you want your planned room to include? Just tell me, and I'll put it into *your* room." It's a combination of personalities and taste.

I also produce records. An album that the band produces without me is different from the record they produce with me; my personality and taste have a profound effect on the outcome of a project. I look at each design job and say to myself, "If this were my space, what would I like to see in it?" I then bring those ideas to my clients. For example, they usually say that they always wished that [commercial] studios had a corner table in the back of the room where they could sit and make their phone calls in privacy. Those are the sort of extras that I can include, because I've been in their place.

Mix: Do musicians often say that they would like their new studio to



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maybe look and feel like a favorite facility?

Comentale: Very rarely. Naturally, a lot of them have worked in the Hit Factory, which is one of several studios I've designed. For instance, Jose Feliciano worked at The Hit Factory, and I asked him what he liked about their rooms. He said he liked the way it felt. I consider it a challenge to re-create a space in which Jose feels equally at home. I spent a lot of time with him, asking him how he experienced the world, and how he finds his way around. A blind person often judges distances by sound reflections off the walls. I've got a whole bunch of extras that I'm incorporating into his new room, so that he'll be able to find his way around it. A lot of people who've worked there are impressed by the way it looks. Jose, on the other hand, is *not* going to be impressed by the way it looks, but by the way it *sounds*.

Mix: In contrast to project or personal-use studios for well-known musicians and producers, what about commercial facilities? Do you have different kinds of designs for situations where you've got to create a facility that has to accommodate a wider variety of sessions, as opposed to one that will only be used by a single individual?

Comentale: There again, I tend to fall back on my experience as chief engineer at the Hit Factory. I've spent 14 years there, working with just about every kind of client, from John Lennon to Gladys Knight to Stevie Wonder. If they wanted to do something technically in the room, it was my job to come up with the solution.

Any room has to have a certain function. I'm in the proposal stage with a client right now. Last week he wanted to build a production room with a smaller console. Yesterday he called me and wants to go with an SSL. I told him, "You've got to spend this much if you're going to build a room capable of functioning in certain areas." If somebody is going to spend \$300,000 to \$400,000 on a console they've *got* to build a room that's capable of working 24 hours a day, seven days a week, and supplying whatever demands their clients are going to walk into. That's the biggest thing you have to deal with in a studio: being able to satisfy your clients' needs.

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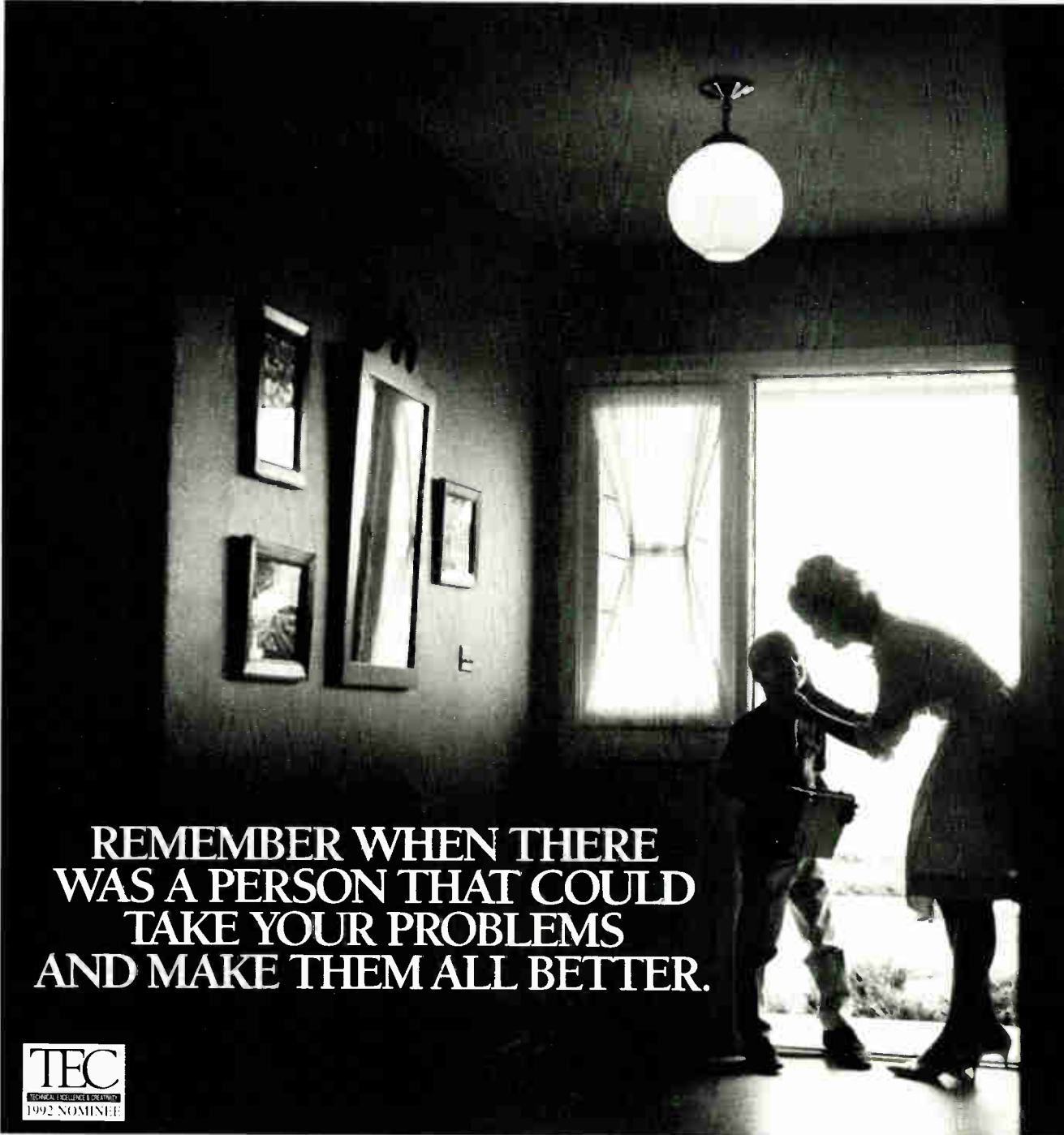
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Mix: We're not just talking about acoustics here, but the logistics of a well-designed room that's able to run 24 hours a day, with trouble-free electrical supplies, comprehensive patch bays, and all the rest?

Comentale: Yes, all of those factors—and others—are important to the overall design, which is why I usually do the installation myself. I believe that the wiring and everything else has to be done very well. In other words, if you've put a clean shirt on, you don't have dirty underwear on underneath.

As far as criteria for building rooms, I look at three things. First, I try to make it practical, a design that fits the client's budget. Second, I determine the kind of business they're going to do in the facility. Third, how much space is available? In other words, suppose a client says that they are going to spend \$500,000 on equipment, yet wants to spend only \$40,000 on building the room. I don't tell them that they couldn't do that, but I have to advise them that the allocation of resources is pretty screwed! I owe it to them to point out that they won't be able to attract the kind of clients who are going to be able to pay the rate that will support the studio. They're already designing in failure from the get-go.

I try to lay out my jobs with built-in growth potential. I'm doing a job now where the client can only afford to go the full distance on the control room itself, which is the main money-maker. I've laid out this project so they can build just what they need to get into business. Further improvement of the studio can be done very easily.

I've designed the air-conditioning system so that—as they add more equipment—they're not going to require more AC. I like to think that there's a good deal of practicality in my designs.

I find that I put a lot more mass and weight into my rooms than most of the rooms I've seen by other designers. One exception is Tom Hidley [Eastlake Audio and Tom Hidley Design]; he also builds some pretty heavy rooms. I always wondered why there weren't too many Hidley rooms here in New York. When I went down to Nashville, I was in a number of his rooms and realized that he usually takes a large space, adds large traps and ends up with a

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much smaller space.

In New York you're usually working on the third, fourth or fifth floor of a building with other tenants on the same floor, as well as upstairs and downstairs. To me, working in a building where I'm on the ground floor with plenty of ceiling height is a *luxury*. If I had a 30- to 40-foot space with 16-foot ceilings to build a control room, I'd be in seventh heaven!

Normally, I have to work with spaces in wood-frame buildings. My air conditioning has to go up on the roof. Working under the most hostile conditions, I've been forced to do more with less.

Mix: What do you think of Live-End/Dead-End™ designs? Do you aim to provide the mixer with a neutral environment in which the monitoring isn't obtrusive?

Comentale: I try to achieve a room that you can feel, yet with good stereo imaging. I find that most engineers don't want a sterile environment; they need to hear some effect of the room. They judge what they're listening to by what the room is feeding back to them. Naturally, you have to knock down bad reflections. I try to create a fairly live mix-

ing environment. In other words, there are sound reflections.

For example, I slat the front of my ceilings over an absorptive cavity. This lets the bass pass through without reflections, but it also gives you some liveliness in the upper midranges and the higher frequencies. It still feels live, but you don't have to pump a tremendous amount of energy and bang your head around to hear anything. People are looking for that physical satisfaction in their rooms.

Mix: What about the recording area? Many studios built in the '70s and '80s had live, bright areas with mirrors and very absorbent areas.

Comentale: I try to combine the two. I'll put a section with carpet on the floors and wood on the walls. But I like organic-sounding things—I don't like very hard, brittle surfaces. You've already got enough of that in the studio with the large glass window. The front of most of my rooms is all glass underneath the speakers.

At the same time you want to cut down on resonance. The walls have to be heavy and stiff. A lot of designers use metal studs in studio walls and control room walls. It



Frank Comentale

doesn't react well. It's not rigid enough. You've got to use wood.

Mix: Let's talk about Glenn Frey's new studio, Mad Dog Ranch. What did you ask Glenn about his ideas for a new facility, so that when you were finished he'd be happy with the result?

Comentale: Glenn likes to work in the control room; it's where he records his guitar parts. In the back of his room there's a workstation that consists of four curved racks. Outboard equipment is located in the front for the engineer, and the back houses all the MIDI gear. I also added a guitar station in the middle of the back wall, so that he could just walk in there at any time, plug in his guitar and be connected to the console or his backline amp.

Mix: What were Donald Fagen and Gary Katz looking for when you built their River Sound Studio?

Comentale: They had a pretty good idea of what they wanted from the beginning. They were very fond of Studio A1 at The Hit Factory. Instead of putting machines at the back of the room, I put them in an alcove. I also built the racks into the walls. I had more ceiling space there to work with, so I gave them a bit more ceiling height.

No two spaces are exactly the same; I don't have any set design. I try to tailor the design to the space. I spend a lot of time on my proposals so that my clients know exactly what they can do with the rooms. That's what a proposal is all about—working out all the details beforehand. ■

In the interest of promoting a caring, sharing attitude to our fragile ecosystem, Mel Lambert has decided to recycle last month's "author's blurb."

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NICK BATZDORF,
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Keyboard Magazine

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**How
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Fresh Air: The daily news, information and culture program, hosted by Terry Gross. You know it, right? One hour of National Public Radio news, reviews of jazz, rock or classical music, commentaries on movies and books, and two in-depth interviews with a wide range of people from Ry Cooder to Salman Rushdie by one of the best interviewers in the business, Terry Gross. If you don't know it, it's time to tune in and join the almost 2 million listeners who hear it nationwide.

Produced at WHYY in Philadelphia, *Fresh Air* is unique in that it is the only daily program that is produced by an NPR member station and broadcast to 150 public radio stations across the U.S. And, along with the talents of the people involved, it's the advent of fiber optics and other innovative technologies that has made such an ambitious schedule realistic.

Fresh Air used to be a local pro-

Engineering technician Audrey Veblaitis mixes the show through an Amek Angela 28-channel console.



gram whose guests were whoever happened to be passing through Philadelphia. But the show's horizons were dramatically expanded with the creation of the satellite system in the '70s and the development and implementation of fiber optic technology in the '80s. Sound quality improved so much that Terry Gross now asks questions in the WHYY studio while guests answer them thousands of miles away in another stu-

PHOTO: KEN YANOVIAK



Amy Salit (L) and Phyllis Myers, *Fresh Air* producers for WHYY-FM/Philadelphia.

dio. The signal is so clear that it sometimes disorients the guests.

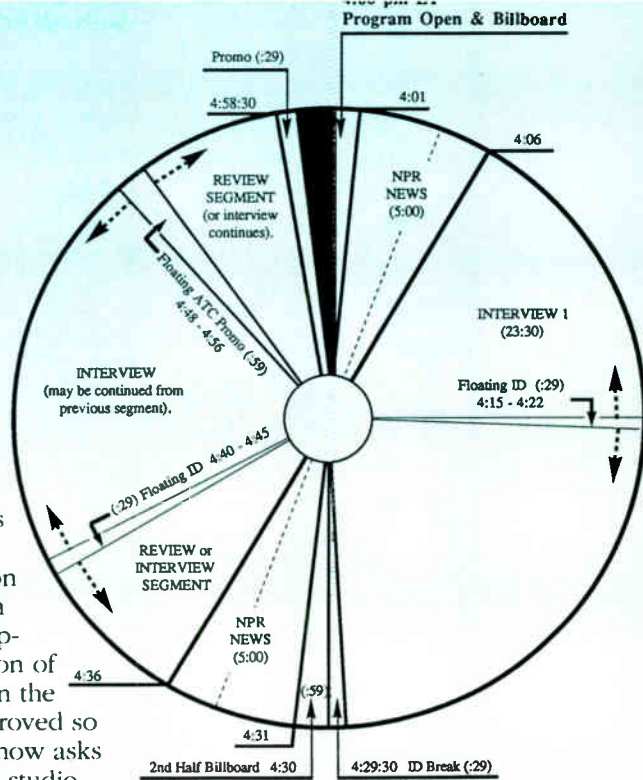
Modern technology has indeed helped the show come into its own. "It gives us a kind of journal-

istic independence," says Gross. "We were really dependent on guests other people were bringing into town. We couldn't write the menu ourselves. Now, with fiber optics and the satellite link-up, we can choose who we want, and then direct them to a public radio station [that has a satellite uplink] close to them."

WHYY is equipped to take advantage of T1 data protocol. It offers the equivalent of 24 bidirectional 4kHz phone lines, which can be configured to carry four audio circuits of 15kHz bandwidth. Normally the lines are configured to carry three bidirectional audio lines and two bidirectional conventional phone lines. (Even though the show is in mono, sometimes stereo is needed for live concerts.)

Gross and her guest carry on a conversation with the analog tape rolling. The remote guest's signal is sent back to WHYY either by direct satellite or through NPR in Washington via T1. The T1 signals received in Philadelphia are converted back to analog and recorded on the same tape as Terry's voice.

Ron Barron, engineering technician supervisor at WHYY, says this system is hassle-free: "For us, trouble is but one phone call. I never have to deal with Bell; I never have



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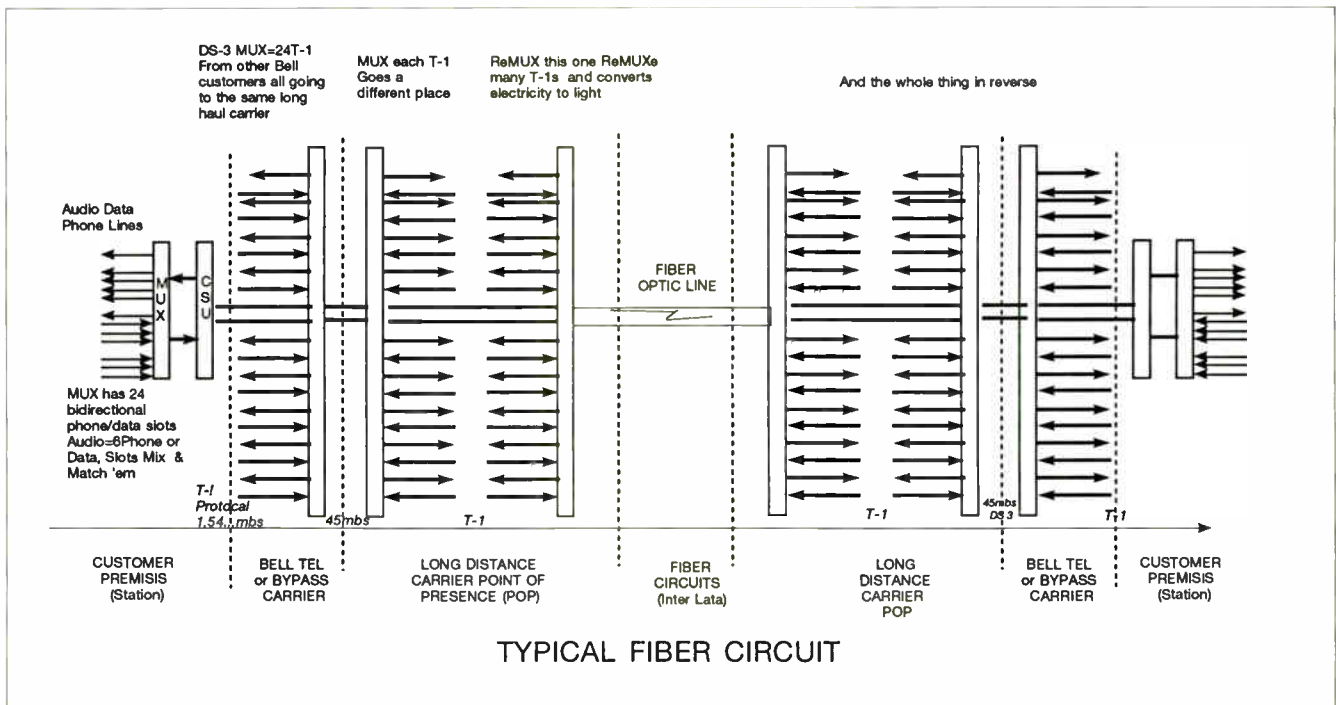
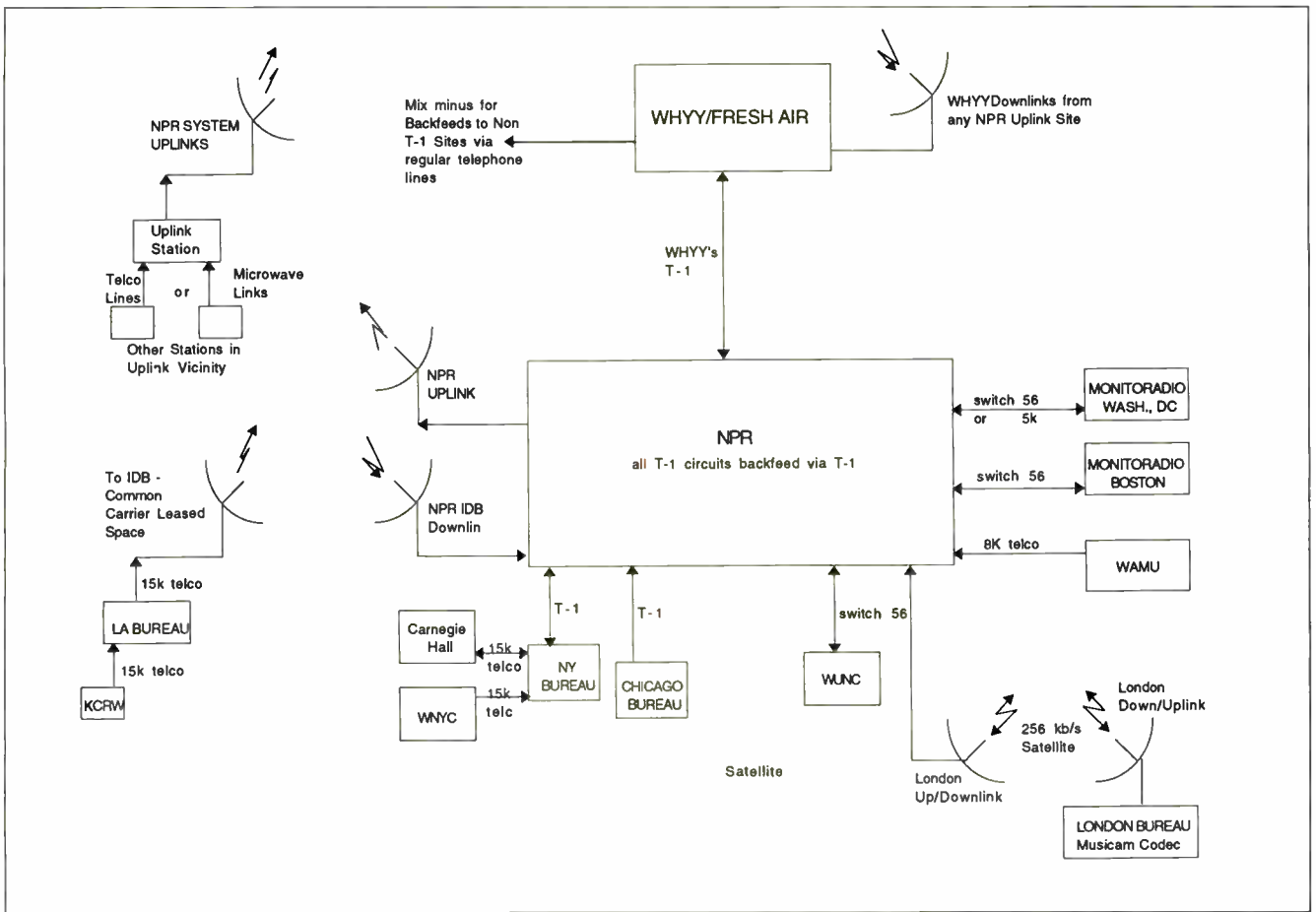
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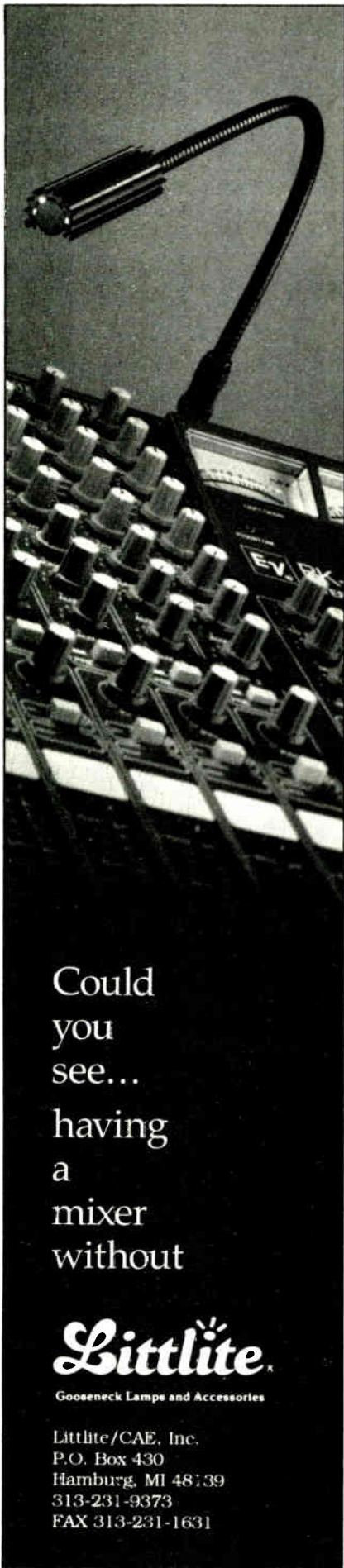
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to deal with ICC [an alternative local telephone company].” WHYY chose Williams Telecommunications in St. Louis to handle its data needs between Philadelphia and Washington, D.C. “If we’re hearing glitches from Washington or the line goes dead,

we just call their 800 number,” Bar-ron says. “They put their monitors on the line. It’s all automated. It’s really fantastic. They monitor the end-point of everybody’s circuit, individually or muxed [multiplexed] together. They can determine where the

errors are happening. The errors significant enough for us to catch—1/4 of a second—are very infrequent: maybe once every two or three weeks. We probably don’t even hear 90 percent of the glitches.” [For more about fiber optics, see “Fiber Optics:



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SWITCHED 56

Switched 56 is a digital dial-up telephone company circuit offered by AT&T. Says Fred Krock, KQED-FM's engineering supervisor, "You dial it up exactly like any telephone, and it gives you direct access to the telephone company's digital network. You use it with a CODEC, a device that allows you to convert the analog audio signal to a digital signal. The glory of this is that the cost for the Switched 56 telephone call is exactly the same as a voice-grade telephone call. [However, installation of lines can cost up to \$750, and there is a \$150 per month line charge.] It uses a pretty aggressive compression scheme. The frequency response is only up to 7.5 kHz

(satellite gives 15 kHz), but for voice that's all you really need. A lot of stations are using the Switched 56 for material from London or Tokyo. They are way ahead of us in this technology.

"The problem is that you can only use it if you are close to the central office of the phone company. That's about two miles right now, but they are extending that distance.

"Also, the telephone company is just beginning to offer ISDN (Integrated Services Digital Network). This costs more than Switched 56, but CODECs are now available that give you two 15kHz audio channels via one telephone company ISDN. It's a pay-for-it-only-as-you-use-it system, so it is much cheaper than the cost of satellite service." ■

Lighting the Way to New Dimensions in Remote/Location Audio Recording," by Bob Paulson, *Mix*, April 1991.]

Each interview is taped on Ampex 406 1/4-inch (at 7-1/2 ips) through an Amek Angela 28-channel console. Then Gross, the interview producer (either Amy Salit or Phyllis Myers) and senior producer Danny Miller discuss the log that's been transcribed as the interview was conducted.

"The primary consideration [when we're deciding what to keep]," says Miller, "is the content. What ideas do we want to get on the air?" For example, in a recent interview with travel writer Paul Theroux, they had to decide whether to focus on his new book about the Pacific Islands or on Theroux himself, as a writer having to cope with a recent separation and a cancer scare. "The second consideration is that it has to sound conversational, both technically and editorially," Miller continues. "The trickiest part is the editorial flow."

The 1/4-inch tape is then edited. Interviews generally last 30 to 40 minutes and are cut down to 15 or 21 minutes. The show is assembled with live intros at 4 p.m. Eastern time. The output of the console is converted to T1 protocol, which goes straight to Washington. From there it's sent out to stations nation-

wide using the fiber optic and satellite systems.

WHYY makes a DAT tape of the entire original show, using a Panasonic 3700, which they use for the "refeed" (the second broadcast) of the show at 7 p.m., assuming there were no problems with the original broadcast. They keep the DAT tape, in addition to the 1/4-inch, for archival purposes and for future dubs. "DAT is used because it is more accurate, time-wise," says Audrey Veblaitis, engineering technician at WHYY. "The tricky thing is that sometimes stations who carry us don't want to take the whole show. So they have to meet exact timeposts. They are connected to the master clock system in Washington."

The U.S. Naval Observatory is the standard for time, and NPR is connected to them through telephone lines. The pulse from the Naval Observatory drives the Leitch Clock at NPR, and that signal drives the rest of the satellite system. With this system, everyone is synchronized and knows precisely when the breaks will occur.

Receiving stations pick the program up from the NPR satellite channels, and 60% of the time the stations broadcast it live. For example, San Francisco local affiliate KQED broadcasts the program live and also rebroadcasts it later from its Studer A810

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recorders. According to KQED-FM engineering supervisor Fred Krock, the present satellite system will probably be upgraded in 1993 or '94 to a digital transmission system.

The two interview producers, Amy Salit and Phyllis Myers, are responsible for going through the 20 to 30 books, innumerable phone calls and stacks of letters that arrive each day. As Salit puts it, "We sift through the detritus of contemporary culture." They also read newspapers and magazines, choosing timely issues and the most interesting creative work. Gross makes the final cuts on whom she wants to interview. Salit and Myers assemble the research material with the help of a part-time research assistant, and Gross reads it and writes the questions. "I am always praised for doing so much research," says Gross, "but really, I'm working all the time. So the number of hours I can devote to each interview is really pitifully small. I do my best with the time that I have, but all I have is maybe three, four, five hours for an interview. I am doing two interviews a day so I never get ahead."

Despite the flexibility that their system allows them, there are still definite advantages to the plain old low-tech phone interview. For one thing, it can go where fiber optics and satellites can't. Gross comments, "We were so thrilled to have the extraordinary sound quality of fiber optics and satellite hook-up that we would never talk to anybody by phone. If it didn't have perfect fidelity, we didn't want it. But when the war in the Gulf started, suddenly our standards changed, and the most important thing was finding people who could interpret what was happening. There were certain kinds of stories where getting the material on the air in a timely fashion was more important. Phones can get you into places you can't physically go. During the war, when there was a curfew in the occupied territories, we were able to call up the Palestinians in Israel and find out what was happening there. And twice we have talked to Salman Rushdie while he was in hiding. It was really easy for him. We have him call us in the control room." ■

Georgia George is production director at Mix and an avid listener of "Fresh Air."



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World Real History

A USER'S **G**UIDE TO DIGITAL AUDIO INTERCONNECTS

PART ONE

ILLUSTRATION BY CHARLIE POWELL

This is the first installment of a two-part article that explains some digital audio basics and discusses how the various methods of interconnection can affect our happy lives. You've probably read—or at least started to

BY BRUCE JACKSON

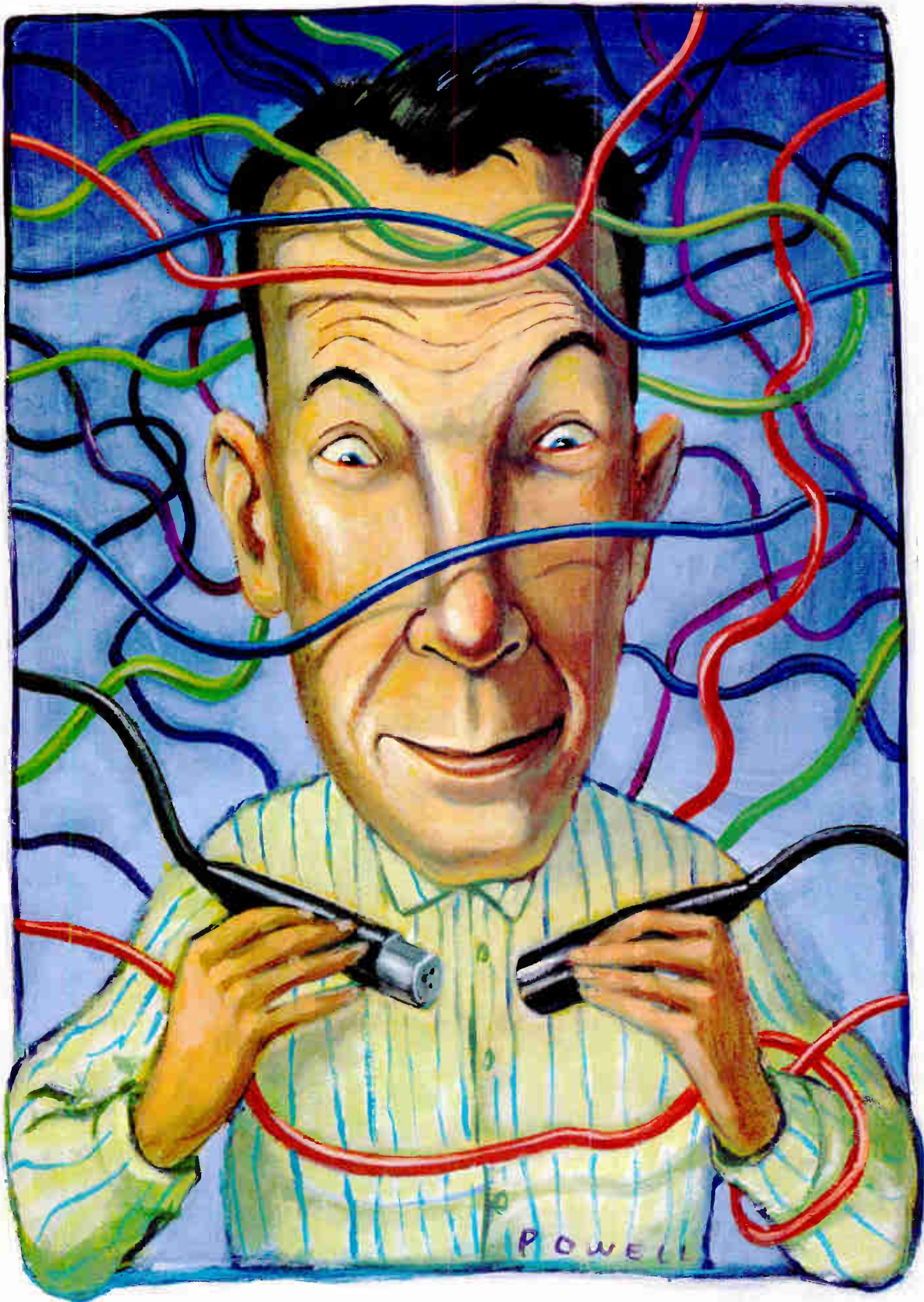
read—many articles on digital audio. Like me, you may be guilty of skipping the technical diagrams and jumping to the last page for the conclusions. Understanding how digital audio works is akin to getting into the details of how MIDI controls musical instruments: It's handy information but not necessary for making music. Most digital audio users' eyes glaze over when discussing the technical aspects of the subject. On the other hand, discussing why one digital audio box won't talk to another can make the same eyes bug out and turn faces red! Many of us have experienced the frustration of trying to make one piece of

digital audio gear connect to another. This article will give you insight into the peculiarities of digital interconnects without the usual technical smokescreen.

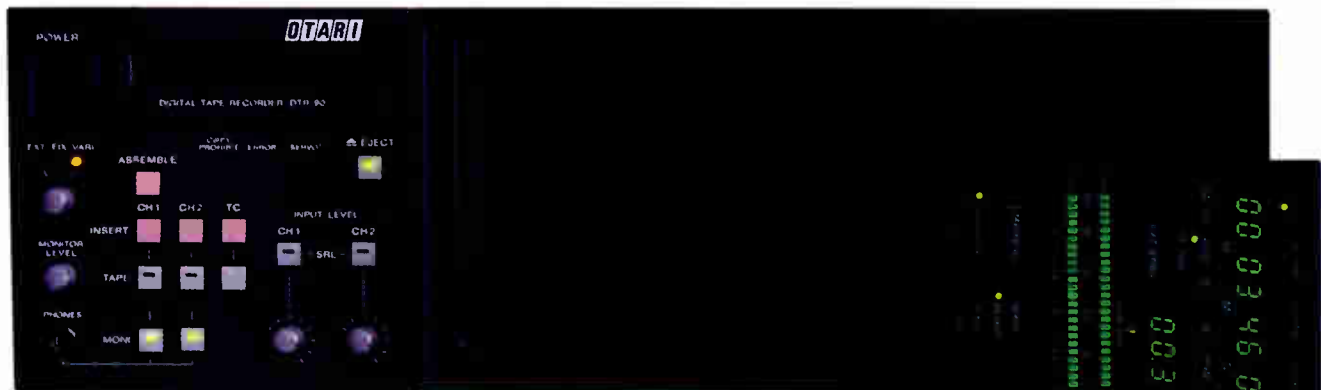
THE DIFFERENCE BETWEEN GOOD OLD ANALOG AND DIGITAL AUDIO

Sound is transmitted through air as the movement of individual air molecules. A microphone turns this movement of air into a changing voltage that represents the air movement. This changing voltage is called an analog of the air movement. Sound analogs can also be mechanical, such as a phonograph groove, electrical current, magnetic field, optical energy or any continuously varying representation.

Digital audio uses numbers to represent sound. These numbers have to be big enough to accurately capture the smallest and biggest details in sounds. The same numbers also need



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to be changed fast enough so that our ear is not aware of them stepping by. You are probably aware that cartoons consist of a sequence of individual drawings changing fast enough to give the illusion of motion. If we slow the sequence of drawings down, the image starts to flicker like the old movies and motion becomes jerky.

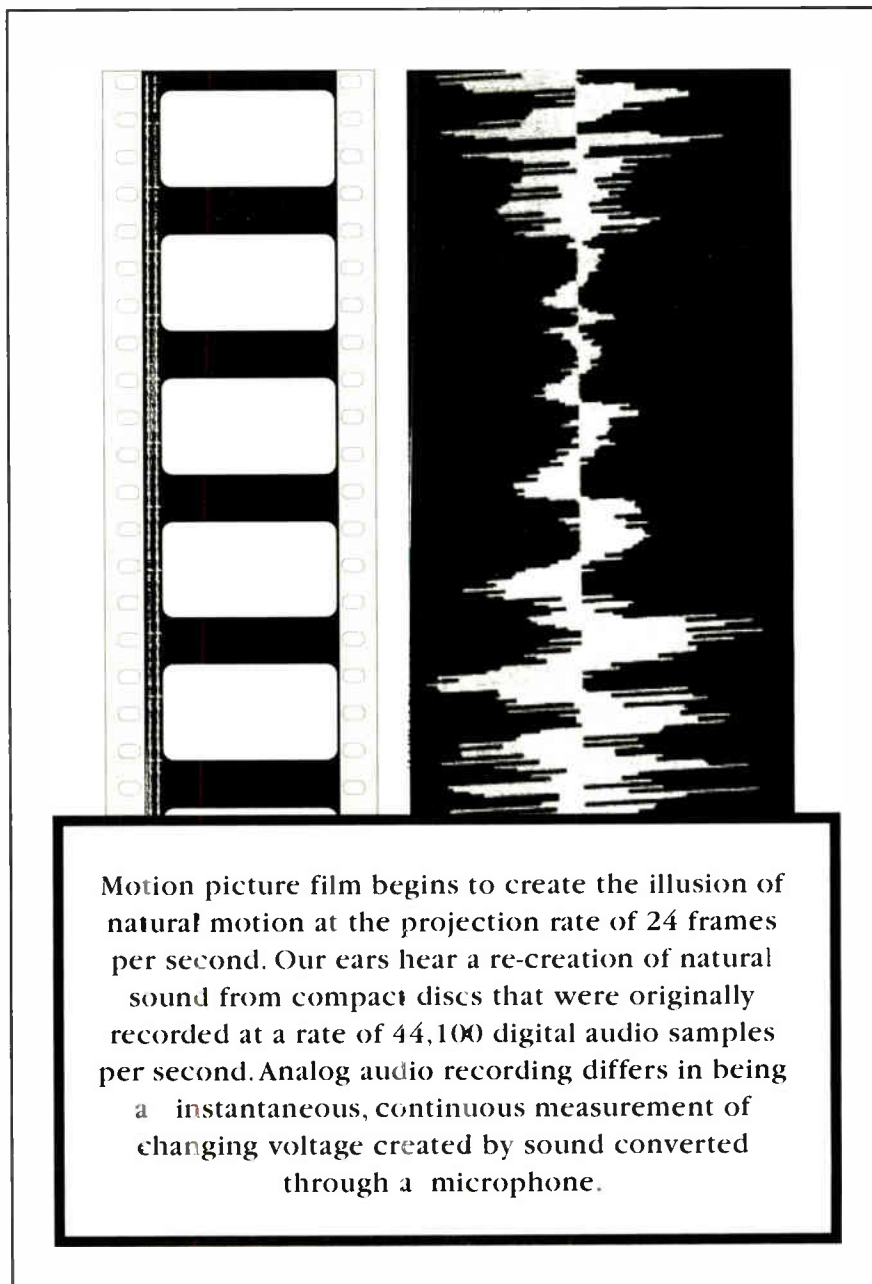
To fool our eyes into seeing fluid motion, the images need to change from one to the next at around 25 cels per second. The frozen visual images of individual movie frames are analogous to the individual numbers of digital audio. Our ears aren't fooled into thinking that these numbers sound real until they change at around 32,000 times per second. The individual numbers are called samples and represent audio in narrow slivers of time. The rate at which these frozen slices of audio change is called the sample rate.

Sample rates are normally represented as kilohertz or kHz (k means 1,000; Hz means cycles per second). A 44.1kHz sample rate (the sample rate used for CDs) is 44,100 samples per second. A sample rate of 32 kHz is used in digital broadcasting applications. These individual samples are different from the musical instrument or vocal samples used in assembling music tracks. The much larger sound samples are made up of strings of the individual samples, much like a video clip is a sequence of individual video frames.

It takes a lot of numbers in the digital world to represent an analog version of the same sound. An analog signal path may need a frequency response of 100 kHz to faithfully reproduce 20kHz audio. A digital signal path for the same 20kHz audio requires a frequency response of several million Hertz. Bandwidth is a measure of the lowest to the highest frequency a path can handle. The wide bandwidth required for digital audio is due to the way the individual numbers are transmitted across an interconnect. There are a number of different methods of making digital audio connections inside equipment and externally to other devices.

DIGITAL AUDIO INTERCONNECTS

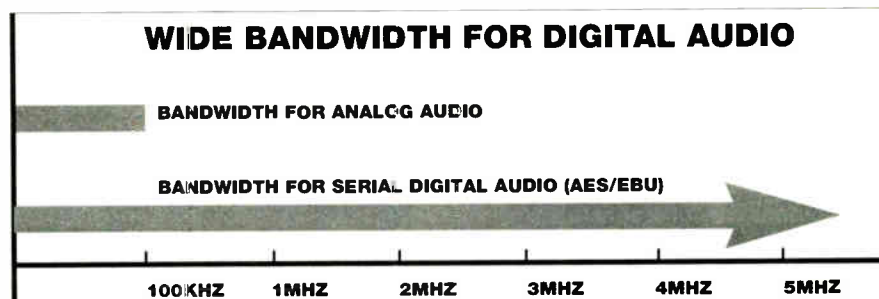
In the early days of digital audio there was no accepted standard for interconnecting different devices, so the manufacturers invented their



own schemes. An interconnect needs to pass the individual numbers of each sample along with timing information and any useful control information, such as if pre-emphasis was applied or not (see sidebar: "What is Emphasis?").

The numbers of digital audio are transmitted in binary form. Instead

of using our familiar ten-finger-oriented decimal numbers, we substitute one-finger binary numbers. Any decimal number can be represented as a binary number and vice versa. The big advantage of using binary coding to represent digital audio samples is that each individual digit of a complete binary number takes



20-Bit CD or DAT Interconnect?

When manufacturers promote their CD players and DAT recorders you may see claims about the use of 18- or 20-bit technology. CDs and DATs are 16-bit-only systems and any extra bits are purely "marketing bits," put there to make one product appear more attractive than another. If you were to use perfect 20-bit conversion to or from analog interconnected with a CD or DAT, the extra four bits would be unused. The extra bits you see in ads came about after the early prod-

ucts failed to live up to their claimed 16-bit-converter performance, delivering more like 13 or 14 bits. When the component manufacturers could make a real 16-bit converter (an impressive achievement), they had already cried wolf. They couldn't say "we now have true 16 bits," so they appealed to our consumer instincts and labeled them 18 bits.

These converters do take in or put out 18 bits or more, but performance-wise, the last couple of bits are usually meaningless and bounce around in the noise. It's best to choose products that make the best use of the 16 bits available for CD and DAT via superior engineering and optimization.

Counting the bits is not necessarily a good measure of how a converter will actually sound. As a rule, you can usually subtract two bits from a component manufacturer's claimed 18 or 20 bits to get a more honest measure of actual performance. When more recorders and workstations can do something with more bits, the main advantage of true 18- and 20-bit systems will be their ability to maintain a lower noise floor throughout the music production process and multichannel mixing applications. If you are mixing your valuable masters to DAT, you need the best possible 16-bit, optimized analog-to-digital conversion. ■

only one of two values rather than the ten with our decimal method. Binary digits are called bits, and—because they have only two values—they can be easily represented by electronic circuits as either on or off, high or low voltage, etc. The most common digital audio numbers in use today are 16 bits long, with only a very small percentage of recorders and workstations capable of handling or storing more (see sidebar: "20-Bit CD or DAT Interconnect?").

ALL AT ONCE OR A BIT AT A TIME

When manufacturers had to come up with schemes to interconnect their products, before they could agree on a standard (pre-AES/EBU), the main requirement was to minimize the number of interconnections. When making interconnections within a digital device, it is usually best to move the numbers around as complete chunks of the individual bits. Sixteen-bit systems can use 16 separate lines to transfer

entire samples in single steps. This is known as parallel operation. A parallel interconnect between different audio devices is cumbersome, requiring more than 32 connections for a stereo 16-bit system plus additional lines for grounds, timing and control information. A more efficient method is to send the 16-bit numbers across one wire, one bit at a time. This is called a serial interconnect and can be compared to sending individual pieces of information

What Is Emphasis?

An audio interconnect needs to inform a receiving device whether pre-emphasis was applied during conversion from analog so that de-emphasis can be applied on conversion back to analog. This preserves the correct frequency response. Recording an audio signal digitally with pre-emphasis passes the analog signal through a special filter, which boosts the high-frequency sounds while not touching the sounds below 1,000 Hz (around one octave above A440). On conversion back to analog, the filter shape is reversed with a high-frequency rolloff filter. The net result is an improved noise floor with certain types of music. Emphasis is often treated as a

holdover from the early days of digital audio with debatable benefits now that converters have improved.

Emphasis can boost the higher frequencies without requiring a decrease in the recording level because sounds generally tend to decay in level at higher frequencies. This natural rolloff with each increasing octave is especially true of classical music. Rock 'n' roll is an exception because it contains a lot of high frequencies by way of direct inputs, hi-hats, cymbals, etc., so emphasis can work against you by eating up headroom with boosted high frequencies on top of already hot highs.

The consumer-oriented F1 (EIAJ) format made emphasis popular. The F1 family of processors took in analog audio and

outputted digital audio as a video signal. This video signal was then recorded on inexpensive consumer VHS and Beta recorders to satisfy the wide-bandwidth requirements of digital audio. On playback, the video containing the digital audio was converted back to analog. The F1 applied emphasis all the time. Although the Sony F1 and its relatives (Sony 501, 601, 701, etc.) were designed as consumer equipment and are long out of production, they were used extensively by professionals, resulting in a lot of CDs with emphasis. Many of today's CD masters are recorded on consumer-oriented DAT recorders. DAT recorders mostly have emphasis only on playback, so you won't see the emphasis indicator very often when playing more recent CDs. ■

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World Radio History

(bits) down a hose and reassembling them into complete numbers at the other end.

It's important to know when the 16-bit numbers start and finish in order to unravel them correctly at the other end, so timing information is also included as either a separate

connection or with the 16-bit audio and identified with an additional unique pattern of bits. You can think of the timing as the pulse of a digital audio system: Every time it beats, a sequence of events is initiated, such as the beginning of a transfer of a sample, one bit at a time. The main

pulse is at the sample rate, beating at 44,100 times a second for a CD player. In addition to the sample rate beat, there are additional higher-frequency pulses used to coordinate all the activity going on between the slower sample rate timing. You could visualize this relationship in

These Interconnects Sound Different!

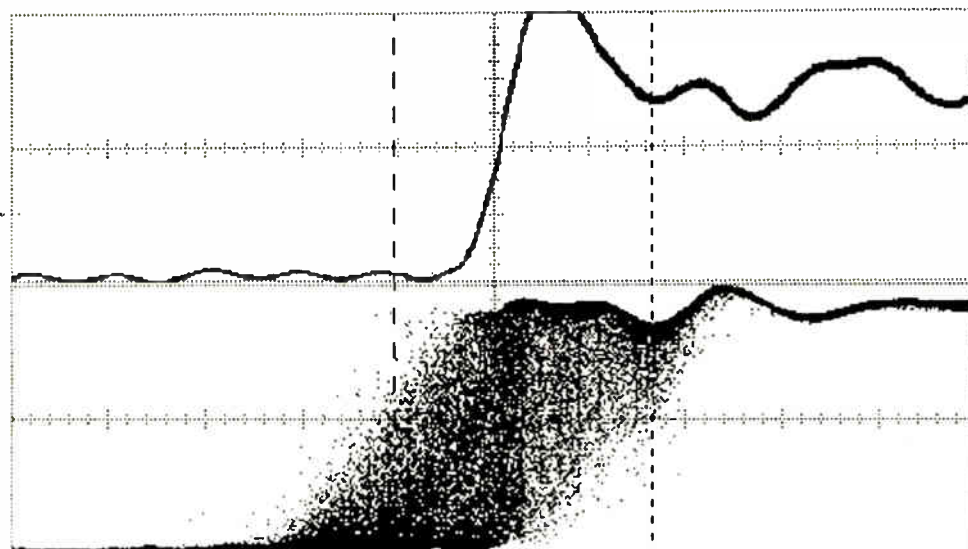
You may have heard critical digital audio listeners complain, "If digital audio is so perfect then how come it sounds different when I use different interconnects?" Some experts will tell them it must be their imagination because if the numbers are sent correctly on each interconnect they both must sound the same. That makes sense, but it's only part of the story.

When a D/A converter receives the samples from an interconnect, it must also extract the timing information and regenerate its own timing "clock." A good analogy is a drummer playing to a click track. If the drummer is good, he can nail the basic tempo of the click and add in faster patterns of his own, such as a 16th-note hi-hat. When digital devices receive the clock from an interconnect, they lock up to the sample rate tempo and add faster multiples many times higher than the drummer's 16th-note example.

Now imagine what would happen to the drummer's playing if we put slight, random variations in his click track reference. The drummer would try to follow the changing tempo but because the changes were unpredictable, he would overshoot the click tempo as it moves up and down. The occurrence of random click track variations around a perfectly steady tempo is called tempo jitter. The drummer ends up with worse jitter in his timing unless he can ignore the small changes and play to the average.

The problem of interconnects affecting the sound can be traced to jitter in the timing of the digital-to-analog playback. Each time digital audio timing is passed through additional circuits, it picks up slight variations around the original perfect timing. The amount of timing jitter added through successive stages depends on the type of circuits. Different computer-logic families, used for digital calculations, add varying amounts of jitter. —CONTINUED ON PAGE 123

hp running



TIMEBASE

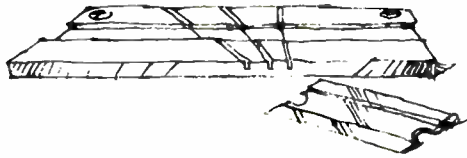
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20.8070 us 20.8320 us 20.8570 us
 5.00 ns/div repetitive

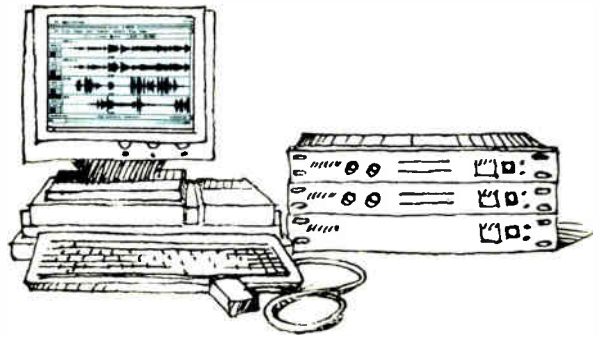
A good example of recovering a clean clock from a jittery input. Note the center marked area showing 13 nanoseconds peak to peak input jitter and the top output showing less than 100 picoseconds of jitter.

stop marker: 20.8403us
 start marker: 20.8268us
 delta t: 13.499 ns
 1/delta t: 74.0811MHz

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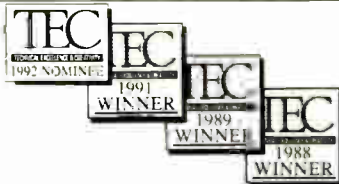
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musical terms as a one-bar loop with the main pulse on beat one and the other pulses as 32nd notes. The high-frequency pulses are often called the bit clock, which is passed across interconnects in one form or another.

IT'S ALL IN THE TIMING

A drummer's timing can make the difference between good music and a memorable hit. Digital audio needs good timing to make it from one place to another with uncompromised sound quality. The timing in interconnect is used to unscramble all the bits for accurate recovery of the exact samples transmitted. The timing also needs to be very regular. Timing jitter is any irregularity in the timing passed across an interconnect (see sidebar: "These Interconnects Sound Different!"). If the samples become messed up in the interconnect, the effects are usually very audible, varying from occasional clicks to a loud, harsh fuzz. Timing jitter can cause more subtle effects. In D/A converters, for example, the location of instruments across the audio sound stage can become less focused. (Note: A "sound stage" is the mental picture you form when you listen to a piece of music and visualize the various instruments and vocals as if they were on stage in front of you. Closing your eyes can help form the image.) A well-defined sound stage has width, depth and focused locations all defined by subtle reflections, reverb tails and tonal quality in a stereo mix.

SONY SDIF INTERFACE

The Sony SDIF interconnect is a good example of a basic digital connection between two digital audio boxes. SDIF format interconnects are found on the Sony 1610 and 1630 processors (used to generate CD masters on U-Matic videocassettes) as well as most Sony professional digital audio products. The original SDIF and newer SDIF II both use two connections for mono transmission and three for stereo. Each channel is transmitted on its own separate connection along with one word-sync connection for any number of audio channels.

The main difference between SDIF and SDIF II is unbalanced versus balanced operation. The 3324 and 3348 digital multitrack recorders have balanced connections, which

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require electronic translation to unbalanced for connection with the SDIF Input/Output on 1610 and 1630 processors. Although the word sync transmits electrical pulses at the sample rate for synchronizing the sample transfers, the same information is also contained within each audio channel so any timing delays between the word sync and channels (due to different wiring lengths) will not corrupt the audio. The SDIF format can handle up to 20-bit samples and includes emphasis identification. The Sony word sync is a symmetrical square wave. The audio samples are transmitted with the most significant bit (MSB) first, the same sequence we read out our familiar decimal numbers.

MITSUBISHI (MELCO) PD INTERFACE

The Mitsubishi 2-track and multi-track interconnect formats are similar to the Sony SDIF format but not enough for direct connectability. Like the Sony format, the Mitsubishi 2-track "DUB" connections are unbalanced, although they're different in their ability to directly drive high-speed optical isolators on the receiving end (for improved ground isolation). The digital audio travels on separate lines along with a word clock line (at the sample rate) and a bit clock line running at a 48-times multiple of the sample rate. The bit clock runs in bursts, with silence in between, resulting in the 32-bit time slots of a sample being compressed into a shorter duration than the full word clock cycle. The Mitsubishi interconnect uses four lines for a stereo signal instead of Sony's three. It's important that all four run together, as any timing skew with the bit clock caused by runs of different lengths can cause errors in the audio when it is decoded.

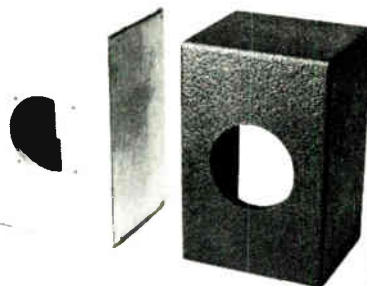
The multitrack version of the Mitsubishi interconnect is a little different. There are still four lines for a stereo connection, except the lines are balanced and the bit clock operates continuously at a 32-times multiple of the word clock. One full cycle of a sample transfer occupies 32 time slots spread evenly over one word clock cycle. No emphasis identification is transmitted in the Mitsubishi Interface standard, although Otari has made modifications to handle emphasis in some of its PD format multitrack recorders. The interconnect can handle up to 20-bit

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samples, transmitted MSB first. The word clock is a short pulse instead of the evenly spaced rise and fall of the Sony clock.

YAMAHA INTERCONNECT

The Yamaha 2-track interconnect and its variations are like the missing link between the above formats and the AES/EBU format. The Yamaha format uses balanced connections and two lines to transmit stereo audio. One line carries the left and right samples transmitted with the least significant bit (LSB) first. The other line carries a symmetrical word clock whose transitions coincide with the LSBs of the left and right samples. The stereo data is transmitted on only one line by taking the first half of the word clock cycle to send up to 24 bits of a left sample, sitting in 32 time slots, followed by the companion right sample over the next 32 time slots. A total of 64 time slots are transmitted for every word clock cycle. This two-line interconnect is also used to combine a number of digital audio products together by cascading from one device to the next in an input-to-output sequence. Each subsequent device then adds its output to the previous device's output.

JVC, NED, PCM-F1, DIGIDESIGN AND OTHER INTERCONNECTS

These are some of the more obscure interconnects using multiline interfaces. Some are proprietary, used to connect products from the same manufacturer, and others are internal interconnects, sometimes adapted for connection to the outside world by another specialty manufacturer. You will probably never have to make a connection to another box with any of them, so just be fulfilled in the knowledge they exist to complicate our lives.

In the final part of this article we'll discuss the use of the AES/EBU format in the typical studio environment, including compatibility with consumer formats, electrical aspects of AES, using it as a sync source for workstations, grounding and digital ground loops, and EAS optical connections. Stay tuned. ■

Bruce Jackson is vice president of engineering with Apogee Electronics, a company dedicated to getting the best out of digital audio.

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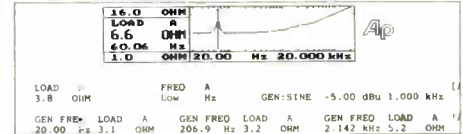
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— FROM PAGE 114, INTERCONNECTS

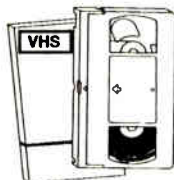
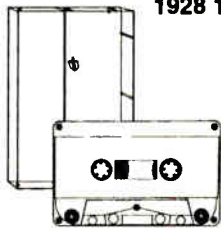
Noise on power supplies and grounds, nearby clocks with similar harmonics, and AC mains and external interference can all add dreaded jitter to perfect timing. Some of it is random and some has specific frequency content. When the internal timing is passed to another device over an interconnect, different types of connections add more or less jitter. A short AES/EBU connection over high-quality data cable will pick up less jitter than the same signal run through a bunch of microphone cables, XLR connectors and patch bays. A consumer coaxial-wire connection is usually cleaner than the consumer "Toslink" optical version, mainly due to the slower response time of the optical transmitter and receiver.

When the circuits in D/A converters recover the timing, they are often negatively influenced by the jitter picked up along the way, much like our poor drummer trying to follow the varying click track. When the recovered timing starts to wobble around as it tries to track the jittery input, it modulates the analog sound coming out of D/A, causing all sorts of subtle negative effects such as changes in the stereo image and tonal quality. An interesting source of jitter in AES/EBU digital interconnects is due to the changing samples and sub-code information. A 1kHz digital audio tone causes 1kHz jitter.

Different interconnects do not sound different if the timing circuits of the reference D/A are designed to ignore any jitter and the samples are correctly transmitted. Manufacturers can claim low-jitter circuitry, although it's only a relative claim as there are no accepted standards for jitter measurement for digital audio at the moment. Jitter also has a big influence on the quality of A/D converters with very similar side effects, which unfortunately are there forever after. ■

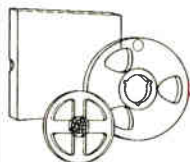
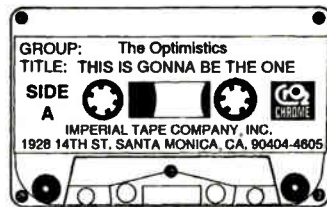
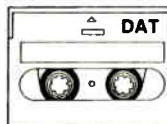
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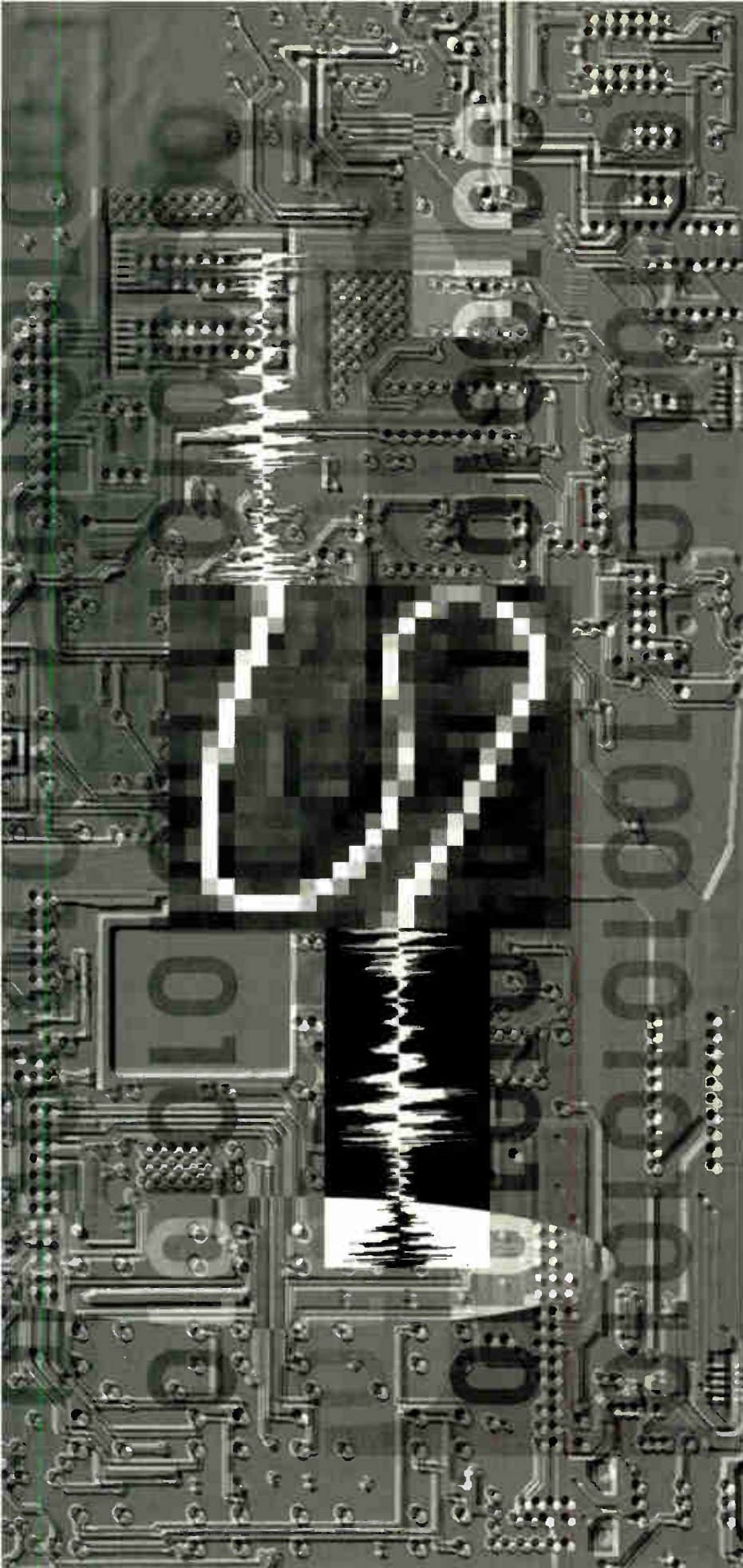
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BY MEL LAMBERT

ILLUSTRATION BY TIM GLEASON



Just around the technology corner, there are advances in consumer release formats that will offer performance beyond 16 bits.

recording and production.

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In many respects, today's 16-bit A-to-D converters outperform those of just a couple of years ago. The trend

Shown below is a comprehensive chart of current 16-bit-plus analog to digital converters, listing their numerous design features and technical parameters.

from multibit/parallel topologies toward low-bit/serial techniques, plus oversampling, digital filtering and decimation, has meant that we can expect 90+dB SNR performance from off-the-shelf products. Increasingly, however, we need to move

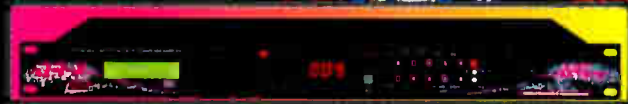
Product Name	Apogee AD-500	BTS BAC-3000	Drake PD 9375A	Lexicon AD 20/20	Siemens HRC-1	NVision NV1000	NVision NV2000	Pro-bel 5120/5121	Sony DABK-2003	VTL Manley Reference	Wadia WA 4000	Yamaha AD2X/8X
Quantization Resolution	18-bit	20-bit	20-bit	20-bit (2-ch) 18-bit (4-ch)	20-bit	20-bit	20-bit	20-bit	20-bit	20-bit	20-bit	19-bit
Sampling Frequencies	32, 44.056, 44.1 & 48 kHz (32-54 kHz via ext. sync)	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz	48 kHz	44.1 kHz and 48 kHz	44.056, 44.1 and 48 kHz (40-54 kHz via ext. sync)	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz	44.1 kHz and 48 kHz
Monotonic Dynamic Range.	95.5 dB (max input to noise floor)	108 dB	108 dB	112 dB (2-ch) 100 dB (4-ch)	106 dB	100 dB	107 dB	105 dB	>102 dB	110 dB	120 dB	>110 dB
Oversampling Rate	64-times	128-times	128-times	64-times	One-time	128-times	128-times	128-times	128-times	128-times	128-times	64-times
Digital Output Formats.	AES/EBU, S/P DIF, Optical	AES/EBU	AES/EBU and SDIF-2	AES/EBU, S/P DIF, Optical	AES/EBU	AES/EBU	AES/EBU	AES/EBU	AES/EBU	AES/EBU and S/PDIF	AES/EBU, SDIF-2, S/P DIF, Optical	Yamaha Cascade, AES/EBU and S/P DIF
Internal Clock Accuracy.	±0 ppm	±0 ppm	±0 ppm	±0 ppm	10 ppm	±1 ppm	±1 ppm	10 ppm	N/A	N/A	10 ppm (worse case)	N/A
External Digital Synchronization Sources.	AES/EBU, S/P DIF, Optical, and Word Clock	AES/EBU	AES/EBU	AES/EBU and Word Clock	AES11-1991 DARS and Word Clock	AES/EBU	Word Clock	AES11-1991 DARS	AES/EBU and Word Clock	N/A	AES/EBU and SDIF-2	AES/EBU, S/P DIF and Word Clock
Other External Sync Sources.	NTSC/PAL Composite Video and Video Sync	N/A	N/A	Optional Video Sync	N/A	N/A	Color Black	Video Sync	Video Sync	N/A	N/A	N/A
Internal A-to-D chip.	Crystal	Ultra Analog	Ultra Analog	Analog Devices AD1879	Proprietary	Analog Devices AD1879	Ultra Analog	Ultra Analog	Ultra Analog	Ultra Analog (custom built)	Ultra Analog	Crystal/Asahi
Additional DSP functions.	N/A	Selectable output	On-board dither	Compressor-limiter, dither, offset removal & meter ballistics	Truncation and Re-dithering for 16-bit O/P	N/A	N/A	Channel Status Enhanced Modes	Pre-Emphasis	PPM Metering; level controls	Output phase; 16-bit mode with dither	Optional Emphasis

SOUND ARCHITECTURE FROM THE HEAVENS!



MULTIVERB ALPHA 2.0 On rare occasions, human engineering can approach the purity of sound available in nature. The new 24 bit processing system in the ALPHA 2.0 is a digital engine capable of producing reverbs and effects with a stunning degree of accuracy and precision. The result is a quality of sound that used to cost thousands of dollars-which is why hundreds of professional recording studios around the world use A.R.T. digital processing. But divine audio fidelity is only a fraction of the innovation engineered into the ALPHA 2.0

- 7 Simultaneous full bandwidth effects at once in stereo!
- New chorus, flange and reverbs through a 24 bit VLSI processing system.
- 7 Band programmable equalizer that can be used with all effects.
- Acoustic Environment Simulator actually recreates the ambient listening area.
- A new multi-interval pitch shifter-over 2 and 1/2 octaves!
- A remote-triggerable sampler.
- A digital instrument tuner and tone/pitch generator. Tune guitar, 4/5/6 string bass and use perfect frequency tones to test P.A. system set-up.
- A new killer space phaser.
- A programmable bypass level.
- An independent programmable mixing system that lets you vary the Dry level, the EQ'd level and the Wet level.
- The most comprehensive Performance MIDI in the business is also the easiest to use.
- X-15 footpedal allows you to turn effects on and off individually and control up to eight parameters in realtime.
- A MIDI DATA MONITOR-monitors any midi data that goes thru the system.
- With over 50 effects to select from, you have an amazing range of sound combinations.



DRX 2100 Offering all the effects and the same 24 bit V.L.S.I. engine of the ALPHA 2.0, the all new DRX-2100 includes a full function dynamics processor. It features a Compressor, Limiter, Exciter, Expander, Noise Gate, Digital frequency routing and will perform 12 simultaneous audio functions with perfect fidelity at 20 KHZ bandwidth.



MULTIVERB LTX If you love the rich, lush sounds of the ALPHA and DRX, but don't have the same love for programming, the LTX is all you'll ever need. It offers over 250 of the best studio designed multiple effects combinations ever created, and is MIDI switchable. If you'd rather perform than program, but still need the purest sound in effects, the LTX offers perfection at a price you'll love.



THE SOUND OF PERFECTION



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1. Should you ask a lot of demanding questions before buying a 16-bit sampler?

- Does it have 20-bit D/A conversion to insure 16-bit fidelity?
- Does it have multi-mode filters with resonance?
- Are there multiple Performance locations with “snapshots” of parameters?
- Is there Truncate Fade-in and Fade-out for “clickless” start and end points?
- Does it have positional (horizontal) crossfading between Patches?
- Does it have Time Stretching, and if so, can you see the pitch alteration?
- Does it have realtime audio digital stereo output versus standard digital I/O only for backup?
- Does it have Note Number Exclusives for cutting off one sample with another?
- Does it have an RGB or composite monitor output?
- Can you combine the velocity-switching, mixing and crossfading of up to four samples on one key?
- Can you expand the memory with standard Macintosh SIMMs?
- Does it have an “Undo” or “Recover” function?
- Is there a mouse port for fast and easy programming and editing?
- Does it have realtime “Scrubbing” for locating edit points easily?
- Does it have four-stage rate and level envelopes?
- Does it have Templates for setting up TVA and TVF envelopes quickly?
- Is there a comprehensive, world-class sample library available from the manufacturer?
- Does it have Normalizing?
- Does it have a Digital Filter with +/- emphasis for permanently “EQing” samples?
- Is there Auto-looping?
- Is there realtime aural feedback when looping, and is it easy to do?
- Are there multiple LFO parameters and waveforms?
- Is there an Alternating Loop mode?
- Can you load or save Performances (multi-timbral setups)?
- Is there matrix modulation in the Patch Control page for flexible control routing?
- Does it have Analog Feel to make certain Patches sound less “sterile”?
- Does it have accurate Phase Lock or will it lose stereo imaging when active?
- Does it have digital Compression and Expansion?
- Does it have Wave Draw allowing you to actually redraw the waveform?
- Does it have an Insert function for splicing data into the middle of other data?
- Does it have an Area Erase function for erasing data but leaving the space (time)?
- Does it have a sample Mix function with a delay parameter?
- Does it receive Polyphonic aftertouch?
- Are there different Velocity Curves available?
- Is there an Index and Jump function for accessing any page in the sampler easily?
- Are there “Select” windows for finding and assigning samples, patches, etc. quickly?
- Is there a Volume ID with view field or similar cataloging system?
- Does it have a 48kHz sampling rate through the digital and analog ins?
- Is there an “Auto-patch” feature which automatically makes full-blown patches from your samples in a matter of seconds?
- Does it have resampling, including the ability to resample an entire Performance?
- Does it have a pre-trigger parameter so as not to lose the attack of your samples?



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World Radio History

beyond 16-bit performance into the headier realm of 100+dB dynamic ranges.

After all, the consumer can extract full 16-bit performance from CD, Mini Disc, laserdisc and the other commercial release media. If our productions are being critically judged by their performance to the 16th bit, it could be argued that the information should be quantified to a higher level of precision.

And consider the ability of workstations to add signals together and increase/reduce their relative levels. If we now expect to deliver at least 16-bit CD performance from noise floor to clipping—especially on classical music releases—then we really need to record the basic tracks to 18- or even 20-bit precision. Currently, a variety of proprietary techniques can convert an 18- or 20-bit signal into a properly truncated and noise-shaped, 16-bit signal to a far higher degree of precision than if the signal had been passed through even the most accurate 16-bit system.

Think about it. If we plan to offer resolution that is viable and exact down to the 16th LSB, then it would

seem sensible to at least have some knowledge of what is happening to a precision of at least 17 bits, even more if we can stretch the resolution. In this way, we can predict what the signal is doing in those lowest bits and develop a non-correlated, noise-floor profile providing an excellent match to the actual information being digitized.

Existing recorders, editors and workstations can benefit from external converters. Many systems of just a couple of years ago might have compromised in their A-to-D sections (and maybe D-to-A output, for that matter). But if the 16-, 20- or even 24-bit data storage functions are fast enough to satisfy our requirements, extended life can be had from such units by bolting on an external converter. Both AES/EBU and IEC 958 Type II— a.k.a. "S/PDIF" and its variants—are capable of carrying 20- or 24-bit signals in addition to 16-bit words. SDIF-2 and Mitsubishi Pro-Dub connections can also handle 20-bit transmissions.

A growing number of second-generation workstations are capable

of storing 20- and even 24-bit signals to hard disk and can perform complex processing (compression, limiting, level adjustment, mixing, equalization, etc.) within the digital domain. Obviously, it's important that we input signals to such systems with as wide a dynamic range as possible, so that subsequent 20-/24-bit processing will not compromise the signal-to-noise ratio, nor limit the headroom performance of the original audio.

Finally, just around the technology corner, there are advances in consumer release formats that will offer performance beyond 16 bits. Rumor has it that a new "super CD" format is being finalized that will provide 20-bit performance from the current basic specification, albeit with a reduced replay time. (It remains to be seen how soon dual-format CD players will arrive in the stores. The extended format does hold enormous promise, however, in enhancing the consumer's view that, in the light of the new recordable Mini Disc format, the older, more familiar CD still represents a viable, ultra-high-quality medium.)

Your assistant is here.



Meeet your new gain control assistant—the 421 AGC-Leveler. Patch the 421 anywhere in your console path, set the target output level, and rest easy. Signals below target are automatically boosted while signals above are smoothly held back. The 421 brings other skills to the studio: brick wall limiting and downward expansion with AutoThreshold for noise elimination, Speech Curve EQ, and a unique parallel input/output metering system for precision monitoring at a glance.

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Symetrix

Obviously, a 20-bit release format is going to require a mastering resolution higher than those we currently accept.

These and other factors are fueling the development of enhanced-resolution ADCs offering performance that's valid beyond 16 data bits.

18-/20-BIT DESIGN CRITERIA

Table 1 lists the primary specifications for 12 high-quality, stand-alone A-to-D converters. Some of these devices have been reviewed in *Mix* by Bob Hodas and Paul Stubblebine (May 1991 and March 1992 issues; other systems will be evaluated in an upcoming issue). The majority of A-to-Ds fall into one of two categories:

1. Multibit converters, utilizing an analog-input filter (to remove all frequencies in excess of the Nyquist, $F_s/2$ limit), a sample-and-hold, a highly accurate reference voltage, a comparator, a PCM generator and a parallel-to-serial output.

2. Low-bit converters, using a flash converter or sigma-delta converter running at high multiples of the sampling rate, a decimating filter, noise shapers, resampler and a serial interface.

While a complete discussion of the pros and cons of both types of design would require more space than is available here, most current designs tend toward low-bit (typically 1-1/2-/4-bit) topologies running at as high as 128 times the sampling rate. At the heart of all A-to-D designs is the problem of reducing quantization error: the differences between the original analog waveform and its discretely sampled, 16-/18-/20-bit digital value. Oversampling, low-bit converters extend the available resolution—and at the same time dramatically reduce distortion, even at small-signal values. They do this not so much by decreasing the error between analog input and digital output, but by making the error occur more often. In other words, the error component spectrum moves outside the audio passband and becomes virtually unimportant.

Design of a true 18-/20-bit A-to-D converter is not for the faint-hearted, however. The analog front end, for example, must be of sufficient resolution to relay a full dynamic range to the input of the internal A-to-D conversion stage. And within the

oversampled, low-bit converter, the designer needs to ensure that the ICs run fast enough to minimize processing delay times. (Typically, these would be of the order of a few milliseconds, meaning that multichannel sources passing through different styles of A-to-D converters might need to be re-phase-aligned within the digital domain.)

SORTING OUT THE SPECS: WHEN IS 20-BIT REALLY 18.3 BITS?

While we're on the subject, let's define a couple of important terms. Inside each of these commercially

available units lurks one (or maybe two) important chips per channel: the actual A-to-D converter ICs. Bearing the familiar names Burr-Brown, Analog Devices, Ultra Analog or Crystal Semiconductors (and others), these pieces of silicon actually coordinate the analog-to-digital translation. On paper, most of these ICs could output a bitstream containing useful information down to the 20th LSB. In the real world, however, a variety of factors limit their measured performance. (Keep in mind that few strictly 16-bit systems offer performance greater than 14

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If you thought that "specmanship" was rife within the analog community, coming to terms with the performance of digital system components can be even more baffling. There currently exists a variety of parameters that are used to describe the performance of analog-to-digital converters, including the following:

- Decibel Full Scale (dBFS) is a unit that describes the amplitude of a digital audio signal. The "0 dB" reference is a 997Hz sine wave whose positive peak value reaches the positive digital full scale, leaving the negative maximum code unused.

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same converter measured, for example, with a 30kHz filter.

- Dynamic Range definitions vary widely. One IC manufacturer defines DR as the ratio of a full-scale signal to the broad band noise (0 to 20 kHz), measured with a -60dB signal. (In other words, we are defining $S/(N+D)$ measured with a minus 60dBFS input signal, and a 20kHz lowpass filter.) Others within the audio community prefer to define DR as the ratio between maximum signal and the noise in the absence of an input signal. Yet another popular definition of DR is quoted in the main article as $DR=(6.02 \cdot n)+1.76$. AES17-1991 does not quote dynamic range. Instead, the Recommended Practice describes the -60dBFS techniques outlined above as the signal-to-noise ratio or noise in the presence of signal and specifies a CCIR weighting filter.

Until converter manufacturers standardize their measurement techniques, it will be difficult for users to make reasonable comparisons from published specs. Meanwhile, our best advice is that manufacturers supply details of their individual test procedures.

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1. "AES17-1991: Standard Method for Digital Audio Engineering—Measurement of Digital Audio Equipment." Audio Engineering Society, New York City (1991).

STUDIO VIEW

by Dan Daley

PERFECTLY GOOD TRANSPORTATION

“P

erfectly good transportation.” That’s a phrase that’s been avoided by American marketing for years. Only in the downsized 1990s would a Madison Avenue type even remotely consider using such a concept to sell a car. No, until now it’s been “bigger is better,” and “newer is even mo’ better.”

But this is the downsized '90s, and less is more. There are a num-

ber of studios that have taken certain lower technological roads—not out of financial desperation but by choice. They have eschewed digital in all but the most basic and ubiqui-

tous applications, like DAT and signal processing. They have decided to stay with analog tape and non-automated consoles and instead concentrate on acoustics, microphones and other decidedly non-glamorous but way-useful stuff.

They’re neither dinosaurs nor paupers; they’re facility owners who’ve drawn a conscious line in the technological sand and said this is as far as they’ll go—for now. They all have client bases that apparently agree with them. And it’s worth noting that the rate differential between these rooms and automated digital ones is, on average, not tremendous.

The advantages are clear. You get out of the equipment rat race. The overhead is lower. There is the opportunity to consolidate capital purchases under single leases or loans. There are fewer formats to try to conform to. The technology has proven itself. Maintenance is not a black art.

Disadvantages? Sure, some. Despite new tape formulations, analog will never be as noiseless as digital. Don’t even think about hiking rates without marquee-value tech upgrades. Kiss off a certain

segment of clients for whom digital is *de rigueur*. It’s not for everyone, but it is the way a number have chosen to go. They have their reasons and motives.

**“I think a lot of kids who
who are growing up
on automation are
missing the best
part of recording—
the touch that
goes with
riding the
faders.”**

—Steven Durr

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bits.)

In addition to the analog interface and front-end circuitry, other factors—such as clock stability, power supply regulation, analog/digital decoupling and even compromises in the physical layout—limit the amount of valid bits that this technically "20-bit" part can generate. We can measure the system's overall monotonic signal-to-noise ratio and then calculate how many bits of digital data that SNR corresponds to.

There is a basic formula that relates signal-to-noise ratio to bit resolution:

$$\text{SNR} = (6.02 * n) + 1.76.$$

For a 16-bit system the maximum theoretical SNR would be $[(6.02 * 16) + 1.76] = 98.08$ dB; for an 18-bit system the SNR would be 110.12 dB; and for a 20-bit device, 122.16 dB.

A well-designed "20-bit" ADC probably offers a value between 100+ and (maybe) 110 dB. Using the above formula for an SNR of 110 dB, this system has an equivalent 18.3-bit resolution. To check that our system is delivering optimized performance we can use a refined formula for a low-bit, second-order sigma-delta converter with oversampling: $\text{SNR} = 6.02 * (x + 2.5y) - 11.14$, where x is the bit resolution of the basic IC, and y the number of octaves of oversampling. For example, a "typical," contemporary sigma-delta system with 256-times oversampling should yield a theoretical SNR of around 115.3 dB; the 5dB difference can be attributed to less-than-optimal noise shaping and other parameters.

With a couple of notable exceptions, conventional multibit ICs run out of steam and performance above 16-bit, leaving the designer with a couple of basic choices. The first would be to use a single 18- or 20-bit, low-bit converter and attempt to extract the theoretical SNR performance. Problems with high clock speeds, system complexity and myriad other reasons make this a route for the noble and brave.

Alternatively, designers have opted to use dual converters that gain range, depending on which section of the signal is being quantized. Some designs, for example, use one 20-bit converter for the upper 18 bits of the desired output and a second 20-bit converter for the lower 18 bits. At some predefined input level, the output flips from converter #1 to converter #2, and the

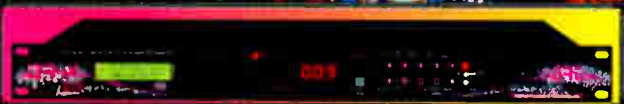
level is automatically adjusted. (Why not just use a single ADC chip, you might ask, and boost/cut the output to handle the appropriate range, automatically adjusting level as we switch? In low-bit systems using FIR decimation filters—like most contemporary designs—the inherent 64-sample delay of around 1.3 ms at 48 kHz, for example, means that we would miss a short sliver of the input each time we toggled ranges and started a new conversion cycle. It's a neat concept, though, despite its impractical nature.)

Using some elegant DSP, a dual-IC ADC can handle level detection and automatic output switching, including automatic and user-defined calibrations. (Temperature- and time-dependent changes in input gain and other parameters can lead to dramatically unpredictable results.) As an added bonus, the signal processing that monitors the input signal and handles the IC flips can

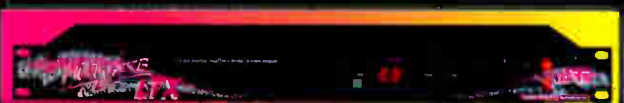
We need to ensure our ability to convert signals from continuously variable analog waveforms into a faithful digital equivalent.

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SOUND ARCHITECTURE FROM THE HEAVENS!



DRX 2100 Offering all the effects and the same 24 bit V.L.S.I. engine of the ALPHA 2.0, the all new DRX-2100 includes a full function dynamics processor. It features a Compressor, Limiter, Exciter, Expander, Noise Gate, Digital frequency routing and will perform 12 simultaneous audio functions with perfect fidelity at 20 KHZ bandwidth.



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- 7 Band programmable equalizer that can be used with all effects.
- Acoustic Environment Simulator actually recreates the ambient listening area.
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- An independent programmable mixing system that lets you vary the Dry level, the EQ'd level and the Wet level.
- The most comprehensive Performance MIDI in the business is also the easiest to use.
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- A MIDI DATA MONITOR-monitors any midi data that goes thru the system.
- With over 50 effects to select from, you have an amazing range of sound combinations.



1. Should you ask a lot of demanding questions before buying a 16-bit sampler?

2. Does it have 20-bit D/A conversion to insure 16-bit fidelity?
3. Does it have multi-mode filters with resonance?
4. Are there multiple Performance locations with “snapshots” of parameters?
5. Is there Truncate Fade-in and Fade-out for “clickless” start and end points?
6. Does it have positional (horizontal) crossfading between Patches?
7. Does it have Time Stretching, and if so, can you see the pitch alteration?
8. Does it have realtime audio digital stereo output versus standard digital I/O only for backup?
9. Does it have Note Number Exclusives for cutting off one sample with another?
10. Does it have an RGB or composite monitor output?
11. Can you combine the velocity-switching, mixing and crossfading of up to four samples on one key?
12. Can you expand the memory with standard Macintosh SIMMs?
13. Does it have an “Undo” or “Recover” function?
14. Is there a mouse port for fast and easy programming and editing?
15. Does it have realtime “Scrubbing” for locating edit points easily?
16. Does it have four-stage rate and level envelopes?
17. Does it have Templates for setting up TVA and TVF envelopes quickly?
18. Is there a comprehensive, world-class sample library available from the manufacturer?
19. Does it have Normalizing?
20. Does it have a Digital Filter with +/- emphasis for permanently “EQing” samples?
21. Is there Auto-looping?
22. Is there realtime aural feedback when looping, and is it easy to do?
23. Are there multiple LFO parameters and waveforms?
24. Is there an Alternating Loop mode?
25. Can you load or save Performances (multi-timbral setups)?
26. Is there matrix modulation in the Patch Control page for flexible control routing?
27. Does it have Analog Feel to make certain Patches sound less “sterile”?
28. Does it have accurate Phase Lock or will it lose stereo imaging when active?
29. Does it have digital Compression and Expansion?
30. Does it have Wave Draw allowing you to actually redraw the waveform?
31. Does it have an Insert function for splicing data into the middle of other data?
32. Does it have an Area Erase function for erasing data but leaving the space (time)?
33. Does it have a sample Mix function with a delay parameter?
34. Does it receive Polyphonic aftertouch?
35. Are there different Velocity Curves available?
36. Is there an Index and Jump function for accessing any page in the sampler easily?
37. Are there “Select” windows for finding and assigning samples, patches, etc. quickly?
38. Is there a Volume ID with view field or similar cataloging system?
39. Does it have a 48kHz sampling rate through the digital and analog ins?
40. Is there an “Auto-patch” feature which automatically makes full-blown patches from your samples in a matter of seconds?
41. Does it have resampling, including the ability to resample an entire Performance?
42. Does it have a pre-trigger parameter so as not to lose the attack of your samples?



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beyond 16-bit performance into the headier realm of 100+dB dynamic ranges.

After all, the consumer can extract full 16-bit performance from CD, Mini Disc, laserdisc and the other commercial release media. If our productions are being critically judged by their performance to the 16th bit, it could be argued that the information should be quantified to a higher level of precision.

And consider the ability of workstations to add signals together and increase/reduce their relative levels. If we now expect to deliver at least 16-bit CD performance from noise floor to clipping—especially on classical music releases—then we really need to record the basic tracks to 18- or even 20-bit precision. Currently, a variety of proprietary techniques can convert an 18- or 20-bit signal into a properly truncated and noise-shaped, 16-bit signal to a far higher degree of precision than if the signal had been passed through even the most accurate 16-bit system.

Think about it. If we plan to offer resolution that is viable and exact down to the 16th LSB, then it would

seem sensible to at least have some knowledge of what is happening to a precision of at least 17 bits, even more if we can stretch the resolution. In this way, we can predict what the signal is doing in those lowest bits and develop a non-correlated, noise-floor profile providing an excellent match to the actual information being digitized.

Existing recorders, editors and workstations can benefit from external converters. Many systems of just a couple of years ago might have compromised in their A-to-D sections (and maybe D-to-A output, for that matter). But if the 16-, 20- or even 24-bit data storage functions are fast enough to satisfy our requirements, extended life can be had from such units by bolting on an external converter. Both AES/EBU and IEC 958 Type II—a.k.a. "S/PDIF" and its variants—are capable of carrying 20- or 24-bit signals in addition to 16-bit words. SDIF-2 and Mitsubishi Pro-Dub connections can also handle 20-bit transmissions.

A growing number of second-generation workstations are capable

of storing 20- and even 24-bit signals to hard disk and can perform complex processing (compression, limiting, level adjustment, mixing, equalization, etc.) within the digital domain. Obviously, it's important that we input signals to such systems with as wide a dynamic range as possible, so that subsequent 20-/24-bit processing will not compromise the signal-to-noise ratio, nor limit the headroom performance of the original audio.

Finally, just around the technology corner, there are advances in consumer release formats that will offer performance beyond 16 bits. Rumor has it that a new "super CD" format is being finalized that will provide 20-bit performance from the current basic specification, albeit with a reduced replay time. (It remains to be seen how soon dual-format CD players will arrive in the stores. The extended format does hold enormous promise, however, in enhancing the consumer's view that, in the light of the new recordable Mini Disc format, the older, more familiar CD still represents a viable, ultra-high-quality medium.)

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Symetrix

Obviously, a 20-bit release format is going to require a mastering resolution higher than those we currently accept.

These and other factors are fueling the development of enhanced-resolution ADCs offering performance that's valid beyond 16 data bits.

18-/20-BIT DESIGN CRITERIA

Table 1 lists the primary specifications for 12 high-quality, stand-alone A-to-D converters. Some of these devices have been reviewed in *Mix* by Bob Hodas and Paul Stubblebine (May 1991 and March 1992 issues; other systems will be evaluated in an upcoming issue). The majority of A-to-Ds fall into one of two categories:

1. Multibit converters, utilizing an analog-input filter (to remove all frequencies in excess of the Nyquist, $F_s/2$ limit), a sample-and-hold, a highly accurate reference voltage, a comparator, a PCM generator and a parallel-to-serial output.

2. Low-bit converters, using a flash converter or sigma-delta converter running at high multiples of the sampling rate, a decimating filter, noise shapers, resampler and a serial interface.

While a complete discussion of the pros and cons of both types of design would require more space than is available here, most current designs tend toward low-bit (typically 1-1/2-/4-bit) topologies running at as high as 128 times the sampling rate. At the heart of all A-to-D designs is the problem of reducing quantization error: the differences between the original analog waveform and its discretely sampled, 16-/18-/20-bit digital value. Oversampling, low-bit converters extend the available resolution—and at the same time dramatically reduce distortion, even at small-signal values. They do this not so much by decreasing the error between analog input and digital output, but by making the error occur more often. In other words, the error component spectrum moves outside the audio passband and becomes virtually unimportant.

Design of a true 18-/20-bit A-to-D converter is not for the faint-hearted, however. The analog front end, for example, must be of sufficient resolution to relay a full dynamic range to the input of the internal A-to-D conversion stage. And within the

oversampled, low-bit converter, the designer needs to ensure that the ICs run fast enough to minimize processing delay times. (Typically, these would be of the order of a few milliseconds, meaning that multichannel sources passing through different styles of A-to-D converters might need to be re-phase-aligned within the digital domain.)

SORTING OUT THE SPECS: WHEN IS 20-BIT REALLY 18.3 BITS?

While we're on the subject, let's define a couple of important terms. Inside each of these commercially

available units lurks one (or maybe two) important chips per channel: the actual A-to-D converter ICs. Bearing the familiar names Burr-Brown, Analog Devices, Ultra Analog or Crystal Semiconductors (and others), these pieces of silicon actually coordinate the analog-to-digital translation. On paper, most of these ICs could output a bitstream containing useful information down to the 20th LSB. In the real world, however, a variety of factors limit their measured performance. (Keep in mind that few strictly 16-bit systems offer performance greater than 14

Coming to Terms with the Numbers: Common SNR Misconceptions

If you thought that "specmanship" was rife within the analog community, coming to terms with the performance of digital system components can be even more baffling. There currently exists a variety of parameters that are used to describe the performance of analog-to-digital converters, including the following:

- Decibel Full Scale (dBFS) is a unit that describes the amplitude of a digital audio signal. The "0 dB" reference is a 997Hz sine wave whose positive peak value reaches the positive digital full scale, leaving the negative maximum code unused.

- Total Harmonic Distortion + Noise (THD+N) is the ratio of the RMS amplitude of the additional distortion and noise to the signal itself. The parameter is expressed in decibels or as a percentage. Signal-to-Noise + Distortion [S/(N+D)] is the reciprocal of THD+N. Before THD+N is measured, the signal is lowpass filtered to remove "inaudible" noise and distortion components. Certain manufacturers use a filter that's flat to 20 kHz; others extend to 30 kHz; some use an A-weighted filter that attenuates high and low frequencies, approximating the ear's frequency response. A converter evaluated with an A-weighted filter will exhibit a lower THD+N than the

same converter measured, for example, with a 30kHz filter.

- Dynamic Range definitions vary widely. One IC manufacturer defines DR as the ratio of a full-scale signal to the broad band noise (0 to 20 kHz), measured with a -60dB signal. (In other words, we are defining S/(N+D) measured with a minus 60dBFS input signal, and a 20kHz lowpass filter.) Others within the audio community prefer to define DR as the ratio between maximum signal and the noise in the absence of an input signal. Yet another popular definition of DR is quoted in the main article as $DR = (6.02 \cdot n) + 1.76$. AES17-1991 does not quote dynamic range. Instead, the Recommended Practice describes the -60dBFS techniques outlined above as the signal-to-noise ratio or noise in the presence of signal and specifies a CCIR weighting filter.

Until converter manufacturers standardize their measurement techniques, it will be difficult for users to make reasonable comparisons from published specs. Meanwhile, our best advice is that manufacturers supply details of their individual test procedures.

—Mel Lambert

1. "AES17-1991: Standard Method for Digital Audio Engineering—Measurement of Digital Audio Equipment." Audio Engineering Society, New York City (1991).

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bits.)

In addition to the analog interface and front-end circuitry, other factors—such as clock stability, power supply regulation, analog/digital decoupling and even compromises in the physical layout—limit the amount of valid bits that this technically "20-bit" part can generate. We can measure the system's overall monotonic signal-to-noise ratio and then calculate how many bits of digital data that SNR corresponds to.

There is a basic formula that relates signal-to-noise ratio to bit resolution:

$$\text{SNR} = (6.02 * n) + 1.76.$$

For a 16-bit system the maximum theoretical SNR would be $[(6.02 * 16) + 1.76] = 98.08$ dB; for an 18-bit system the SNR would be 110.12 dB; and for a 20-bit device, 122.16 dB.

A well-designed "20-bit" ADC probably offers a value between 100+ and (maybe) 110 dB. Using the above formula for an SNR of 110 dB, this system has an equivalent 18.3-bit resolution. To check that our system is delivering optimized performance we can use a refined formula for a low-bit, second-order sigma-delta converter with oversampling: $\text{SNR} = 6.02 * (x + 2.5y) - 11.14$, where x is the bit resolution of the basic IC, and y the number of octaves of oversampling. For example, a "typical," contemporary sigma-delta system with 256-times oversampling should yield a theoretical SNR of around 115.3 dB; the 5dB difference can be attributed to less-than-optimal noise shaping and other parameters.

With a couple of notable exceptions, conventional multibit ICs run out of steam and performance above 16-bit, leaving the designer with a couple of basic choices. The first would be to use a single 18- or 20-bit, low-bit converter and attempt to extract the theoretical SNR performance. Problems with high clock speeds, system complexity and myriad other reasons make this a route for the noble and brave.

Alternatively, designers have opted to use dual converters that gain range, depending on which section of the signal is being quantized. Some designs, for example, use one 20-bit converter for the upper 18 bits of the desired output and a second 20-bit converter for the lower 18 bits. At some predefined input level, the output flips from converter #1 to converter #2, and the

level is automatically adjusted. (Why not just use a single ADC chip, you might ask, and boost/cut the output to handle the appropriate range, automatically adjusting level as we switch? In low-bit systems using FIR decimation filters—like most contemporary designs—the inherent 64-sample delay of around 1.3 ms at 48 kHz, for example, means that we would miss a short sliver of the input each time we toggled ranges and started a new conversion cycle. It's a neat concept, though, despite its impractical nature.)

Using some elegant DSP, a dual-IC ADC can handle level detection and automatic output switching, including automatic and user-defined calibrations. (Temperature- and time-dependent changes in input gain and other parameters can lead to dramatically unpredictable results.) As an added bonus, the signal processing that monitors the input signal and handles the IC flips can

We need to ensure our ability to convert signals from continuously variable analog waveforms into a faithful digital equivalent.

also be used for additional functions, such as overload protection or some soft compression as input levels approach clipping. In silicon, it's relatively easy to implement a soft-knee limiter circuit or some gentle EQ to roll off low-frequency rumble or cut top-end noise.

Even if we record only 16 bits of a digitized signal, the security of implementing overload protection within the A-to-D conversion process via a 20-bit IC means that we can run our analog input as hot as we need (with-in reason, of course), safe in the knowledge that we have between two and four bits of compression available. Again, digitizing the input to a higher resolution than we might think necessary offers practical advantages in the studio.

Some contemporary units even offer the choice of using the component 18-bit ICs in single or tandem mode. Now the system can function, for example, as a 4-channel converter with better than 16-bit resolution, or in extended mode as a stereo, dual-converter, 20-bit device, dependent upon the nature of the signals being digitized and the storage media to which they are being routed.

**OTHER CONSIDERATIONS:
SYNCHRONIZATION REFERENCES**

In any digital facility, the source and stability of master digital sync references are of paramount importance. A-to-D converters must be able to operate at the appropriate sampling rate: 44.056 kHz for audio locked to NTSC 29.97 fps video (laserdisc mastering being one important example); 44.1 kHz for CD mastering (and compatibility with most workstations that normally lock to 30 fps sync); 48 kHz for extended range recordings and compatibility with digital VTR formats; plus 32 kHz for potential broadcast applications.

Because they might easily be used on a remote music session where a highly accurate digital word clock source probably won't be available, many stand-alone converters feature very respectable internal clocks, capable of high degrees of thermal stability to just a few parts per million.

Of course, if a sync reference is available, these same converters should be capable of switching to follow external rather than internal clock sources. Sync versatility is normally the order of the day. In addition

to a conventional square wave word clock, it's also important to be able to lock to video sync (for mixed-media sessions), AES-11 digital audio reference signal and other digital inputs such as AES/EBU and co-ax/optical S/PDIF ports.

For added flexibility, many users appreciate the provision of sample-rate dividers or gear boxes to handle the familiar 44.056/44.1kHz conversion, referenced to either 29.97 or 30fps video sync rates. On many occasions, the ability to knowingly reference the sample rate to a different sync frequency can prove invaluable, as is the ability to generate a word-

clock output for DAT and similar recorders at the selected sample rates.

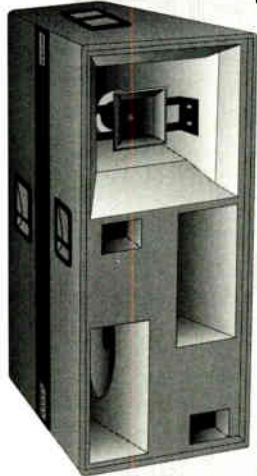
THE LAST WORD


In addition to providing linear, accurate translation of analog signals into the digital domain, other functions, such as flexible synchronization, compression and multichannel operation, can dramatically improve the quality of any mastering project. For a growing number of reasons, stand-alone, 18-/20-bit analog-digital converters represent an essential tool in recording and production facilities. ■

Mel Lambert is a Mix senior editor.


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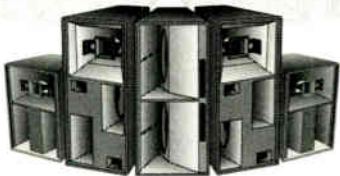



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by Dan Daley

PERFECTLY GOOD TRANSPORTATION

“**P**erfectly good transportation.” That’s a phrase that’s been avoided by American marketing for years. Only in the downsized 1990s would a Madison Avenue type even remotely consider using such a concept to sell a car. No, until now it’s been “bigger is better,” and “newer is even mo’ better.”

But this is the downsized '90s, and less is more. There are a num-

ber of studios that have taken certain lower technological roads—not out of financial desperation but by choice. They have eschewed digital in all but the most basic and ubiqui-

ous applications, like DAT and signal processing. They have decided to stay with analog tape and non-automated consoles and instead concentrate on acoustics, microphones and other decidedly non-glamorous but way-useful stuff.

They’re neither dinosaurs nor paupers; they’re facility owners who’ve drawn a conscious line in the technological sand and said this is as far as they’ll go—for now. They all have client bases that apparently agree with them. And it’s worth noting that the rate differential between these rooms and automated digital ones is, on average, not tremendous.

The advantages are clear. You get out of the equipment rat race. The overhead is lower. There is the opportunity to consolidate capital purchases under single leases or loans. There are fewer formats to try to conform to. The technology has proven itself. Maintenance is not a black art.

Disadvantages? Sure, some. Despite new tape formulations, analog will never be as noiseless as digital. Don’t even think about hiking rates without marquee-value tech upgrades. Kiss off a certain

segment of clients for whom digital is *de rigueur*. It’s not for everyone, but it is the way a number have chosen to go. They have their reasons and motives.

**“I think a lot of kids who
who are growing up
on automation are
missing the best
part of recording—
the touch that
goes with
riding the
faders.”**

—Steven Durr

ber of studios that have taken certain lower technological roads—not out of financial desperation but by choice. They have eschewed digital in all but the most basic and ubiqui-

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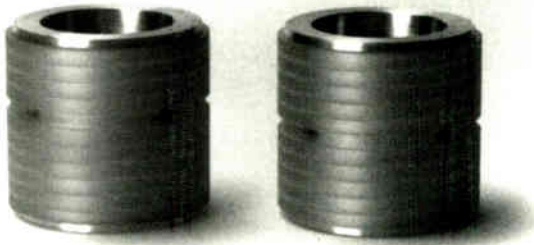
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Oliver DiCicco has owned and operated Mobius Music in San Francisco for 16 years. It's still the analog room it was on opening day, the major upgrade being the addition of Dolby SR for the Studer 827 multi-track. The console is a vintage Neve 8086 MkIII. His client base is Bay Area labels and musicians, including Windham Hill, as well as a smattering of national avant-garde musicians like New York's John Zorn. He bills about \$120,000 per year and owns the building the studio is in, which provides him with a capital resource for loans.

DiCicco has a DAT deck but uses it only when a client requests it; he prefers the Studer 2-track, also with SR. "The trouble with a lot of the newer digital technology is that it just doesn't sound as good," he says. "The analog technology may be older, but it represents the state of its art, while digital technology changes every week. You can't keep up with it, financially or otherwise. Even getting involved with MIDI means there's a new keyboard or box always coming out, and people who read the music magazines come in and look for it. And too much of it seems like it was designed by the accounting departments."

While he owns a few digital signal processors, such as a Lexicon 224 and an Eventide 113000, DiCicco says his money is better spent on vintage Neumann microphones and other such gear. "Rupert Neve had a very subjective set of criteria in mind when he designed his equipment, and I have the same sort of criteria in mind for my studio," says DiCicco. "I have enough of a customer base that agrees with me, and I have to be realistic about where I fit in the market. San Francisco isn't L.A., and people come here because I try to provide acoustic sensibilities and a sense of what it takes to record real-time music. If I choose the equipment wisely—from the entire range available, not just the newest—I can give my clients what they want at the price they can afford."

Brielle Music originated as a project studio for owner Jon Brielle but now outside rentals bring in about \$150,000 per year, about a quarter of its business. Brielle is looking at some sort of computer-based digital

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STUDIO-GRADE MIC PREAMPS. Only the CR-1604 incorporates discrete, large-emitter-geometry transistor preamplifiers instead of simple ICs. Which is why our mic preamps deliver an honest -129dBm E.I.N., 0.005% THD, yet can handle +14dBu max inputs without a pad.

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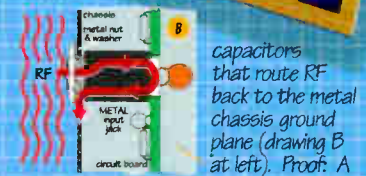
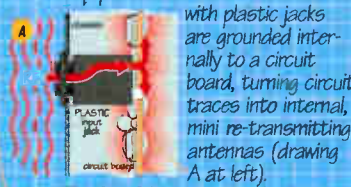
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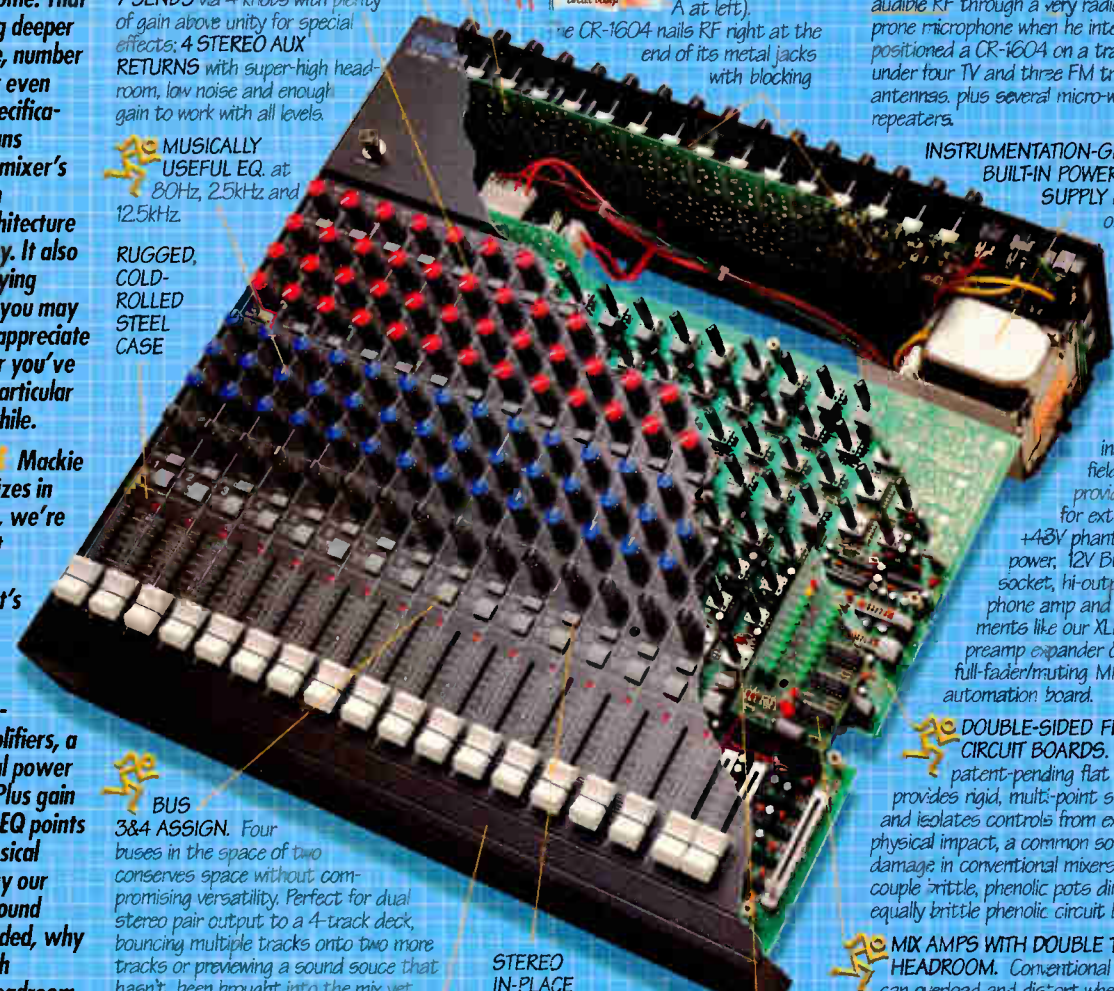
capacitors that route RF back to the metal chassis ground plane (drawing B at left). Proof: A Radio World magazine reviewer detected no audible RF through a very radio frequency-prone microphone when he intentionally positioned a CR-1604 on a transmitter hill under four TV and three FM transmitter antennas, plus several micro-wave repeaters.

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system, but it will be subordinate to the Studer A80 multitrack the studio has used for two years. The current extent of the studio's digital is the common cost-effective route: a DAT (Panasonic) and reverbs (Lexicon 480L).

"When I was making my decisions two years ago, I felt that digital was changing very fast, and I believed it would get cheaper," Brielle says. "I decided to spend my money on making the room acoustics as good as possible. It's a lot easier to change the equipment later on than it is to change the room. And I prefer the sound of analog."

Brielle acknowledges that there are pressures from his current (mainly corporate) client base that have compelled him to look at digital equipment. But he's being cautious in selecting any digital equipment: "I don't want to go the flavor-of-the-week route," he says. "And I'll definitely be keeping the analog 24-track technology."

Studio designer Steven Durr opened Imagine Sound in Nashville earlier this year with a decidedly

low-tech intent: The console is the original 44-input API board from Nashville's RCA studios; the same one used to cut The Everly Brothers and Elvis' Nipper records. The multitrack is a Studer 827, which is hot-rodged via Ampex 499. "High-tech is fun, but there's a trade-off," says Durr. "The more complex you make the equipment, the more components you have to use, and that has a degrading effect on the sound. The older consoles were made simply, and as a result you have a much better inherent sound. On the API, I don't have to automatically reach for the EQ when I open a fader because the sound is there to start with. I can use the EQ more artistically, instead of needing it to get out of the box."

Durr's point in outfitting the studio reflects the fact that Nashville has plenty of high-tech rooms, with more on the way. His marketing approach is to generate a word-of-mouth campaign based on his vintage equipment and recording room design. "To compete, we had to have something unique," he says. "There's a lot of acoustic music being recorded here, and we went

after that market without trying to make it compatible with computers or digital. I can live with a little tape hiss."

Imagine is equipped to be a tracking room. Durr says that that can have its limits in terms of the bottom line. But, he adds, for as many people who want or need automation for mixing, there are a substantial number who want to use the older method of manually riding faders. "It's a hassle to mix on, I'll admit," he concedes. "You have to patch everything and move your own faders. But I think a lot of kids who are growing up on automation are missing the best part of recording—the touch that goes with riding the faders."

Low-tech is a relative term, certainly not a derogatory one. The breadth and depth of newer digital equipment and older-but-very-viable analog equipment means that technological-hybrid rooms will become more common, either by choice or economic necessity. ■

Dan Daley is Mix's East Coast editor. He intends to emerge from the Flint Age any day now.

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A PRACTICAL GUIDE TO ANALOG TAPE RECORDER ALIGNMENT

by Norman Dlugatch

Chart 1: Analog tape machine alignment

New Project				Existing Multitrack Project				Existing 2/4-track Project			
Step	Source	Adjust	To	Step	Source	Adjust	To	Step	Source	Adjust	To:
Clean & degauss	N/A	N/A	N/A	Clean & degauss	N/A	N/A	N/A	Clean & degauss	N/A	N/A	N/A
Input cal @ 1kHz	Console @ 0 VU	Input cal	0 VU	Input cal @ 1kHz	Console @ 0 VU	Input Cal	0 VU	Input cal @ 1kHz	Console @ 0 VU	Input cal	0 VU
1kHz repro	Test tape	Reproduce level	See level chart	1kHz repro	Project Tones	Reproduce level	0 VU	1kHz repro	Project tones	Reproduce level	0 VU
repro azimuth 10kHz or higher	Test tape	Reproduce azimuth screw	See note 1	1kHz sync	Project Tones	Sync level	0 VU	repro azimuth 10kHz or higher	Project tones	Reproduce azimuth screw	See note 1
10kHz repro	Test Tape	Reproduce HF	See level chart	repro azimuth 10kHz or higher	Project Tones	Reproduce azimuth screw	See note 1	10kHz repro	Project tones	Reproduce HF	0 VU
Bias @ 10kHz	Console	Bias level	See bias chart	sync azimuth 10kHz or higher	Project Tones	Record azimuth screw	See note 1	LF repro (Note 2)	Project tones	Reproduce LF	0 VU
1kHz record	Console @ 0 VU	Record Level	0 VU	10kHz repro	Project Tones	Reproduce HF	0 VU	Bias @ 10kHz	Console	Bias level	See bias chart
Erase and noise test	No input signal		Listen	10kHz sync	Project Tones	Sync HF	0 VU	1kHz record	Console @ 0 VU	Record level	0 VU
Record azimuth 10kHz or higher	Console	Record azimuth screw	(Note 1)	LF repro (Note 2)	Project Tones	Reproduce LF	0 VU	Erase and noise test	No input signal		Listen
10kHz record	Console @ 0 VU	Record HF	0 VU	LF sync (Note 2)	Project Tones	Sync LF	0 VU	record azimuth 10kHz or higher	Console	Record azimuth screw	See note 1
LF repro (Note 2)	New tape	Reproduce LF	0 VU	Bias @ 10kHz	Console	Bias level	See bias chart	10kHz record	Console @ 0 VU	Record HF	0 VU
Print tones per Chart	Console @ 0 VU	N/A	N/A	1kHz record	Console @ 0 VU	Record level	0 VU	LF repro check	New tape		0 VU
1kHz sync (Note 4)	New tape	Sync level	0 VU	Erase and noise test	No input signal		Listen				
10kHz sync (Note 4)	New tape	Sync HF	0 VU	10kHz record	Console @ 0 VU	Record HF	0 VU				
LF sync (Note 2)	New tape	Sync LF	0 VU	LF repro check	New tape		0 VU				

Note 1. Multitrack azimuth: Use the console to sum the output of all tracks to one bus and adjust the azimuth screw on the head assembly for peak level at 10kHz or higher
2/4-track azimuth: Use an oscilloscope when possible, or adjust for peak output at highest available frequency.

Note 2. LF should be 100Hz for 15 ips and 40 to 60Hz for 30 ips. The frequency chosen should produce the flattest low frequency response.

Note 3. Use the Machine Control Chart to determine the name of the appropriate adjustment.

Note 4. Optional steps for 2/4-track alignments.



If you have ever encountered distorted recordings, unbalanced stereo tracks, strange phasing problems on stereo mixes, or dull tracks, you may have been the victim of sloppy tape machine alignment. Accurate tape machine alignment will not guarantee a hit record, but it will certainly make the recording process as invisible and painless as possible. There is nothing more annoying in the production of records than the "perfect take" that is rendered unusable by sloppy or non-existent machine maintenance.

A decade ago, it seemed that the demise of analog tape was inevitable. Today, with continual improvements in noise reduction systems, record electronics and high-output tape formulations, analog is here to stay, and proper tape alignment is more important than ever.

Most recorder and tape manufacturers have written volumes on analog tape recorder alignment, with instructions presented in a highly technical format. This article is designed to provide a practical and useful set of instructions for aligning common-

Bias Chart						
Speed	7.5 ips		15 ips		30 ips	
Gap Length	0.5 mil	0.25 mil	0.5 mil	0.25 mil	0.5 mil	0.25 mil
3M	ATR100		Others		ATR100	
250	3.5	5	2.5	3	1	1.5
226	3.5	5	2.5	3	1	1.5
227	3.5	5	2.5	3	1	1.5
806/807	3	4	1	1.5	0.5	1
808/809	2	3	0.5	1
996	4	6.5	3	4	1.5	2
Ampex						
456	3.5	5	2.5	3	1	1.5
499	3.5	5	2.5	3	1	1.5
BASF						
468	3.5	5	3	4	1	1.5
911	3.5	6	2.5	3	1	1.5
469	3.5	5	3	4	1	1.5

Notes:

- 0.5 mil gap heads are used on the ATR100, Ampex 440, MM1000, Otari 5050B and Otari 7800. Most other machines are 0.25 mil.
- Overbias setting based on 10 kHz input signal.
- Use -10dB input at 7.5 ips.
- Set bias by turning bias level pot counter-clockwise for a peak reading, then turn it clockwise until level drops by amount in chart.
- Optimum bias settings are dependent on many factors such as head wear, individual tape variations, etc. This chart is only offered as a guide.

Chart 2: Bias chart

ly used professional analog tape machines. While the procedures outlined here are generally implemented by pro studios, some approaches to analog tape alignment may vary from studio to studio and engineer to engineer. Overbias settings and treatment of low-frequency tones as

well as length and number of tones are subject to individual preferences.

Chart 1 presents the steps necessary to perform an accurate and professional alignment. Alignments have been separated into three types:

- New projects for all new multi-

—CONTINUED ON PAGE 142

ALIGNMENT EXAMPLE USING CHART 1 FOR A NEW MULTITRACK PROJECT

Step 1: Clean all heads and guides thoroughly using the proper cleaning agent. Isopropyl alcohol is very effective. (Use denatured alcohol for digital machines.) Clean the pucks with the manufacturer's recommended solvent. Degauss (demagnetize) the heads on a daily basis. It is better not to degauss if you are unfamiliar with the proper technique.

Step 2: Set the console to feed a 1kHz signal to all tracks at 0 VU (+4 dBm). Adjust the input-calibrate control on the machine to 0 VU on each track. See Note A regarding the control names.

Step 3: Place the machine in reproduce mode and play back a 1kHz tone from your test tape. Adjust the reproduce level control on each track to the proper level. See Note B below.

Step 4: Sum all the tracks to

one bus on the console and play back a 10kHz or higher tone from your test tape and adjust the azimuth screw on the play head for peak level.

Step 5: Play back the 10kHz tone from your test tape and set it to the same level as in Step 3.

Step 6: Remove the test tape from the machine and put up a new roll of tape. Send 10 kHz from the console at approximately 0 VU. The level is not important. Adjust the bias control on each track (or the master bias control on some machines) for the proper setting according to the bias chart. Remember to locate the peak output by turning the control counterclockwise and then turn the control clockwise until the level drops by the amount indicated in the chart.

Step 7: Set the console to feed a 1kHz signal at 0 VU (+4 dBm). Place the machine in record and adjust the record level control to 0 VU.

Step 8: Turn off the console oscillator and place the machine

in record. Listen to each track one at a time and check for erasure and noise problems.

Step 9: Set the console to feed 10 kHz at 0 VU and put the machine in record. Adjust the azimuth screw on the record head with the same console setup as in Step 4.

Step 10: Set the console to feed 10 kHz at 0 VU (+4 dBm). Place the machine in record and adjust the record-high-frequency control to 0 VU.

Step 11: Set the console to feed a low-frequency tone at 0 VU. (100 Hz at 15 ips and approximately 50 Hz at 30 ips.) Adjust the low-frequency-reproduce control to 0 VU.

Step 12: Print a set of tones according to the tone length chart. Leave a gap of blank tape between each tone for easy identification.

Step 13: Play back the freshly recorded 1kHz tone and place the machine in the sync mode. Adjust the sync level control to 0 VU.

—CONTINUED ON PAGE 144

track and 2/4-track alignments.

- Existing multitrack projects where project tones are available.
- Existing 2/4-track projects with project tones.

The "Source" column represents the origin of the test signal, test tape, tones recorded for a project or signal from the console. New tape means tones recorded on a new reel of tape. The actual physical adjustment to be made to the machine is in the "Adjust" column. The result of the adjustment is in the "To" column.

The bias chart (Chart 2) represents information supplied by the manufacturers. Unfortunately, some tape machine manufacturers supply

	1k left	15k	10k	40 or 50	100	Dolby	Record Pad
Analog Multitrack		:30	1:30	1:30	:30	:30	2:00
Digital Multitrack							
2-track album		:30	1:00	1:00	:30	:30	
2-track single		:30	:30	:30	:30	:30	
4-track		:30	1:00	1:00	:30	:30	
Digital/DAT	:30		:45	1:00			

Note: 15kHz and 100Hz playback levels should be noted on the tape legend. Tones should be recorded at the head of the reel before recording and moved to the end of the reel at the end of the session or preferably to a separate reel.

Chart 3: Tone length chart

conflicting bias information for different tape types. Keep in mind that the optimum bias setting varies with the gap widths and overall condi-

tion of the recording heads as well as tape variations. The optimum bias for your particular machine may differ somewhat from this chart. Since many studios do not have the knowledge and equipment to determine the optimum bias, the chart should serve as an excellent guide to the proper setting.

While the tone length chart (Chart 3) is subjective, it provides a good starting point for most studios to follow. The tones appear in the usage order, and the lengths vary depending on the expected usage. Since most machines do not

Chart 4: Machine control chart

Control Description	Studer 800		MCI JH24		Otan MTR90		Ampex ATR100	
	Location	Name	Location	Name	Location	Name	Location	Name
Input Cal	Blue Record Card	Input Level	Record /Sync Card	Input LVL	Audio card	Mon	I/O Module	Cal
Reproduce Level	White Repro Card	Level	Repro Card	LVL	Audio card	Repro Gain	Audio card	Repro Gan
Reproduce HF	White Repro Card	Treble	Repro Card	<	Audio card	Repro High or Low spd EQ	Audio card	Repro EO HF
Bias Level	Master Bias Card	Setting	Bias Card	Hr or Lo	Card #7	Bias adjust 1, 2 or 3	Audio card	Bias Norm
Record Level	Blue Record Card	Level	Record /Sync Card	LVL	Audio card	Record Gain	Audio card	Rec Gan
Record HF	Blue Record Card	Treble	Record /Sync Card	Record	Audio card	Record High or Low spd EQ	Audio card	Rec EO
Reproduce LF	White Repro Card	Bass	Repro Card	>	Audio card	Repro Low Freq	Audio card	Repro EQ LF
Sync Level	Yellow Sync Card	Level	Record /Sync Card	LVL	Audio card	Sync Gan	Audio card	Sync Gan
Sync HF	Yellow Sync Card	Treble	Record /Sync Card	<	Audio card	Sync High or Low spd EQ	Audio card	n/a
Sync LF	Yellow Sync Card	Bass	Record /Sync Card	>	Audio card	Sync Low Freq	Audio card	n/a

Note: Use the appropriate control for the tape speed in use. (Lo or Hi, Fast or Slow, etc.)
 * The Studer 800 input level should be set to -7VU with the output calibrate switch depressed.
 Then release the output calibrate switch and set the output cal pot on the reproduce card to 0 VU

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Chart 5: Level chart

have a 15kHz record adjustment, note the actual printed level on the box. Note the low frequency used for alignment on the tape box, as well as the actual VU meter reading of the other low frequency tone. (For example, write "100 Hz = -1 VU" on the box.) Ideally, place the tones for a multitrack project on a reel by themselves to avoid accidental erasure of masters and to facilitate sending tones around to various studios separately from the masters. Place the tones for a 2- or 4-track at the end of the first reel.

I hope that this article helps demystify the alignment process and offers some standards for other studios to follow. Everyone's lives might be a little more productive and pleasant if all tone reels were consistent with regard to frequencies, length and location. ■

Norman Dlugatch is president of Full Range Audio Services in Santa Clarita, Calif.

Level Chart

Test Tape Level

Desired Level	185 nWb/m	200 nWb/m	250 nWb/m	370 nWb/m
(+9)	520 nWb/m (-9) VU	(-8) VU	(-6) VU	(-3) VU
(+8)	465 nWb/m (-8) VU	(-7) VU	(-5) VU	(-2) VU
(+7)	415 nWb/m (-7) VU	(-6) VU	(-4) VU	(-1) VU
(+6)	370 nWb/m (-6) VU	(-5) VU	(-3) VU	(0) VU
(+5)	330 nWb/m (-5) VU	(-4) VU	(-2) VU	(+1) VU
(+4)	295 nWb/m (-4) VU	(-3) VU	(-1) VU	(+2) VU
(+3)	250 nWb/m (-3) VU	(-2) VU	(0) VU	(+3) VU
MRL (0)	200 nWb/m (+1) VU	(0) VU	(+2) VU	(+5) VU
Ampex (0)	185 nWb/m (0) VU	(+1) VU	(+3) VU	(+6) VU

—FROM PAGE 141

Step 14: Play back the freshly recorded 10kHz tone and adjust the sync-high-frequency control to 0 VU.

Step 15: Play back the freshly recorded low-frequency tone and adjust the sync-low-frequency control to 0 VU.

Note A: The machine control chart (Chart 4) shows the name of the control for each adjustment in Chart 1. If you have a different machine than the three listed in the chart, try to find the corresponding control by trial and error or by reading the manufacturer's alignment procedure.

Note B: The level chart (Chart 5) should simplify the calculation of the correct setting for the required recording level. The majority of studios cannot afford a test tape for each required recording level, so it is necessary to use one expensive test tape and this chart to establish the correct setting. Locate the test tape that your facility owns across the top of the chart. Find the required level on the left and set the machine to the junction of that row and column. For example, when using a 200nWb/m test tape, set the playback level to -5 VU for a +6 recording (referenced to Ampex 0 of 185 nWb/m). ■

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—FROM PAGE 91

St. John's Wood. My interview was most bizarre. I was grilled by two fairly elderly men, who were talking nothing more than technical drawing. It had nothing to do with the music, and I didn't know at that time what was involved in making a record. I just wanted to be a part of it all.

Nevertheless, I was hired and just went from there. There was a lot of luck, but I was also trying to do things differently. Many times when I tried to change the methods of recording—as a fully fledged engineer I would drastically change the techniques—most of the engineers were 40 and older and they would say, "Why do you want to do this? We've been doing it this way for years. Leave it alone." What would happen is they would get a session, and the producer would suggest that they do it "like Geoff does it." There was a bit of resentment.

Bonzai: Because you were working with the Beatles, did you have the clout to do what you wanted?

Emerick: Oh yes, we could get away with just about anything. With the recording of the drums, I wanted to move closer with the bass drum mic to get that impact. EMI's directive was to place the mic about three feet away. Whilst I was doing this, I was sent a letter from the technical division that said you couldn't do this because of the air pressure against the diaphragm in the microphone, but they would give us permission nonetheless to do it.

Bonzai: Just as Norman went on to producing, how did you make that transition?

Emerick: Well, I had left EMI and was working with Apple. The record companies were relying so much on the engineer to carry the sessions. The few of us who had some sort of clout could say we wanted a piece of the action. We were not only engineering, we were actually making the record, with all the decisions necessary.

Robin Trower was the first for me as a producer. Matthew Fisher produced *Bridge of Sighs* and I produced his next album [*For Earth Below*]. Then I did some albums with Gino Vanelli at AIR. There was

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LUNCHING WITH BONZAI

Elvis Costello's *Imperial Bedroom*, probably my biggest success as a producer. It was really easy for me, because he was so full of energy. My role was just to capture it as quickly as possible. I think we cut 14 basic rhythm tracks in a night, did some overdubs, vocals and finished in about two weeks.

Bonzai: Did you introduce the use of headphones for musicians in the studio?

Emerick: Well, we'd never used headphones before when doing overdubs. The standard method was to feed the tracks back through loudspeakers and the vocalists and musicians would play along.

Bonzai: Didn't that cause muddiness?

Emerick: Sure, but the system didn't allow you to use headphones. It was unheard of.

Bonzai: How weird.

Emerick: Yes, but no stranger than the BBC radio announcers being expected to wear evening clothes. They had to wear a tuxedo to read the evening news, even though no one saw them.

Bonzai: What about consoles?

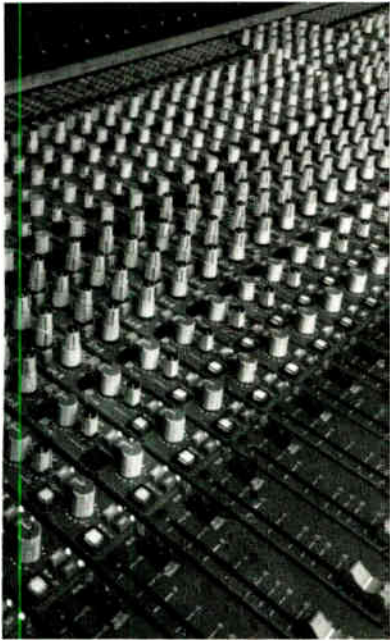
Emerick: I love Neve boards and always have. We're talking about textures and tones, and I've always felt that mixing sounds is like painting a picture. You get a dab of this and a dab of that, you've got your depth and so forth.

Bonzai: What advice would you give to those trying to create something as historical as your past work?

Emerick: Go back to the basics. You start with the song, and the sound, the melody. I've always worked hard because of the *music*, not for the technology. My training at EMI was in classical music as well as rock—to be able to go in and record an opera on 2-track was an incredible experience. These are the big paintings with the big brushstrokes where you learn about engineering. You can't go back and fix it; it's there. That's why some of the old recordings will never be beat, never in a thousand years. ■

Contrary to popular myth, that is not Mix roving editor Mr. Bonzai standing to the left of Karl Marx on the cover of Sgt. Pepper.

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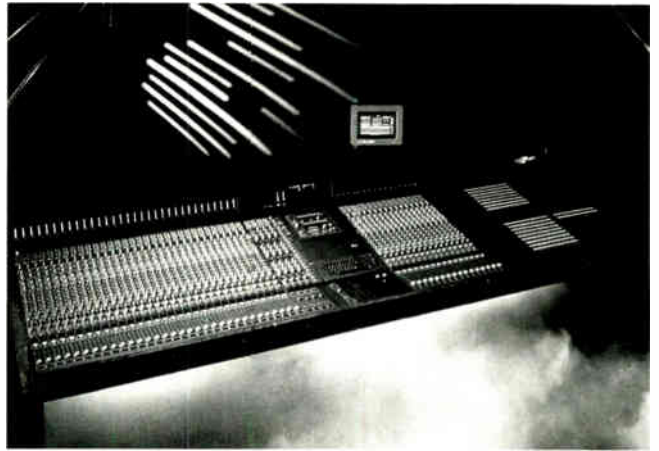
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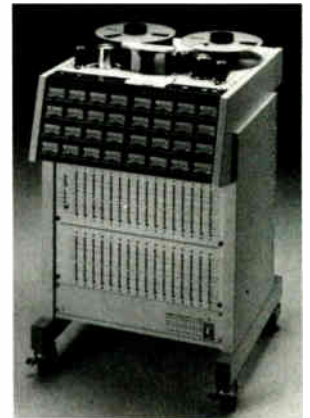
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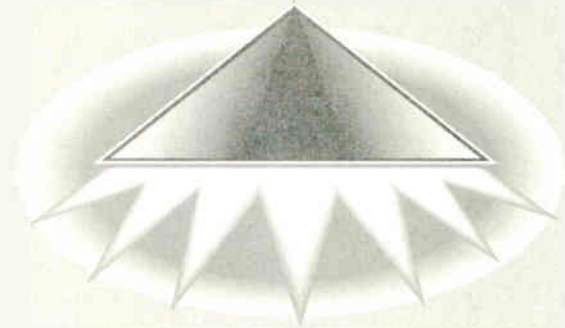
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PART III

MODERN CONTROL ROOM DESIGN AND CONSTRUCTION

HOW TO DO IT



THE FINISHING TOUCHES

BY MALCOLM CHISHOLM

Over the past two months, we've delved into the basics of control room design and construction, examining shapes, geometry, dimensions, acoustical materials, and floor and wall construction techniques. In this final installment, we'll look at the finishing touches that complete the project.

WINDOWS

While 1/2-inch glass set just inside the wall edges is common practice for control rooms, this is not optimum.

Fig. 1 shows isolation (in dB) of two spaced 1/4-inch glass panes at various frequencies. While figures are not available for double 1/4-inch glass at 4 kHz, those given for other thick-

nesses suggest that the isolation is higher than for 2 kHz. In any case, the gap's the thing, and

SPACING	125 HZ	250 HZ	500 HZ	1 KHZ	2 KHZ	4 KHZ
2"	25	28	36	41	46	—
4"	28	34	38	42	40	—
6"	31	37	43	48	44	—
8"	40	42	49	56	43	—

Figure 1

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World Radio History

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given a 40dB loss at 125 Hz with a 2dB-per-octave curve for an 8-inch spacing, there seems little need to use thicker, more expensive glass.

It seems wrong to use the same size of glass on both sides of a window, but measurements show otherwise. In addition, with one window tilted eight inches, there is no probability of a strong drumhead effect between panes at any single frequency. The angle of the inner window, however, requires eight inches on its own, so the two windows will need a foot between them at the top. Since most walls aren't a foot thick, this necessitates mounting the windows on—rather than in—the wall. It's easily done by building a second 2-foot-high wall outside the main wall to support the outside window. The top of the outside window frame also provides a handy shelf for odds and ends.

Lining a window's inside frame edges with Fiberglas™ increases its attenuation capability by 5 dB or more. One-inch ceiling panels or Linear Glass Cloth™ over six to eight inches of 703 board will do, both reducing transmission and tidying up the gap between panes. Cute idea. Not mine, but cute. If that's not enough, 1/4-inch laminated (safety) glass provides 6 dB more loss than standard 1/4-inch plate at all frequencies, as does 1/2-inch plate. Costs more, does more. Use 703 board rather than glass wool inside the window: 703 is the thinnest wall-mounted treatment available for absorption down to 60 Hz. In fact, hard-backed 703 re-

quires only half the space of its nearest competitor. Fig. 2 shows how the noise reduction coefficients for Fiberglas materials vary with fre-

things to somebody with a room problem. To build a flat room, however, it's necessary to use flat acoustical treatment. Except for a

	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	NRC
A: 3.5" Fiberglas building insulation	.34	.85	1.09	.97	.97	1.12	.96
B: 6.25" Fiberglas building insulation	.64	1.14	1.09	.99	1.00	1.21	1.05
C: 3.5" Fiberglas noise barrier batts	.38	.88	1.13	1.03	.97	1.12	1.00
D: 2" Fiberglas 703 insulation board, unfaced	.22	.82	1.21	1.10	1.02	1.05	1.05
E: 4" Fiberglas 703 insulation board, unfaced	.84	1.24	1.24	1.08	1.00	.97	1.1

Figure 2

quency.

Note that 4-inch 703 is a better low-end absorber than 6.25-inch glass wool, and about equal to seven inches of noise batts.

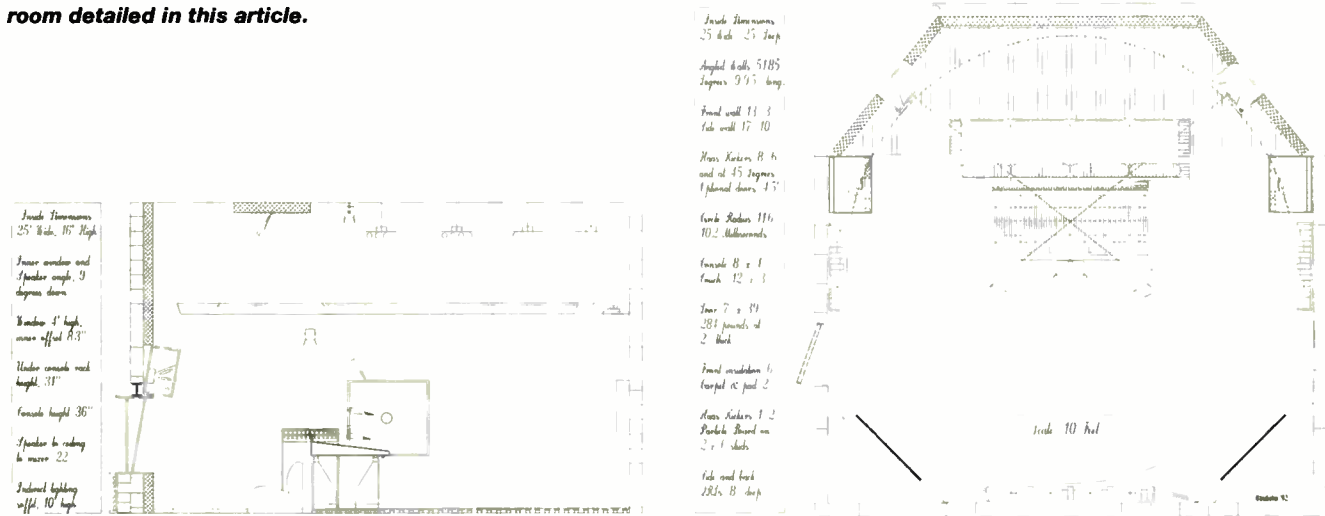
According to the good folk at Owens-Corning (back when they had a testing lab), doubling the thickness of a treatment should shift the figures down an octave. Real measurements show it's not exact, but the principle holds.

Segueing neatly into control room treatment... *Don't equalize those speakers!* Build a flat room and install flat monitors. It sounds better and costs less. Sell those third-octave


hung ceiling, that means thick treatment with about eight inches of 703 board as a minimum, which, at least in theory, will put you down 1.6 dB at 62.5 Hz. Close enough.

So why doesn't everybody use thick treatment? All those other rooms sound great with thin stuff. Actually, those other rooms are surfaced with wallboard on 2x4s, which show acoustical absorption of 4% in the midrange and 29% at 125 Hz. Since wallboard's not porous, it's sure as hell not absorbing the bass, so it must be transmitting it through the wall. Same applies to glass and a few other non-porous flexible mate-

Side and top views of the control room detailed in this article.



This is no Fairy Tale

A frog is perched on a tall, brown reed. The frog is wearing a small, ornate crown with a red jewel on top. It is holding a silver and blue microphone in its mouth. The background is a clear blue sky with some green reeds on the left and right sides.

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rials. With the walls leaking bass out of the room, you don't need to soak it up inside. On the other hand, if you can feel the walls vibrating with every bass note, you can bet your boots they're affecting the bass sound. Put in a rigid wall, you'll get no vibration and true bass, but you'll need to soak up as much low end as top, so use thick treatment. A foot or more of glass wool is fine for a studio but takes up too much space in a control room, so 703s are better there.

You'll need to treat the front (speaker) wall to eliminate bounce to the mixer from the back wall, and possibly some treatment on the forward side walls to soak up speaker bounce to the mixer from them. Unless the ceiling is *really* up there, you'll have to treat it for reflections from the speakers to mixer position.

Locating treatment is easy. Buy a cheap, plastic decorating mirror at a tile store, run it along the walls, and hang some absorption anywhere you can see the speakers from the mix or producer/second positions. Ditto on the front and speaker walls for the back walls. Ditto again for the ceiling. You'll probably wind up with most of the front wall and a good deal of the ceiling fuzzed, which is why it's called the Dead End™

How much you fuzz depends on the studio. Specifically, the control room should have a shorter reverberation time than the studio because if it's equal or longer you won't be able to hear the sound of the studio room as such. For medium and big studios (ranging from a half- to one-second reverb time) it's no problem. For small ones it can be big trouble. And while one can hang fuzz all over a studio, the back third of a control room must be left live to feed the QRDs™

Treating everything possible, a standard control room (such as the one illustrated) at a base of 25x25x16 feet will come down to about a quarter second. For a rationally treated live studio, the minimum size for a quarter second (0.266) is 14,400 cubic feet.

For smaller studios, one can lower the control room ceiling, which reduces the volume and thus the reverb time. In fact, using a ratio of one foot of ceiling height per 1,000 cubic feet of studio volume comes out pretty close. (But an 8-

foot-high control room for an 8,000-cubic-foot studio will make things very, very cozy.)

If the control room's too long, it's not a disaster. It's just that you'll have trouble hearing the live sound of the studio itself: basic laws of physics. All the other good stuff works nicely. Where to put treatment is easy. How is not much harder.

I *strongly* recommend hanging acoustical treatment on the walls rather than building it in. It doesn't have to look horrible, it's less expensive, and it's the mainframe way of doing things. And you might actually need to put equipment up there one day. One simple way to hang treatment is to box it. Use 1/4-inch plywood to build 8-inch deep frames, screw the corners together using 2x2s, staple some chicken wire across the back, and cover the front with upholsterer's burlap. The burlap is good-looking, won't sag, takes paint (non-sealing, please) and compensates the non-linear response of 703 at very high frequencies. Don't like burlap? Try Linear Glass Cloth™. Nice stuff. For that matter, ceiling panels aren't bad. And for wear areas, there's no substitute for Tectum™

As drawn, there should be no glancing-blow, low-incident-angle reflections in the room. If you plan to *make* some with small speakers, lights and such, use Sonex™ to kill them. Nothing touches it for the purpose, but restrain yourself from wall-papering the room with it, as the base is so thin that it's got no absorption at the low end. Read the specs.

Ceiling treatment is best done with a conventional grid system using 1-1/2-inch Omega™ Fiberglass panels. They're the best in the Armstrong™ catalog: flat (0.97) to 125 Hz and below. Others may be as good, but, as above, read the specs. Some ceiling panels are more equal than others.

THE DOOR

There are a number of commercially available, steel soundproof doors that come in their own steel frames. They work every time, but I have a couple of problems with them. First, they're not as wide as I'd like. And second, I've seen three tape machines trip on the thresholds and fall flat on their faces. It takes two peo-

ple to get wheeled equipment over a threshold, and you don't always have help available.

As an alternative, it may be best to build your own. The design parameters depend on how soundproof you want it, starting with a standard, 1.75-inch, solid-core door at about four pounds per square foot and well under 20 dB of isolation at 125 Hz.

You may want to stop here, as improving a door's performance takes some effort. Doors are pretty much mass-law devices, so building one for low losses gets you into walk-in, refrigerator-style hardware. If that's acceptable, go for it. If not, stick with a single solid core. Don't even think about double doors on either side of the wall. If they're properly sealed it'll take two men and a boy to get them open.

A massive door can be made of multiple sheets of 3/4-inch particleboard at three pounds per foot, one inch at four pounds per foot, or 1-inch Lamiboard™ at 6.25 pounds per foot. That last is 200 pounds a sheet, 175 pounds for a 4x7-foot door. A couple of those will get you 24 dB at 60 Hz, and probably better if they're mounted on a flat 2x4 (2x6 at the hinge side) frame stuffed with glass wool. On the other hand, you're looking at a 400-pound door, so moderation may be in order.

Laminated construction allows doors to be built like a safe, with a 1/2- to 3/4-inch setback for each layer. That takes care of sealing three sides with no effort, and a rubber-blade sealer can be used for the bottom. You can get them with an automatic push-down mechanism, but it's probably overkill. Hiding the blade between layers in the middle of the door is real cute until it wears out, and then you have to take the door down to replace it.

LIGHTS

The purpose of lights is to see what you're doing. This sounds obvious, but engineers do a lot of things in a control room, and no one lighting system is suitable for all of them.

For recording, you generally want the lights down so the musicians aren't distracted by movement in the control room, but up enough so you can see all those little knobs. Unfortunately, such a compromise can't be achieved, and all of us have, oc-

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asionally, gone half-blind trying to set equalization in low-light situations.

Recording takes two lighting systems: one for the equipment, one for the general room. Equipment lights are easy. Get two or three little theatrical spotlights with barn doors, put them up on the ceiling, and set the barn doors so the light covers *only* the tops of the console and machines. The Fresnel lenses in those things are so efficient you can nearly burn the paint off a console at 12 feet, and with the barn doors you can do it with no light on anything else.

For everything else, indirect lighting is best as it's so even that light levels can be held really low. The troughs in the drawing are an old film-mix lighting system. Both the trough and the wall just behind it are lined with crumpled aluminum foil for maximum reflection; the lights are store showcase tubes or dimmable fluorescents. The showcase tubes are nicer, giving a peculiarly warm, soft, even light.

Bouncing the trough lights off a white enameled ceiling is pretty efficient. They don't heat up the room, and they produce perfectly even light without any bright spots to contract one's pupils, so the lights can be taken to amazingly low levels during sessions. So low, in fact, that it's a good idea to hold down the lighting just outside the control room. It makes for a sort of visual decompression chamber between control and studio rooms.

Soft, sexy lights are great for recording, but they're terrible for setup, cleaning, maintenance, repairs and the like. For that kind of work you need harsh, nasty fluorescents. So hang a bunch of industrial fixtures a foot or two below the ceiling behind the mixer. A bunch in this case means enough to make the sun come out when you hit the switch. As a minor bonus, the fixtures do a decent job of dispersing sound in the area, but make the spacing a little irregular to avoid a comb generator.

TOYS

All God's children got toys. Even purists who *won't* use anything more than outboard equalizers and limiters. The problem with toys is where to put them, and some of the solutions are outrageous.

If the receptionist can grab a sheet of stationery faster than you can get to a limiter-threshold control, you might look at how the receptionist would do that. Having looked, consider that the Brits call a console a mixing desk.

I've been supporting consoles on outboard racks for years and am astonished that so few other people do, as it's such a sensible idea. Cheap, too. Bud™ 31-inch, open-frame relay racks cost well under a hundred bucks each, can mount 28 inches of equipment and can raise the console height a few inches.

The extra height opens up the mix position and adds more comfort than you might think, but the chief advantage of mounting toys like desk drawers is that you can diddle them while facing the speakers. The alternative positions make no sense to me, as tweaking sidecar gear puts the mixer into monaural with one ear toward the speakers, while turning around to use equipment behind the mix position hardly bears thinking about.

The most frequent objection I've heard to this toy-mounting method is that people will kick the knobs off. Maybe, but several years of experience says it doesn't happen. Ever. Setting the racks back nine or ten inches from the front of the console may have helped. The second objection is that you can't see the knobs. But you can, especially if you hang a shielded, showcase light under the console to light them.

Two 31-inch racks at the front of the console will give you 4.5 feet of toys, with another 4.5 feet at the back for things you don't need to reach, such as power supplies and monitor amps. If nine feet of rackspace isn't enough, you may be in the processing business, not recording. However, the racks aren't particularly handsome, so you might want to cover the sides. Easy. Cement flat refrigerator magnets to a couple of nice-looking panels, stick 'em on the sides. Quick on, quick off. Don't forget to mount a fluorescent light-stick behind each rack, to simplify calibration and service.

Try a computer monitor arm for machine remotes. There are a dozen or more on the market, and one of them should suit your situation. At

—CONTINUED ON PAGE 228

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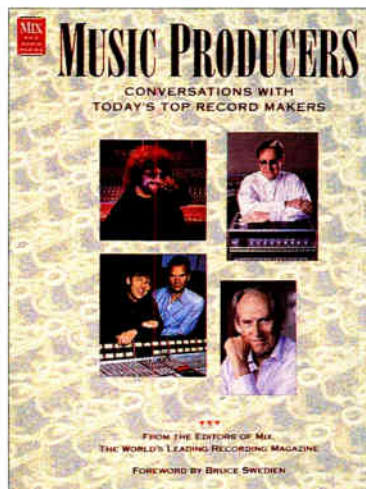
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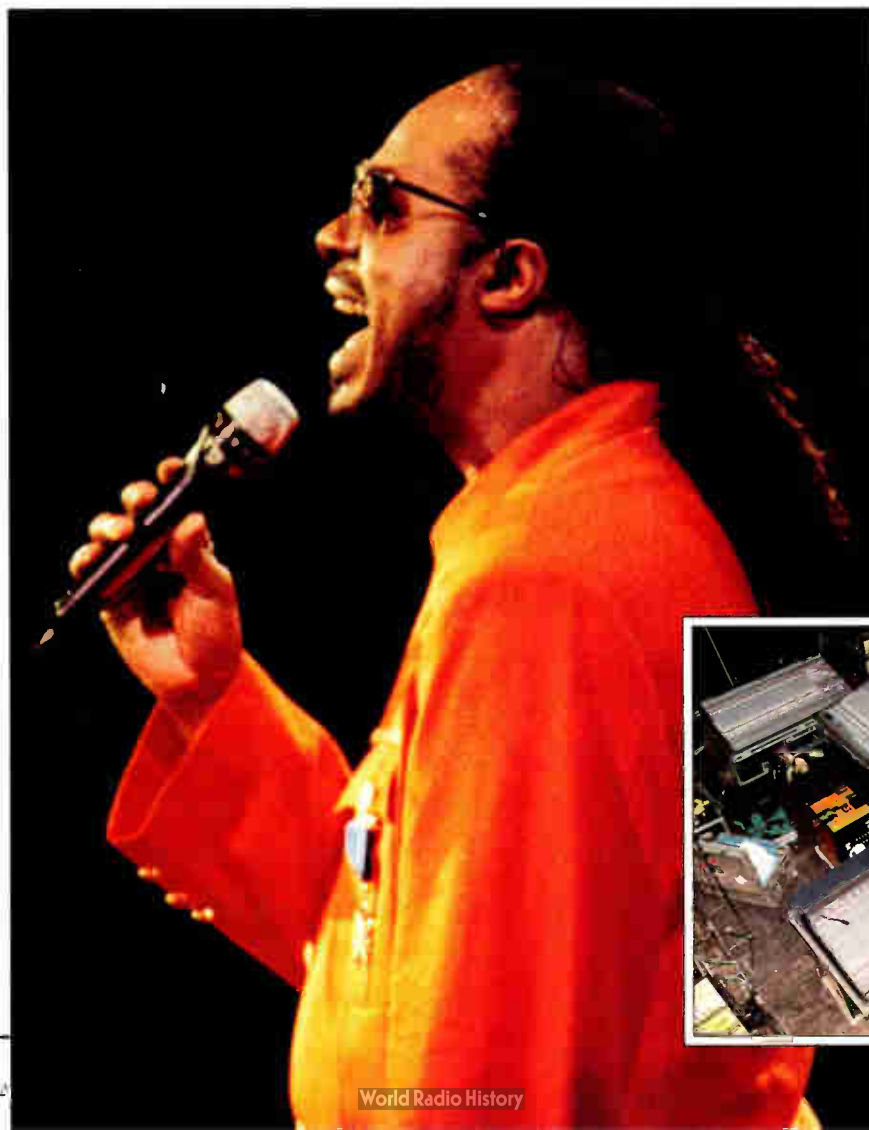
Below: Stevie Wonder using the C:MAX wireless in-the-ear monitoring system during his recent European tour. Below right: The monitor mix position used four consoles—two Midas and two Ramsa boards.

STEVIE WONDER'S NATURAL WONDER TOUR

Stevie Wonder recently completed a monthlong tour of Europe, including stops in Italy, Spain, France, England and Sweden. Billed as the "Natural Wonder," the tour featured a 26-piece orchestra alongside a full band. Canegreen Ltd. of London supplied sound for the show, including a Meyer loudspeaker system and Midas, Ramsa and Yamaha consoles. "Stevie wanted a symphony," says Larry Droppa, one of the crew's two monitor engineers. "In his mind it was

getting back to doing the older songs in a natural format, the way they were recorded."

"I'd worked with orchestras before, but this was very interesting," says house mixer Danny Leake. "It was the first time I used an orchestra of that size with a full-tilt band." High stage levels and multimiked orchestral instruments are a tough combination. To help solve that problem, the tour used about 30 pairs of Circuits Maximus' C:MAX™ wired and wireless in-the-ear monitoring systems. (Monitor engineer Droppa, who has worked



PHOTOS LARRY DROPPA

with Wonder for six years, is also C:MAX's president.) "Essentially," explains Leake, "Larry's system allowed us to lower the stage volume a lot by taking away the wedges, which made everything easier to deal with."

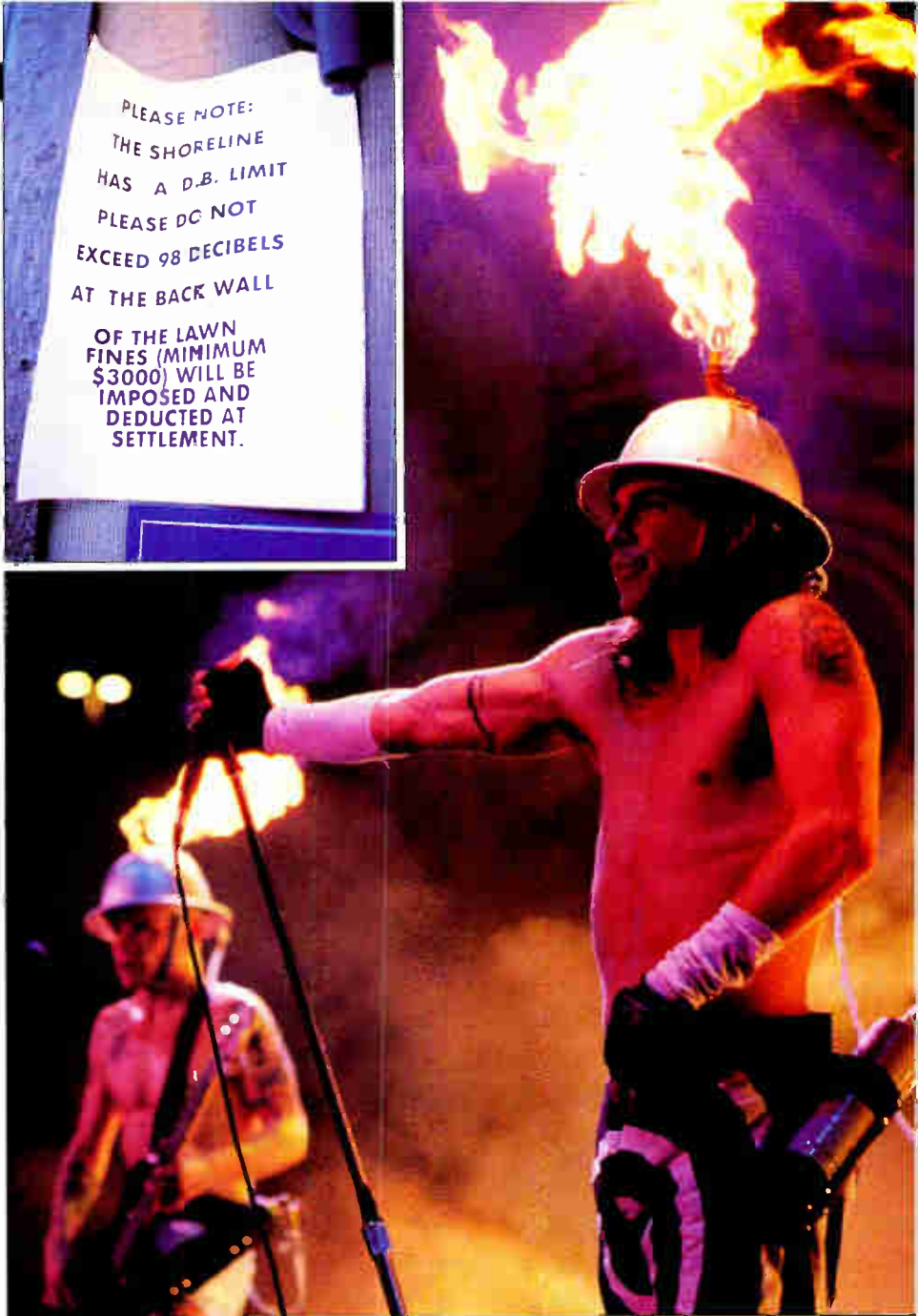
Wireless C:MAX systems were used by Wonder, backing vocalist Keith John and percussionist Lenny Castro, while the remaining band members, 26-piece orchestra and conductor ran hard-wired. Only four wedges and drum subs were used onstage. Each C:MAX system includes a pair of earphones, a belt pack with user controls (more on these in a moment) and a stage box. When hard-wired, the belt-pack is connected to the stage box via a thin, 15-foot multiwire cable. The stage box serves two purposes: First, it receives a mix from the monitor board, which is routed to the performer's earphones. Second, the performer's mic (or instrumental mix) is routed through the same stage box and back to his or her earphones, as well as to the monitor and house split.

From the belt-pack, the performer can then adjust the mono center-panned signal and the "band mix," which is processed into pseudo-stereo. In practice, this allowed the symphony to use just one monitor mix while each musician adjusted the monitor level of his or her own mic as needed. Obviously, this results in a lot fewer "turn me up" requests. "In every city we picked up a different symphony," explains Droppa. "It was an educational process every day to teach them how to use the system, but once we got it dialed in it worked very well."

Monitor duties were divided between Droppa (who used two Midas XL3 consoles) and Rick

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Lollapalooza '92 began its tour at Shoreline Amphitheater (Mountain View, Calif.) at the end of June. Electrotec provided its LAB-Q system, which included 80 main cabinets, 20 under-hungs and 24 Q-2 subs. Two house and two monitor consoles were used to facilitate quick set changes, with the show running according to schedule. Headliners The Red Hot Chili Peppers were mixed by Dave Rat (FOH) and Karrie Keyes (monitor), with Ministry handled by Lee Popa (FOH) and Bill Sheppell (monitor). Electrotec's top man on the job was George Barnes.

Top left: This ominous warning was posted near band dressing rooms. Above: Anthony Kiedis of the Red Hot Chili Peppers monitors the property-line SPL level with special headgear.

The tour's P.A. was used in conjunction with the venue's Excel Audio-based lawn system for a late-night noise test (see last month's story on "Sheds, Neighbors and Noise"). The test, which was designed to better understand how noise is reflected off atmospheric inversions, ironically generated its own spate of complaints. ☺

PHOTOS: JAY BLANKENBERG

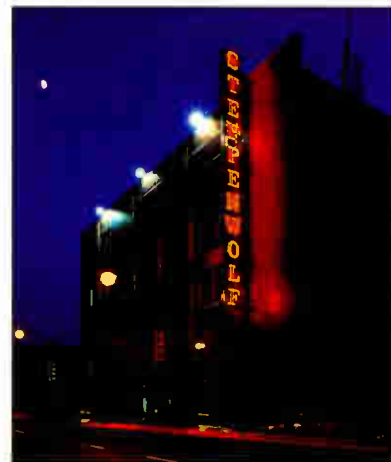
Massei (via two Ramsa WR-S840 desks). Droppa handled the RF monitors while Massei covered the rest of the band. House consoles included two Yamaha PM3000s and a Midas Pro 40 for the orchestra, which was sub-mixed into a stereo string and individual mono wind and brass mixes. These were brought into the house and sent to the monitor boards to avoid having to create another symphony mix.

Wonder used a Sennheiser 431 for his vocal, running through a Drawmer 1960 tube limiter. FOH vocal effects included an Eventide H3000, Lexicon PCM 70, LXP15 and 480L. Mic selection for the orchestra included AKG 451s on violas, cellos, harp, flute and sax. Sennheiser 409s on brass and Sony ECM 50 clip mics on violins. The Sonys were chosen because they could easily be clipped to a new violin each night, and they provided improved isolation from the nearby percussionist. "When he

got wild with the timbales," Leake explains, "it got a little brutal until we got the ECM 50s. But they have a big hump at 5 kHz—it's a lavalier mic. So I ended up pulling a lot of center out to make it sound a little more natural. The system guy with Canegreen, Gary Falkenthal, had also worked a lot of orchestral gigs, and he helped me a lot." Finally, a send carrying kick and bass was sent to a dbx sub-harmonizer and on to the Meyer rig. "I'd never heard subs that tight," concludes Leake. "I had a really good time with that."

STEPPEWOLF THEATER ADDS ELF

Chicago's Steppenwolf Theater recently added Bag End's ELF-1 subwoofer system. ELF (extended low frequency) provides extended bass response in a compact enclosure. "We were doing a production titled *The Song of Jacob Zulu*, a story about violence in South Africa featuring Ladysmith Black Mambazo," says Rob Milburn, sound designer for



Chicago's Steppenwolf Theater is the site of a recent ELF subwoofer install.

Steppenwolf. "The script required several explosions to provide dramatic impact at key points. Low frequency was necessary to really project the violence into the explosions."

The theater complex, which includes a 500-seat main theater and a 100-seat experimental theater, was completed in the spring

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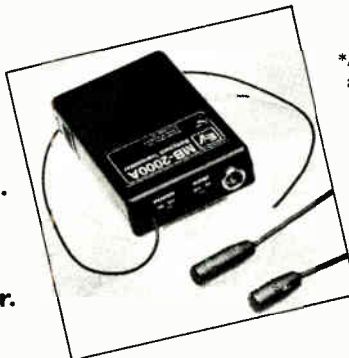
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of '91. Budget constraints prevented the installation of subs at that time, but the system was designed with that addition in mind. "Steppenwolf has always used sound in creative ways to set a tone, create an environment and enhance dramatic transitions," Milburn notes. "The definition provided by ELF is great. It gives us a nice, fat low end."

The Bag End ELF-1 system module is a 2-channel, micro-processor-driven loudspeaker controller incorporating dual-ELF integrators, active EQ frequency dividing and system protection limiters.

NEWS FLASHES

JBL Professional is offering "Flash Fax," a service designed to get you product information almost instantly. Just call (818) 895-8190 from a touch-tone phone and follow the instructions. Moments after you hang up, information on any of nearly 200 JBL, Soundcraft and UREI products will show up on your fax machine... Dan Dugan of San Francisco's **Dugan Sound Design** puts his money where his mouth is: Dugan has offered to make \$1,000 bets with those who believe they can hear the difference between generic professional and more esoteric audiophile-type cables. He led a workshop at last year's AES convention, which included a mass listening test comparing a \$2,400 pair of fancy speaker cables with \$20 pro cables. The audience scored 96 correct out of 212 trials, which was a bit worse than outright guessing... **Entertainment Sound** (Silver Spring, MD) teamed up with **RCI Sound** to provide a large EAW KF850/SB850 system for a recent National Organization for Women rally at the Eclipse in Washington, D.C. Ed Casey mixed the house, Jon Feldman did monitors and Patti Heck was system engineer. Gear included EAW SM122 wedges, KF300 sidefills, Soundcraft consoles and QSC amps. Entertainment was also

out with the Alvin Ailey American Dance Theater. The production carried KF300s and SB850s to handle 1,200-seat venues such as the Wang Center in Boston, City Center in NY and Atlanta's Fox Theater. Dave Gibson mixed house and monitors from a Soundcraft 200 driving QSC power... Rod Stewart's recent tour with Electrotec (Canooga Park, CA) used a Milab LSR2000 mic for Stewart's lead vocal. Lars Brogaard was responsible for the tour's equipment roster. "The LSR2000 combines the crisp attributes of a condenser with a dynamic mic's ability to handle extremely high SPLs," says Brogaard. "The mic does not exhibit dramatic frequency response variations, especially the harsh peaks typically found at 2 to 3 kHz." Milab VM-44s were also used on drums and guitars... **Westbury National Sound** provided a 64-cabinet rig for Spinal Tap during Canada Day festivities at Molton Park in Barrie, Ontario. Later that day Tap used **Rocky Mountain Sound's** 80-box Adamson system at UBC Thunderbird Stadium. The same day, yet another Adamson rig was in use at the Ottawa Civic Center, where **Wall Sound** provided a 64-box rig for Jeff Healey and Tragically Hip... **Stateside, Audio Arts** completed several large concerts including Roberta Flack, the Guess Who, Grover Washington Jr., Manhattan Transfer and The Country Music Festival in Ithaca, NY, again with Adamson gear... **Russ Berger Design Group Ltd.** (Dallas, TX) recently completed acoustical consulting and upgrades for the 700-seat theater at Silver Dollar City in Branson, MO. The venue, part of an old-time Ozark mountain theme park, is used for music, comedy, radio broadcast and variety show performances. "The comprehensive recommendations we received helped us implement corrective actions that significantly upgraded the theater and stayed within our budget," says Brad Schroeder, Silver Dollar City's entertainment director. ♣

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by Karen Mitchell

SOUNDS LIKE TELLURIDE



PHOTOS: BENKO PHOTOGRAPHY

Above:
The Nashville Bluegrass Band on the Telluride stage. Right:
Festival system engineer Mark Miceli at the FOH.



"Telluride is harder than most festivals," admits Mark R. Miceli, system engineer for the 19th annual Telluride Bluegrass Festival (held June 18-21 in Telluride's Town Park). "We have acoustic acts, strings, then full-blown rock 'n' roll sets. There's a lot of diversity." So much, in fact, that this year's festival offerings, playing to an audience of 10,000, included the no-nonsense Virginia bluegrass strains of Ralph Stanley & The Clinch Mountain Boys, a late-night Blue Rodeo set, Emmylou Harris, Peter Rowan, Poi Dog Pondering, Shawn Colvin

and Delbert McClinton, not to mention the saffron-robed Drepung Monks, a group of nine Tibetan monks who can each hold three notes simultaneously.

Telluride is a southwestern Colorado town some 8,745 feet above sea level. While it's a spectacular setting for music, the high-alpine, semi-arid climate can wreak havoc with sound. "I modeled Telluride for Stage Sound," says Miceli, who came to

Colorado just after doing the Mariachi Festival in Tucson. "I used [Renkus-Heinz's acoustical simulation program] EASE. This is the first time I've ever modeled a festival." The software enabled him to place speaker towers, check coverage and see where the dead spots would be.

The flip side of the modeling coin is measurement at the site. "I use a TEF analyzer," Miceli says. "That's the only way to

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measure within a microsecond. We time-align everything back to the stage instead of the tower. With the multiple delay, we can cover the whole seating area and keep the sound pressure level just around 100 dB. Otherwise, the people in the front have their ears bleeding. And this is a bluegrass festival." The main system provided by Tucson's Stage Sound included 30 Meyer MSL-3 cabinets with 650 subs and USM-1 monitors, a Yamaha PM3000, Crest amps, outboard equipment by Lexicon and Yamaha and microphones by AKG, Neumann and Shure.

One of the founders of the Telluride Bluegrass Festival is Kooster McAllister, who is with Record Plant Remote, NYC. "Even if they hadn't brought the remote truck out, I'd be here as chief engineer," says McAllister, who was recording at Telluride for a two-CD set due to be released by Christmas. "It's always a challenge to do acoustic with all of its nuances. And in Telluride, you're flying by the seat of your pants—there are never any soundchecks. We hold off on the multitrack for the first couple of songs."

McAllister records everything in Dolby SR using Meyer HD-1 monitors, a Trident console, Lexicon 300s and 200s, Eventide H3000s and various compressors and limiters. "I use Neumann KM84s for guitar and mandolin, Shure SM98s for drum kits and Shure SM91s for kick drum," he says. "For vocals I use Shure Beta 58s, and I like AKG 414s for overheads. Audience mics are AKG 451s with CK8 short shots, Shure SM81s and two PZM Crown mics."

Richard Battaglia, tour manager and sound engineer for Bela Fleck and the Flecktones, says that the band carries its own personal equipment geared to festivals. Gear includes what he calls "the usual compressors," including

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dbx and a BBE 822. "Here, festival check equals line check," says Battaglia, who has also worked with the New Grass Revival. "But there is enough time to set up; there's no pressure."

Battaglia also designs and builds preamps for Chard Stuff, his Nashville-based, 6-year-old company. Among his customers are Bernie Leadon, Sam Bush, Jerry Douglas and, of course, Bela Fleck. "They're designed for acoustic musicians," Battaglia says. "We do limited production. The pre-amp allows the musician to make a blend [between the pickup and mic in the instrument] and send out one signal."

Kathy Wolter has been a monitor engineer for Emmylou Harris for the last two years and has worked in the business for eight. "This is a little harder because we only get a half-an-hour set change," she says. "But if the crew is together, we can do it. I get different gear at every venue, but I carry Clair Brothers 12 AM monitors. This way, Emmylou hears it the same each time."

The unpredictable climate in Telluride, where a summer afternoon temperature in the 70s can plummet 30-40 degrees when the sun goes down, affects performers, too. "I actually avoid some outdoor shows because they're sonically difficult," says singer/songwriter Leo Kottke. "When the sun goes down, that's a nightmare. The sound shifts second by second, and it's a squirrely mix that can go haywire."

"The Telluride weather causes problems in getting the instruments tuned up," adds Maple Byrne, Emmylou Harris's production manager. "Here I tune them about ten to 12 times, twice as much as for indoor shows. But it's the last one that counts." ☺

Karen Mitchell is a feature writer and columnist for the Boulder, Colo., Daily Camera and an audiophile, of sorts.

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by Perrin Meyer

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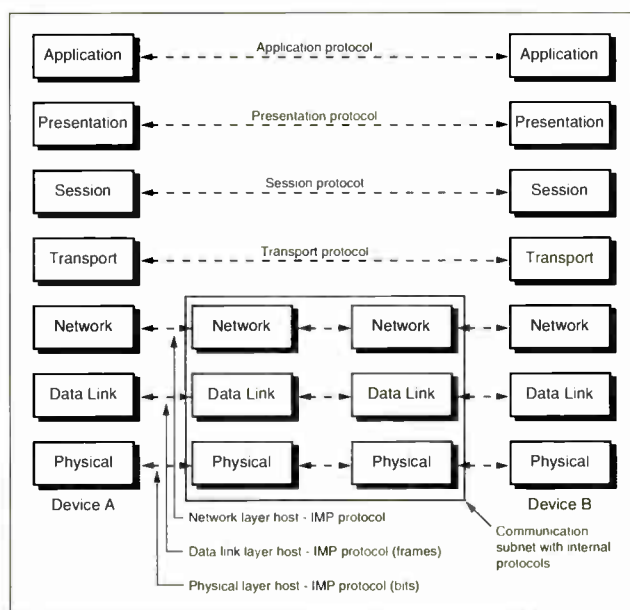


Figure 1: The ISO OSI protocol model

Many products in the audio world are now digital or digitally controllable. It is conceivable that all of these products could be controlled by a central computer, or even by multiple devices attached to a suitable interface bus. Just as Local Area Networks have increased office productivity, control networks of digital audio gear could be used to attain a new level of quality in live performances and recording studios.

For this to be the case, however, all of the digital devices must communicate using a common format. Compact discs would be a nightmare if every manufacturer had their own way of representing digital information. And were it not for the open, commonly adopted standard of MIDI, the contemporary project studio would not have

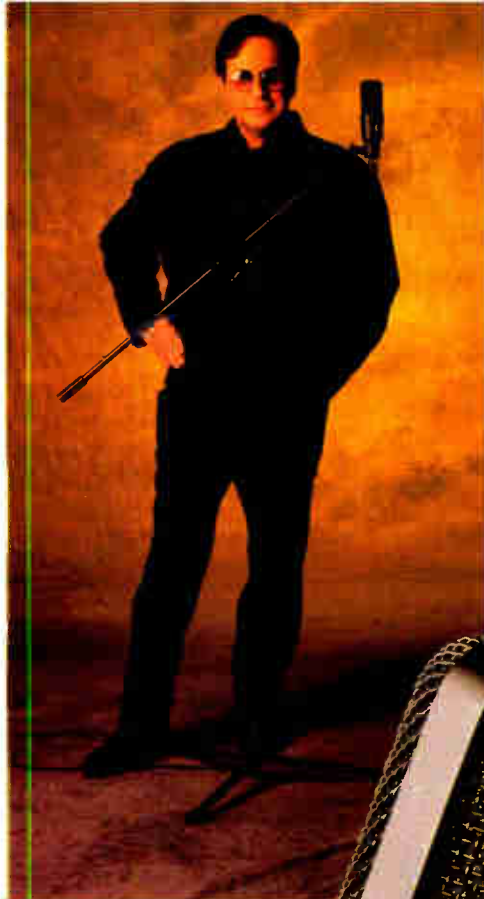
been possible.

A similar standard is needed to ensure the seamless connection of such devices as audio amplifiers and signal processors to master control computers, a task for which MIDI is insufficient. Despite earnest attempts to develop an industry standard for controlling and monitoring audio devices, none has yet emerged. As a consequence, a number of proprietary protocols currently vie for hegemony in the audio world, but this is clearly unproductive. Our hope is that this discussion may help to clarify the considerations involved in network design and further the dialog toward an acceptable standard for our industry.

NETWORK BASICS

A computer control network is much more complicated than just hooking up, say, a printer to a PC. Often, control buses have many devices on the same line to make wiring simpler, which makes the problem of messages getting garbled due to noise or a misbehaving device a distinct possibility. It is vital that a communications protocol be implemented in each device, enabling it to recognize meaningful data.

Modern protocols include schemes that allow multiple devices on a line to take turns communicating without collisions. They also include extensive error correction. However, the more complex the protocol, the more software must be em-



Phil Ramone photos by Michael Bloom

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bedded in each device, and the more bandwidth of a network is then spent on error and control codes. Thus, there are trade-offs between simplicity and expandability in any network. For example, it makes for a much simpler and better-behaved network if only one device on the network has the ability to originate messages and poll devices. However, many modern networks allow any device on the line to originate messages. This

makes for an easily expandable network, but complex algorithms must be included in the protocol to make sure that the devices don't garble each other's messages or monopolize the line.

PROTOCOLS

A convenient way to describe communications networks is the

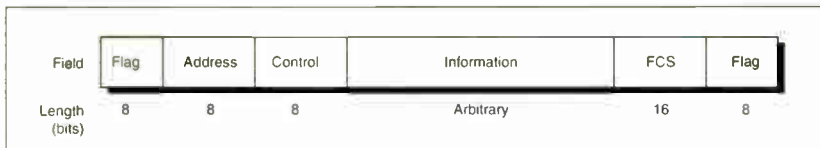


Figure 2: Sample frame format

International Standards Organization Open Systems Interconnection seven-layer protocol model. The seven layers (from the bottom up) are termed physical, data link, network, transport, session, presentation and application (Fig. 1). For control networks, the physical and data link layers are the most important, with the other five usually lumped together to reduce software complexity.

The physical layer is concerned with standardizing network connectors and mediums and their physical properties, such as fiber optic, twisted-pair RS-485, and thick or thin co-ax. The electrical representation of bits is described in this layer, as well as the maximum length a bus can run without repeaters.

The data link layer breaks up the raw bitstream into discrete units and exchanges the units using a protocol. Most modern LANs use bit-oriented protocols. Such protocols use frames as the unit of exchange, where the data to be sent is broken up into small numbers of bytes with various address and error-correction codes added (Fig. 2). The maximum number of bytes in the information portion of the frame is protocol-dependent.

The Frame Check Sequence (FCS) field is used for an error-correction scheme called cyclical redundancy checking. By computing this number from the data and comparing it to the number in this field, a protocol can tell to a high degree of accuracy whether a frame has been corrupted. It is then up to protocol to send the frame again or take other measures.

This checking mechanism helps ensure that the data received by devices is both meaningful and correct. A wrong character in a text file might go unnoticed, but a wrong bit in a



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control code might mute the wrong channel of a device during a live show—with disastrous results. The importance of error-checking cannot be overstated.

The physical and data link layers can be thought of as a data highway, where many different types of messages could be sent. The higher layers formulate those messages and make sure that the devices on the line know what to do with them. The respective layers should be separable and independent: The higher layers don't care how the lower layers do their jobs.

It would be possible to connect networks that are incompatible in their physical and data link layers but are OSI-compliant with bridges that translate common messages between the two formats. (For example, a bridge could translate a control code transmitted on a MIDI network into a form that a device on an Ethernet network could recognize.) But this adds a lot of complexity, and bridges can become bottlenecks that can wreak havoc on a time-critical control network. For these reasons, a unified standard—down to the physical layers—is required to achieve the full functionality of a computer control network.

NETWORK DESIGN

A number of factors influence the design of a network, including the speed required, the topology and the number of nodes. Common network speeds range from 19.2 Kbps (PA-422 and most computers' RS-232C ports) to 10 Mbps (Ethernet). Control messages are typically short (around 100 bytes), so the 10 Mbps speed of an Ethernet system might seem to be overkill. However, as control becomes more complicated, the data rates get quite high. For example, uploading coefficients to a 32-bit, 8-pole filter in real time would require a speed of about 22 Kbps to avoid zipper noise [from "Theory and Real-Time Im-

plementation of Time-Varying Digital Audio Filters," JAES, vol. 38, no. 7/8]. Communication protocols also have overhead, in that lots of control codes are necessary for addressing and error correction, and this can increase the minimum required speed.

The most common type of network topology is a two-wire serial bus, as these have simple wiring requirements and allow speeds up to around 10 Mbps and wire lengths of up to 300

meters. Parallel buses such as IEEE 488.2 are very fast, but they are only rated to a total length of 30 meters, which would be impractical for an installed system. Star topologies connect a central computer to every controllable device, which allows one device to fail without bringing the whole bus down, but it is much less efficient to wire. Other topologies include rings and combinations of these systems (Fig. 3).

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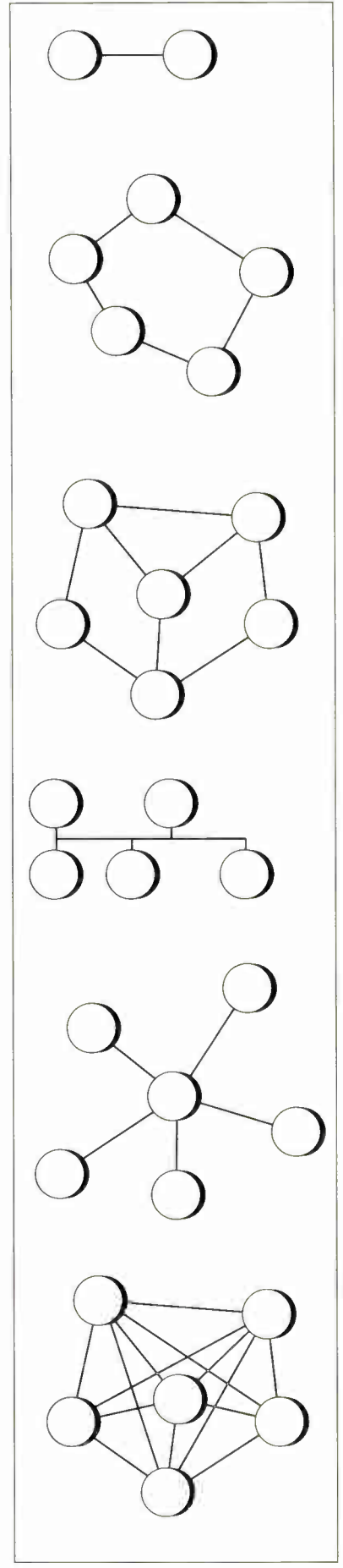
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are able to link separate branches of a network, which can be desirable. Even if a bus has enough capacity to connect every device in a building on one line, it might be impractical: As more nodes get added, the performance and predictability of networks decrease. Thus, a limit of, say, 250 nodes per line would not necessarily be a severe drawback as long as the protocol gave nodes the ability to address nodes that are not on

Figure 3: Network topologies—(from top) point-to-point; ring or loop; mesh; bus or multipoint; star; fully connected.

their particular wire. Also, protocols sharing similar data links and higher layers can be used to create networks that are upwardly compatible. For example, a well-defined protocol could be moved to fiber optics, and the increased speed might permit the transmission of digital audio alongside control information.



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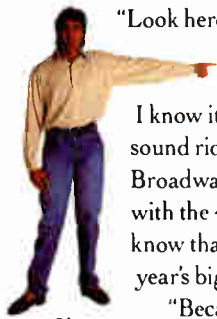


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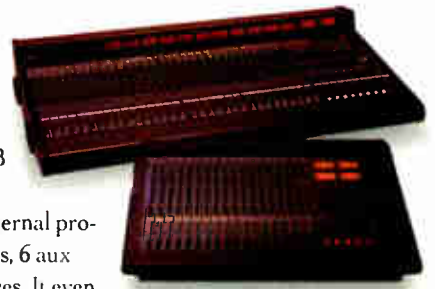
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"Obviously, they're both ripoffs of the Yamaha PM3000."

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"Obviously,
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CONTROL PROTOCOLS

The IEEE 802 protocols and Apple Computer's LocalTalk are examples of the physical and data link layers. IEEE 802.3 (Ethernet) runs on thick or thin co-ax or twisted-pair conductors; LocalTalk runs on twisted-pair. Ethernet and LocalTalk are very high-speed (10 Mbps and 230 Kbps, respectively), but they are designed for interoffice LANs and are optimized for relatively infre-

quent transfers of large files. This represents the direct opposite of a control protocol.

As a point of reference, consider the IEEE 1118-1990 (based on the Intel Bitbus), a common factory automation protocol that runs at 375 Kbps. IEEE 1118-1990 supports up to 250 nodes on a maximum length of 300 meters of twisted-pair RS-485 wiring. It is a slave-master protocol, meaning that only the master computer on a single wire can originate messages. Its protocol is opti-

mized for sending short control messages, and thus does not have the complexity of the seven OSI layers.

The master-slave topology provides for a relatively simple protocol and very well-behaved network, as one computer has complete control over all the messages sent. This simplifies device microcontroller programming but limits expandability. The master must be explicitly programmed to poll any node on the bus that might have a message to send, such as an amp that is clipping. Master-slave systems are also dependent on the reliable operation of the master.

LAN protocols such as Ethernet and LocalTalk, as well as many control protocols, allow any computer on a bus to send a message whenever it wants. Sophisticated algorithms take care of collisions, but on a heavily loaded line, the characteristics of the network can become unpredictable. This might pose a problem if very tight timing requirements are needed. It also adds a lot of complexity to the protocol, and thus is less efficient than a master-slave setup.

Another type of network that allows any device on a bus to originate messages is called the Token bus (IEEE 802.4). In this system, any node can originate a message, but the nodes pass a small control message (called a token) around, and only when a specific node has a token can it send a message. This creates a predictable network, but it adds considerable complexity (which can affect real-time performance) because the protocol must keep track of the tokens as well as deal with lost or garbled tokens and the addition of new nodes.

PA-422

Approved as an AES standard for the audio industry, AES-15 (commonly known as PA-422) is a different type of system than most of those mentioned so far. Based on the electrical standard RS-422, it is not bit-oriented but character-oriented,

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World Radio History

similar to the way computers communicate with terminals and modems. It uses eight wires: two for each balanced pair, four for data transmission and four for control. Wire pairs called the DSR (data set ready) and DTR (data terminal ready) allow nodes to grab the line and transmit data. PA-422 is asynchronous, using a Universal Asynchronous Receiver Transmitter (UART) to convert the signals into characters.

PA-422 has advantages in that almost all computers have built-in UART and RS-232C ports, which, by balancing the signal lines, can be converted into RS-422 electrical signals. PA-422's speed is 19.2 Kbps, which is rather slow compared to most modern networks, but most desktop computers can drive this speed directly. Plug-in cards are not needed, as is the case with Ethernet or other systems.


However, PA-422 also has significant drawbacks. As opposed to bit-oriented protocols that transmit data in frames with error checking done on the data link layer, PA-422 transmits data directly once a device has seized the line. Error-checking is not built into the protocol, except for a simple parity check, so this must be taken care of by each device. The standard does not specify how long any one device can transmit data, so performance of a heavily loaded bus would be unpredictable. Finally, it would be very hard to upgrade a PA-422 network to higher speeds and other physical mediums such as fiber optic, due to the asynchronous, multi-wire, character-oriented nature of the protocol.

CONCLUSION

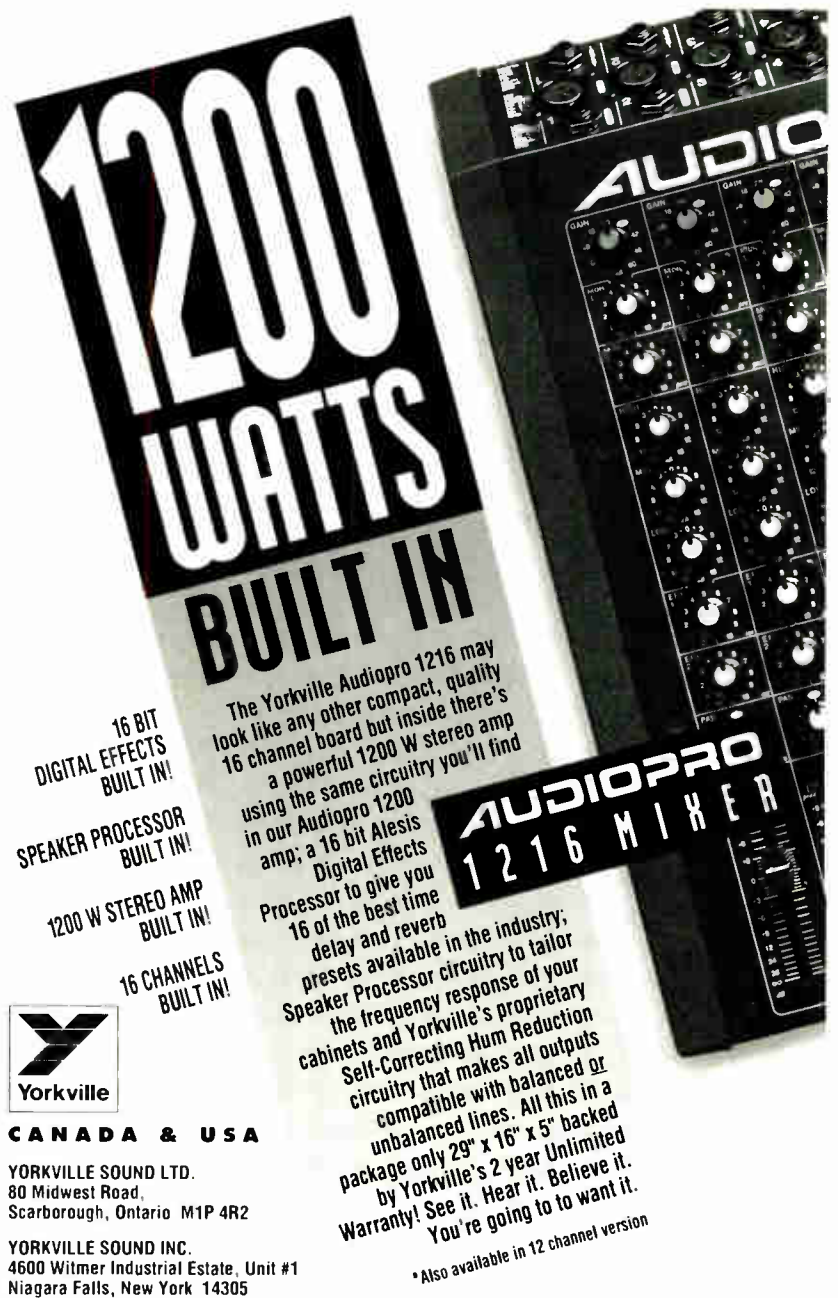
The drawbacks of PA-422, coupled with the difficulties in agreeing upon a unified successor, are clearly hampering development in an area that offers great promise for the audio industry as a whole. It is important that a professional audio control network be developed that both

meets the current control needs and provides sufficient expansion capability to handle the increased data flow brought on by the conversion to all-digital products.

While creating a protocol specific to audio control is a complex task, everyone in the pro audio community would benefit from adoption of an open standard. Manufacturers would not have to depend on a competitor's networking system, and users need not be bur-

dened with incompatible products. While proprietary protocols have been adopted by a limited number of manufacturers, we would be wise to take the lessons of MIDI (and other such open standards) to heart. 

Perrin Meyer is researching communications protocols for Meyer products and is studying for a B.S. degree in applied physics at Columbia University.



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ALESIS ADAT

I'm not sure whether this is a review of a product or a phenomenon, as no device in the recent history of professional audio has created such controversy, speculation and conjecture as the Alesis ADAT. Announced in January 1991, the long-awaited system uses a modular approach to digital multitrack recording, at a price that's comparable to the least

all-important DDD tag, was the decision to abandon the code based on an affirmation of analog (particularly advanced analog techniques) as a viable medium, or was the availability of low-cost digital a perceived threat to the allure of a DDD sticker?

Meanwhile, the advent of ADAT had the audio industry buzzing. Alesis ads proclaimed, "Everything



expensive pro analog decks available.

The repercussions are far-reaching indeed. Was it mere coincidence that as the first ADATs were delivered to retailers, the Society of Professional Recording Services recommended that record labels drop the SPARS code designations (ADD, DDD, etc.) that grace album releases, indicating whether the product was recorded/mixed using analog or digital gear? After years of "educating" consumers to look for that

you've heard is true," but as ADAT's scheduled December 1991 release date came and passed, the true meaning of the slogan seemed unclear, as doubts about the system's audio quality and sync capability ran rampant. Now that ADATs are readily available, we put a 16-track system through its paces. The results were surprising.

But let's start with some basics. Packaged in a 15-pound, three-rack-space chassis and priced at \$3,995, ADAT is an 8-track digital recorder.

offering up to 40 minutes of recording on an S-VHS cassette. As many as 16 units (128 tracks) can be synchronized via low-cost, 9-pin cables with "D" connectors, similar to those used with IBM-style computers. An optional master controller—the

+4dBu connections via a 56-pin Elco connector and unbalanced 1/4-inch inputs/outputs, as well as 9-pin sync in/out ports and an output for an optional external meter bridge (also unavailable at press time). Fiber optic in/out ports allow the cloning

work on drum tuning or empty the ashtrays before the session. Tracks can be recorded while formatting, though any gaps in the address data on the tape may result in unrecordable areas. In a multitransport ADAT system, you can always be format-

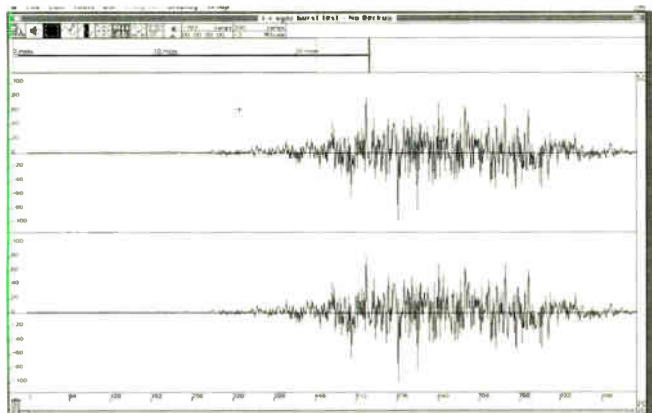


Figure 1: Waveform burst indicates sample-accurate multi-machine sync.

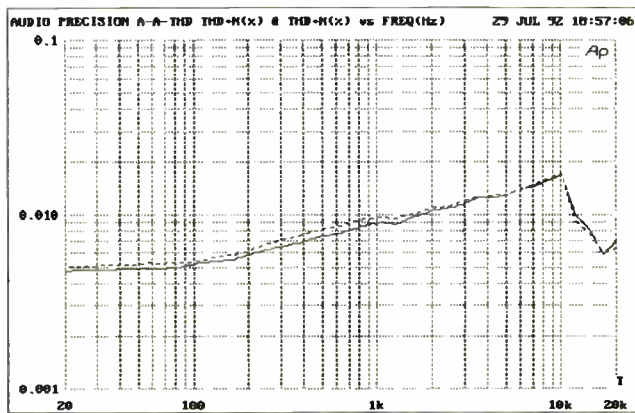


Figure 2: THD+N plot of two channels is well under 0.02%—even in worst case.

\$1,995 Model BRC—provides SMPTE and MIDI synchronization, along with assembly editing in the digital domain and at-a-glance monitoring of transport status. Unfortunately, at

of safety copies—each unit includes the necessary glass fiber cable—and provide access to the digital audio datastream for connecting peripheral devices. An AES/EBU-to-ADAT dig-

ting tapes on an unused transport while recording tracks on the other machine(s).

With ADAT's higher operating speed, a 120-minute VHS cassette

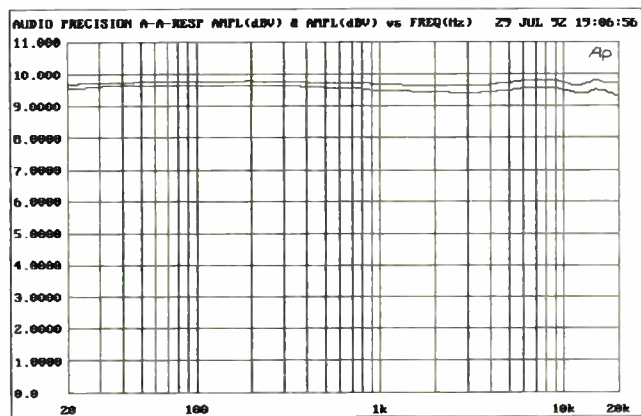


Figure 3: Frequency response plot of two adjacent channels.

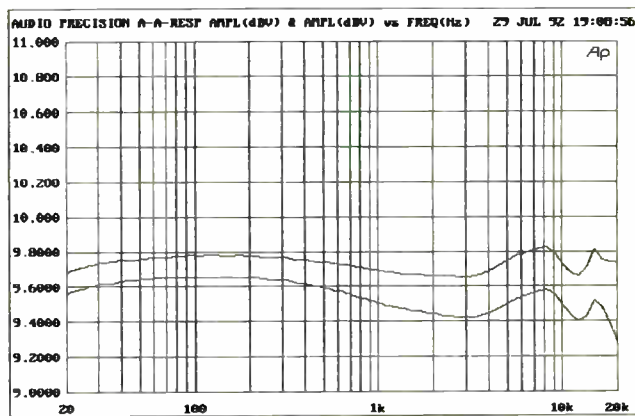


Figure 4: Expanded-range plot shows frequency response of under ± 0.2 dB.

press time, BRC was unavailable; anticipated release date is sometime after this month's AES show.

ADAT features 16-bit linear resolution, variable sampling rates of 40.4 kHz to 50.8 kHz, two location memories (plus return-to-zero), looping/rehearse function and LRC (included with the unit, this is a palm-sized remote controller that duplicates all the transport controls). The rear panel includes balanced

ital interface will be optional.

Operationally, ADAT is straightforward—anyone who has used a cassette multitrack could figure ADAT out in a matter of minutes. One obvious exception is tape formatting, which is similar to the procedure of formatting floppy disks. ADAT formatting writes time address data onto the videotape; however, formatting takes place in real time (40 minutes per tape), so you can

yields 40 minutes and 44 seconds of record time. However, be wary of shorter cassettes: I formatted a 20-minute, pro-broadcast cassette, which—after recording the time address data—only provided a net recording time of six minutes!

Currently, there is no standard for the wiring of 56-pin Elcos, so using ADAT's +4dBu connections may require some lengthy soldering sessions. At least Alesis had the fore-

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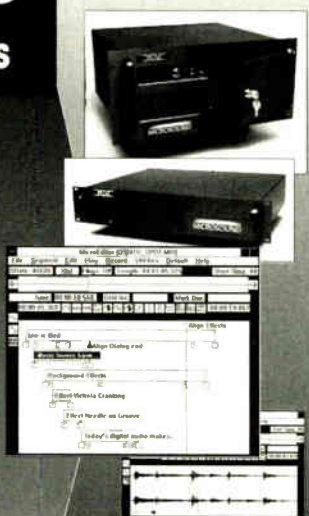
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FIELD TEST

thought of printing the Elco pinout both on the back panel and in the manual. While this is not noted, the pinout diagram refers to the *face* of the female connector or the *solder side* of the male plug. As an alternative, several companies are marketing Elco-to-XLR and Elco-to-1/4-inch snakes in a variety of lengths. As all the tape send/return connections on my console are Elcos, I had to suffer the fate of the solder to check out the balanced connections. It was worth it: The hotter outputs require less input gain, and the balanced lines reduce the possibility of noise/hum problems.

FUN WITH SYNC

One of the most persistent rumors about ADAT concerns the system's sync accuracy. Alesis claims sample-accurate sync performance ($\pm 1/48,000$ second), which is unheard of even in the realm of the most accurate pro videocassette editing systems. So how could Alesis pull this off in a low-cost system? Well, the secret is in electronic—rather than mechanical—sync. As data is read by two machines (in close mechanical sync), the digital information is stored in a buffer. Word clock timing information (carried in that 9-pin cable) from the master machine controls the release of data from the second deck's buffer, which enables sample-accurate sync, at least in theory. Other information carried via the 9-pin connections includes bidirectional MIDI data for MIDI Machine Control and Alesis proprietary sys ex, sample address data and word clock in/out.

To check out ADAT's self-sync accuracy, I recorded two tapes with simultaneous information and fed an instantaneous tone burst 40 seconds from the tail of each tape. The next day I played the ADATs in sync, routing one output from each machine into a separate channel of a Digidesign Sound Tools system, and recorded the burst. The resulting waveform display is shown in Fig. 1. The horizontal axis is divided into blocks of 64 samples, with each time period approximately 0.00145 seconds. This looks tight to me. Judge for yourself.

I had the opportunity to test Data-SYNC, a low-cost, third-party acces-

sory from JL Cooper Electronics of Los Angeles. DataSYNC generates MIDI time code directly from ADAT's 9-pin sync connector, allowing ADAT to provide MTC or MMC for driving sequencers or other MIDI-controllable devices without having to waste an audio track for recording time code. DataSYNC handled these chores without a hitch, and it includes a MIDI merging input (in addition to its MIDI output). For those users who need sync capability but would not require the additional functions of the BRC, DataSYNC is a highly useful and economical solution.

SPECS AND ALL THAT

Alesis claims a THD+Noise spec of 0.009 (at 1 kHz); as shown in Fig. 2, this was confirmed to be extremely close, although one of the machines tested out insignificantly higher at 0.00952%. Even at 10 kHz, the worst-case figure shown in the plot, THD+N measures well below 0.02%, which is quite respectable.

One of digital's axioms is not to exceed 0 dB on the meters, as digital clipping is an artifact that is immediately apparent. Lighting the red clip

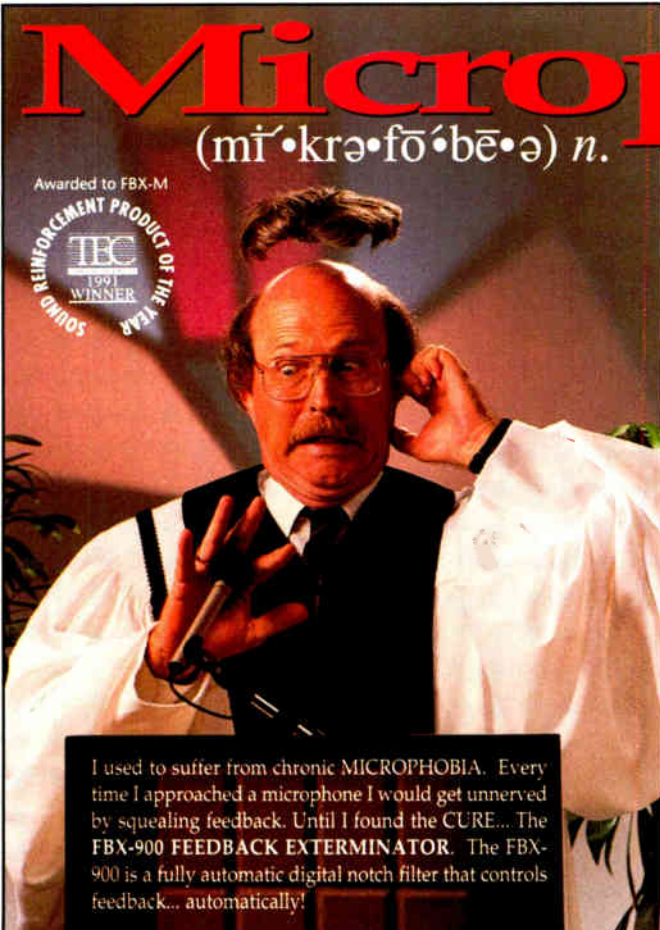
LEDs resulted in a very audible, unpleasant total harmonic distortion exceeding 5.6%. A word to the wise: Keep out of the red.

In terms of frequency response, Alesis states a figure of 20-20k Hz, ± 0.5 dB. The units we tested exceeded this spec by a considerable margin, as shown in Fig. 3. The expanded scale in Fig. 4 shows Deck No. 1 as flat to a tolerance of ± 0.1 dB range; Deck No. 2's performance is ± 0.2 dB, much better than the stated specs.

In the "Don't try this at home" department, we disassembled an ADAT. The layout of the transport and boards is clean and clear: Access for servicing or routine maintenance should be fairly simple, especially in the transport section, which looked like it was designed for heavy use. I was surprised by the amount of room in the case. It didn't resemble the jumbled trappings of a consumer VCR at all, which is what I expected. The DACs are Burr-Brown 1700s; the ADCs are Crystal CS5336s; good stuff. Some of the little touches, like Schottke protection diodes on the analog-digital converters, the high-quality Wima capacitors

and placement of the switching power supply in a separate lower compartment (shielded from other components), indicate that a lot of care went into the audio design. The measured specs confirm this. A built-in lithium cell on the main board retains autolocator settings, even when the unit is unplugged or switched off.

Specs are fine, but how does it sound? In repeated listening tests over a period of weeks on Meyer, Tannoy, JBL, KRK and other monitors, the ADAT sounded very good. In fact, A/B comparison tests of the ADAT and a CD playback source revealed only extremely subtle differences between the two. In qualitative terms, I'd say it sounds equal to a good-quality DAT machine. So if you're pleased with the sound of DATs, you'll be quite happy with ADAT. Of course, if you want a different sound, try ADAT with a Drake or Vacuum Tube Logic outboard ADC—that is, once Alesis (or some enterprising third party) releases an ADAT optical-to-AES/EBU or S/PDIF interface. And no, ADAT doesn't sound much like an analog machine, but neither does a Mitsubishi X-880




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One sound that I didn't like was the actual noise of the transports, which was noticeable in a quiet control room and was about as loud as a hard disk whirring. It wasn't unreasonably loud, but it was clearly noticeable, and I couldn't help but wonder how 16 transports would sound simultaneously...

The layout of the front panel is logical, with everything where you'd expect it to be. Among those few additions that I would have liked would be a preset switch for changing the sampling rate from 48 to 44.1 kHz (the unit defaults to 48 kHz—changing the rate to 44.1 involves lowering the +100/-300 cent pitch control by 152 cents) and an infinite peak hold switch for the meters. The latter reset automatically after about two seconds.

Speaking of time, the deck requires about three to four seconds to go into "play" or "record" from "stop." If the heads are "engaged" (meaning a pause-style mode where the tape is lightly held against the

head drum), then going into "play" takes only one to one-and-a-half seconds. The tape can be shuttled forward or backward with the heads engaged, although long fast-forwards or rewinds should be avoided in this mode. Two presses on the "stop" button disengage the heads, or they disengage automatically when no transport activity occurs after four minutes. A 40-minute tape rewrites in 112 seconds.

In a variety of sessions (rock quartet, traditional jazz trio and radio jingle production), the ADAT worked well. The transport was smooth, if sometimes a bit noisy from cassette shell noise, particularly when shuttling into play. Punch-in/out were seamless, even on difficult passages. The crossfade time on edits is preset at 10 ms, which is comparatively short, although the BRC will supposedly offer a choice of 10, 20, 30 or 40ms crossfades.

Five different tape types (including Sony, JVC, Ampex and TDK) were tested, the only problem occurring with a JVC S-XZ top-of-the-line S-VHS formulation. (At a discounted street price of \$12.99, this,

ironically, was the most expensive tape we used.) As another twist, the cheaper \$8.99 JVC S-XG worked just fine.

In the middle of a live jazz session, the deck started flashing "Er-7" and finally dropped out of "record." In a couple of hundred hours of recording, this was the only glitch we experienced. Wondering what Error 7 referred to, I looked through the manual, which was no help. Alesis prefers in such cases that you call their tech staff at the toll-free number in the manual; unfortunately, our problem occurred during a late-night session. We put another formatted tape (Ampex) into the deck and continued recording for another two hours without incident.

The Alesis representative I spoke to the next day explained that Er-7 indicates a loss in control-track data, and since the machine worked afterward, perhaps the tape may have been faulty. He also said that Alesis had tested dozens of tape formulations, ranging from el-cheapo off-brands to exotic high-end stuff, and had good results.

A few lessons: If you're recording

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something important, run two machines in tandem as a backup. Always have a few extra formatted tapes available, just in case.

However, I decided to put this tape question to the test. Although Alesis recommends using the best tape possible—especially as these tend to have the best mechanisms and shells—I decided to check out ADAT's performance with the worst tape I could find: a generic *non-S-VHS* tape from K-Mart. I pre-formatted the tape, but when I re-wound and started recording, the blinking Er-7 display came on almost immediately. Undaunted, I resorted to an old analog trick: exercising the tape (fast-forward and rewinding before using for the first time) and re-formatting. I nervously hit the "record" button and was surprised to see the system operate normally. And the playback was spot-on! So I set up a 20-second loop and let the machine cycle (play-rewind-locate-play...) for about 90 minutes. It still sounded great. Perhaps the ol' exercise trick applies equally well to digital multitrack cassettes. Time will tell.

A few other comments concern the manual, which provides good primer-level explanations of ADAT operations and recording principles (and even includes a glossary of digital terms), but omits a meaningful explanation of how ADAT works and does not include schematics or a signal flow diagram. A list explaining some of the error codes would also be helpful. There are no instructions on head cleaning, but to be fair, after a couple of hundred hours of use, the pathway was remarkably clean, and any maintenance engineer versed in video head cleaning will have no problem cleaning the heads, drum and guides. Conversely, untrained hands in any precision mechanism can lead to possible equipment damage and/or electrocution. On a brighter note, Alesis covers ADAT with a one-year parts/labor warranty (except the head assembly, which is 90 days).

The implications of ADAT—and similar systems now under development by several other companies—could spell a major recording revolution in the making. At suggested retail, a complete 24-track ADAT digital system (including BRC) costs under \$14,000, a price point compa-

rable to the *least* expensive 1-inch analog 24-tracks; and videotape-based recording systems also offer a substantial savings in tape costs—up to 90%! Other points worth considering stem from the modular aspects of such a system. Users can upgrade to more tracks by simply adding another recorder unit, and systems are downwardly compatible—a 24- or 32-track system would have no trouble playing back 8- or 16-track sessions. That trick is a lot harder to pull off using a conventional reel-to-reel multitrack.

Perhaps more significant than price alone is that modular recording systems may bring new ways of looking at the entire recording process. As an example, a bass overdub in a typical digital recording session requires a facility with an expensive digital multitrack, probably accompanied by a big-ticket console and nice recording room. So the time is booked, and the producer, engineer, second and bassist all converge at a studio for a couple of hours. Add in the cost of studio time and salaries, and this quick overdub becomes an expensive proposition. As an adjunct, the acoustics of the recording room become just another irrelevant fixture as soon as the bassist plugs into a direct box. With a modular system, the producer could give the bassist a slave tape with a scratch track; working at a suitably equipped home studio, the player lays down several tracks at a convenient time. Later, the player gets paid, the producer chooses from up to seven different bass takes; the slave tape is synched to the master, and the selected track is digitally transferred. Megatracking becomes reality.

Overall, the Alesis ADAT has much to offer either the aspiring novice or the seasoned producer, combining quality sound and flexibility at a price/performance ratio that's unbeatable. In terms of future reliability, ADAT's solid construction and attention to detail make a bold statement about the company's commitment to the pro market.

Alesis, 3630 Holdredge Avenue, Los Angeles, CA 90016; (310) 558-4530. ■

The author wishes to thank Gary Hall, JJ Jenkins and Jeff Mock for their assistance with this article.



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by Rick Clark

JIM DICKINSON

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It was through the efforts of renegades and raconteurs in an oppressive culture that Memphis burst upon the global music scene. The truthful spirit of naked soul, in all of its terrifying beauty, ran through the Delta blues to Sun Records and Stax, and through strong-willed personalities like Elvis Presley, Chips Moman, Otis Redding, Dan Penn, Jerry Lee Lewis, Sam Phillips, Rufus Thomas and many more.

Producer Jim Dickinson understands that first hand. Ever since his first childhood encounters with Delta blues men and jug bands, Dickinson has sought musical situations with people similarly committed to keeping the honesty of music alive. Unfortunately, in an age where so much rock 'n' roll has been reduced to clever marketing conceit, and where the edges have been sanded off much of today's black music, Dickinson's production voodoo has been the subject of a love/hate relationship with various record labels. The situation has been one where labels want the results he achieves, but they don't want to experience the medicine that comes with the process. The swampy, wild-card element of the creative process scares the corporate mentality, but that's historically the nature of great rock, blues and R&B recordings.

In spite of that, Dickinson has amassed an impressive array of production and performance credits that speak well of his philosophical integrity. As a producer, Dickinson has worked with Big Star, The Replacements, Ry Cooder, Jason & The Nashville Scorchers, Mojo Nixon and many others. His sideman credits include the Rolling Stones, Carmen McCrae, Johnny Winter, Aretha Franklin, Dr. John, Eric Clapton, Arlo Guthrie, The Cramps, Los Lobos, John Hiatt and too many more to name. By himself, and with Ry Cooder, Dickinson has helped score sixteen films, including *Paris*,



Texas, Crossroads, Brewster's Millions, Streets Of Fire and *The Long Riders*. Anyone who has heard his audacious Atlantic solo album, *Dixie Fried*, or the primal undertakings of his band Mudboy & The Neutrons (a name bestowed by Cooder), knows that Dickinson is one-of-a-kind, like many of his greatest influences from the mid-South region.

Mix: In your "Production Manifesto" you state that "Music has a spirit beyond notes and rhythm. To foster that spirit and to cause it to flourish—to capture it at its peak—is the producer's task." It's apparent that you look at

your job as operating beyond the normal commercial and sonic goals of production.

Dickinson: As a producer, I try to remain aware and attuned to the peculiar harmonic properties of the events as they unfold. This is not just musical. I'm talking about how the balance is gonna change in the room constantly during the process, just because of the process itself. It's in the life of the event where you find the soul, and that's what you're trying to capture.

This becomes a moral responsibility for the producer. When you talk about records, what is the terminology that's used? This is a good record or this is a bad record. Well, that's basically the way I see it. There are enough bad records that get made, and you know it's your obligation during the process to try to make a good record.

I think that in the case of many young bands, who can remain nameless, that the more they compromise, the more they eliminate the very thing that might have gotten them across.

Mix: So it's the idiosyncratic elements that hold much appeal to you?

Dickinson: I have a reputation with companies who say: "Oh yeah, Dickinson, he goes for the quirks." That's right! I do go for the quirks. They say that as if it's bad. I think it's the quirks that need to be magnified, because music—good music—shoots sparks, and I try to catch those sparks. If I can, I'll turn 'em up to where they're in your face, because I think a record has to be bigger than life. I'm not a documentary producer. I try to capture the moment and enlarge it to where it's more obvious. The overtones, and the squeaks and squawks on the strings, are the human elements that many engineers and producers try to eliminate.

Mix: So you're not a big fan of cleaning up everything in sight.

Dickinson: I know engineers and producers who will go back and systematically, with the computer, remove the breath from the vocal performance. Well, when you take away the breath, it seems obvious to me that you are destroying the life. That which is alive is what's breathing. I learned that from recording horn players. There's always that big breath before they play, and I always try to get it because I think it sounds alive. You

know it's right before the beat. No musician I've ever heard breathes out of meter.

Mix: Your production of *Big Star Third* recently got released on Rykodisc to much critical praise. *Rolling Stone* even gave it a rare five-star rating—for a 17-year-old recording that has never been officially released. Stateside, you've attracted quite a bit of work from artists who admire that album's unsettling spirit.

Dickinson: That's true. I think many artists came to me for some kind of revelation. The emotions they heard in *Big Star Third* were close to the surface. They credit me with bringing something out of Alex [Chilton], and it's something they wanted to have

the problems that are between them and a successful recording, which is something I learned from Tom Dowd, who is the great problem-solver.

Mix: The Replacements were one of those bands who came as a result of your work with Big Star. What was it like working with them?

Dickinson: When I recorded them, they were a trio. When they came into the room, they had a presence beyond their mere presence, like the old Rolling Stones. I figured that if I could capture that unknown quality onto the tape, I could move it around to where it worked musically.

Mix: Ardent [in Memphis] has been the setting for some pretty strange sessions. The Replacements were no dif-



Producer Jim Dickinson taking a break to catch up on the latest "Bat escapades." You'd never guess he is a keyboardist.

brought out in them. I think that because the record was difficult to find, its mysterious quality was enhanced further. Alex was very definitely growing toward another level, and that's what the recording is a document of. I was nailed for indulging Alex on *Big Star Third*, but I think it is important that the artist is enabled to perform with integrity.

What I did for Alex was literally remove the yoke of oppressive production that he had been under since the first time he ever uttered a word into a microphone, for good or ill. I tried to show him how to use the studio, rather than be abused by it. And that's what I try to do with any artist that's interested in that. And if they're not interested in that, I try to eliminate

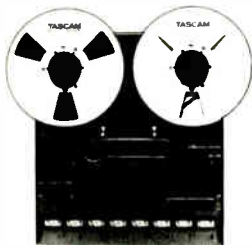
ferent, I understand.

Dickinson: During The Replacements sessions, complaints circulated at Ardent's regular Monday morning studio engineer's meetings that the band was tearing up the studio, which was really not the case. They were just a little sloppy. After it was all over, [John] Fry came up to me and said, "Listen, Jim, I'm not complaining about this, but I would like to know, out of curiosity, how did they get the vomit on the wall?" I said, "John, they puked in their hands and they threw it up there." The stain is still there and they point to it as if it were a historic bullet hole or something, for which I am, I guess, responsible.

Mix: You used Fairlight extensively with The Replacements. In what fash-

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ion did you employ it, and how did you keep it so raw and organic-sounding?

Dickinson: This didn't happen on every track, because there are songs that are complete performances, but ironically, it was the comedy material—and I don't mean this as a play on words—that [Replacements leader Paul] Westerberg didn't want to take

"I think it's the quirks that need to be magnified, because music—good music—shoots sparks, and I try to catch those sparks."

seriously. I would get drastically different vocal performances from one take to the next. Everyone assumes it is spontaneous performance, but it was put together top to bottom, including the background vocals. There are also places where they were recording as a trio, and I made a rhythm guitar bed with the Fairlight, out of snippet performances that would be real hot, giving the band a real believable quartet sound. Westerberg did not strive for perfection in his rhythm playing, but by taking his part and looping it, his chaotic rhythm acquired structure. Of course, we had to hand-generate a click. That's what we did on the ones that we really cleaned up, like the remix of "Alex Chilton" or "Shooting Dirty Pool." We would generate a click that, where if the tempo fluctuated, we fluctuated the tempo, which was pretty drastic in some cases. Then the Fairlight could read the tempo map and compensate.

Mix: What else can you tell us about that project?

Dickinson: The snare drum sound was run through the "listen mic to tape" feature of the SSL console, which operates like a drastic 100-to-1 ratio compressor. The whole sound of "Pleased To Meet Me" is based around that "listen mic to tape" technique, and I've used it on other records, too. It is something that the SSL console is not de-

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signed to do. You have to bypass some circuitry to make it happen, but you can do it.

Mix: Judging from much of the earthy music you have done, it is interesting that you are a firm believer in digital.

Dickinson: As a person who uses digital, I'm haunted by people who don't. There are people who will say, "Oh, I always analog my drums," or, "Oh, I always analog my vocals." They look at you with this kind of superior look on their face, like you're some kind of decadent, addicted Japanese

person who records everything digitally because you don't care. Well, anybody who knows me notes that, by the time I've hit the tape, I've gone through as many tubes as I possibly can and some other stuff as well: I'm not going dry to the tape. What I'm really doing is multifaceted sampling anyway. So, I defend my use of digital that way.

Mix: What are your favorite rooms to work in?

Dickinson: Acoustically, my favorite room is Ocean Way in Hollywood. The "B" room is amazing. I did a lot of work with Cooder there. My favorite mix

room is "B" at Ardent in Memphis, because of the way the speakers are configured. They're mounted so low and just far enough away from you that you really do achieve a different listening perspective. The SSL is what I prefer to mix on. I've never been able to work on a complete Massenburg console. I've seen them work, and that's one of my ambitions—to get to do a fully automated Massenburg project.

Mix: Which engineers have stood out to you as favorites?

Dickinson: They all bring their own little gifts, but when I look back on the projects, most of my favorite ones are with John Hampton at Ardent. He's very low-key and invisible, which, of course, is good as an engineer. He's got a sense for a certain place in the upper midrange that is unique. He's just now really starting to get his due. I have a real different personality relationship with Joe Hardy that makes it easier to work with certain kinds of artists. Hardy is clinical in an off-the-wall way. He'll go deep and far afield with you, and still keep you technically in a realm where you're creating usable sound rather than just noise.

John Fry, to get the record straight, was the master. He was the best, hands-on, top-to-bottom engineer I ever worked with. *Big Star Third* is a testimony.

Mix: If you could pick who you would like to produce next, who would it be?

Dickinson: The Beastie Boys, because I'm sure they are jaded enough by now that I could really help them. [Laughs]

Mix: With all the maddening politics that arbitrarily make or break careers, for seemingly no reason, your maverick approach has surely met with frustrating situations. How have you dealt with it?

Dickinson: In this business, rejection and humiliation are literally a daily occurrence. You can't ask an artist to not be sensitive, but if you take it too personally, it will kill you and your art.

I had a coach in high school who told me, "You've got to remember, Dickinson, they are not doing it to *you*, they are just doing it." I apply that to the record business: They are just doing it. It is happening, and it is falling on you and your art, but you can't take it personally. ■

Memphis-based writer Rick Clark knows where to find plastic chattering Elvis teeth near Graceland.

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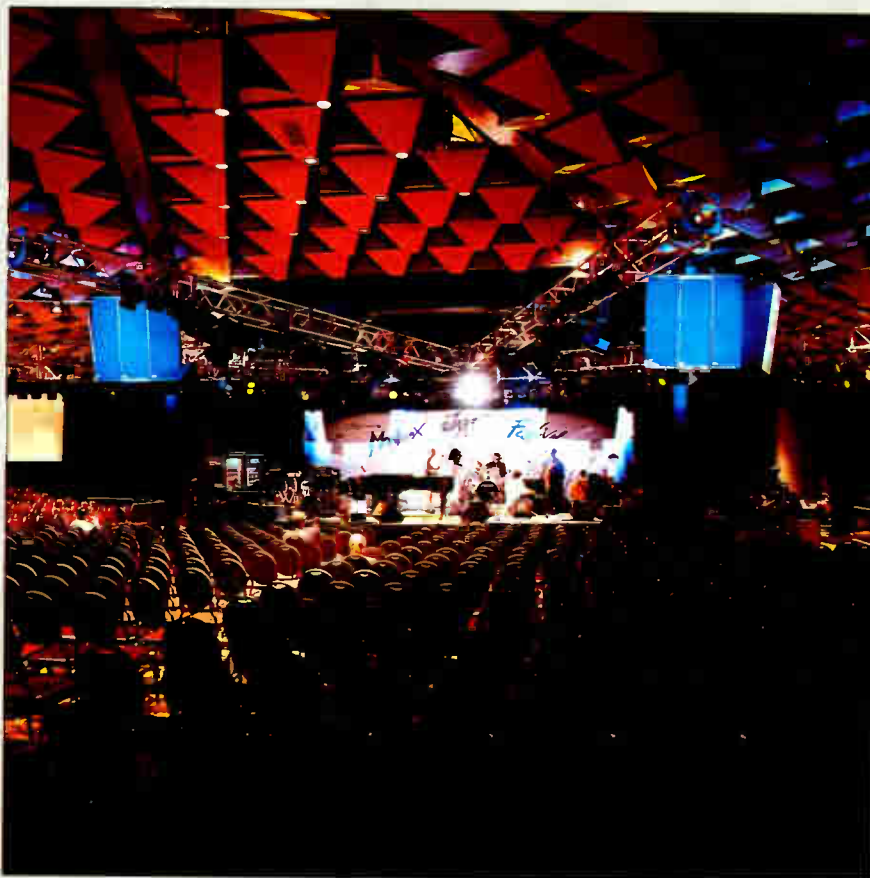
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by David Schwartz

GETTING JAZZED IN MONTREUX



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Summer music festivals in Western Europe are nearly as common as county fairs in the States. In Switzerland alone, large musicfests seem to fill every valley and population center during the month of July. Among the most enduring of these, as well as most musically varied and technically ambitious, is the 26-year-old Montreux Jazz Festival on the eastern edge of Lake Geneva.

This 16-day, three-stage event, which frequently runs well into the wee morning hours, is the ongoing brainchild of one-time aspiring chef and more recently WEA International managing director Claude Nobs.

The fiftysomething impresario, who in 1964 booked the Rolling Stones into Montreux for their first performance outside of Great Britain, has sought to bring the best music to the Montreux Festival with a fervor reflected in his lifelong compulsion for jazz and record collecting (more than 25,000 LPs).

Last year Nobs invited Quincy Jones to co-produce the event, a partnership that continued this year, resulting in a diverse collection of performers and the newly adjusted (but seldom used) moniker: Montreux Jazz & World Music Festival 1992. Headliners spanned the gamut

PHOTO: COURTESY OF MEYER SOUND

of the world's record charts, with each evening loosely held together by a musical theme.

Western Night grouped Emmylou Harris, Glen Frey and Mark O'Connor; Blues Night featured Buddy Guy, the Blues Brothers band and Eddie Floyd; Gospel Night teamed Andre Crouch, Gladys Knight and Tremaine Hawkins with the Atlanta Super Choir. Rock acts Simply Red, Eric Clapton and Ringo & Friends each carried their own evenings and



Chief mixer Chris Ridgeway at work.

usually finished before midnight, unlike the more typical 2 a.m. rave-up jams of the multi-artist groupings. And there were even jazz performances here and there from artists such as local favorite Rachel Farrel, Randy Crawford and the VSOP-ish quintet of Herbie Hancock, Wayne Shorter, Tony Williams, Ron Carter and Wallace Roney Jr.

Performing artists at this festival are treated to one of the world's

most enthusiastic audiences, partly due to the intimacy of the 2,500-seat headliner room at Montreux's Casino (immortalized in Deep Purple's "Smoke on the Water" after burning down in 1971 during a Frank Zappa concert). The audience also benefits from a tremendous technical effort made to optimize sound, lighting and video support. Described by crew members as a high-tech summer camp, the MJF is a fortress of production capabilities in remote recording, digital multitrack in-house recording facilities, high-definition video recording, live radio and television broadcast, three-camera archiving and state-of-the-art live sound reinforcement, all coordinated with Swiss precision.

It takes four weeks for the festival support staff to set up, run the show and move out. Hyperson Sonorization, Switzerland's local Meyer Sound dealer, provides the sound equipment to augment the house system in cooperation with the French company Best Audio. A British production crew, headed by Fraser Kennedy, has been coordinating the technical aspects of the event for a number of years, with chief mixer Chris Ridgeway running the sound booth and mixing all artists who do not bring their own mixer.

Providing sound to the main performing room is no small chore, as the room is shaped more or less like a three-leaf clover with the stage

—CONTINUED ON PAGE 195



GREMLINS, PRINCES AND REAL WORLD SIGHTINGS

by Colin Paulson

Summer madness has definitely left its mark on Britain. Chrysalis-owned Air Studios' new complex in Hampstead, north London, received an unwelcome and unplanned redesign recently when a concrete pump exploded, caking the 50-foot-high octagonal main hall and several construction workers. This is not the first disaster to befall the project since rain washed away the foundation of the adjacent cottage. The building was designed as a missionary school in the 19th century, serving as the learning place for one David Livingston, the

—CONTINUED ON PAGE 198

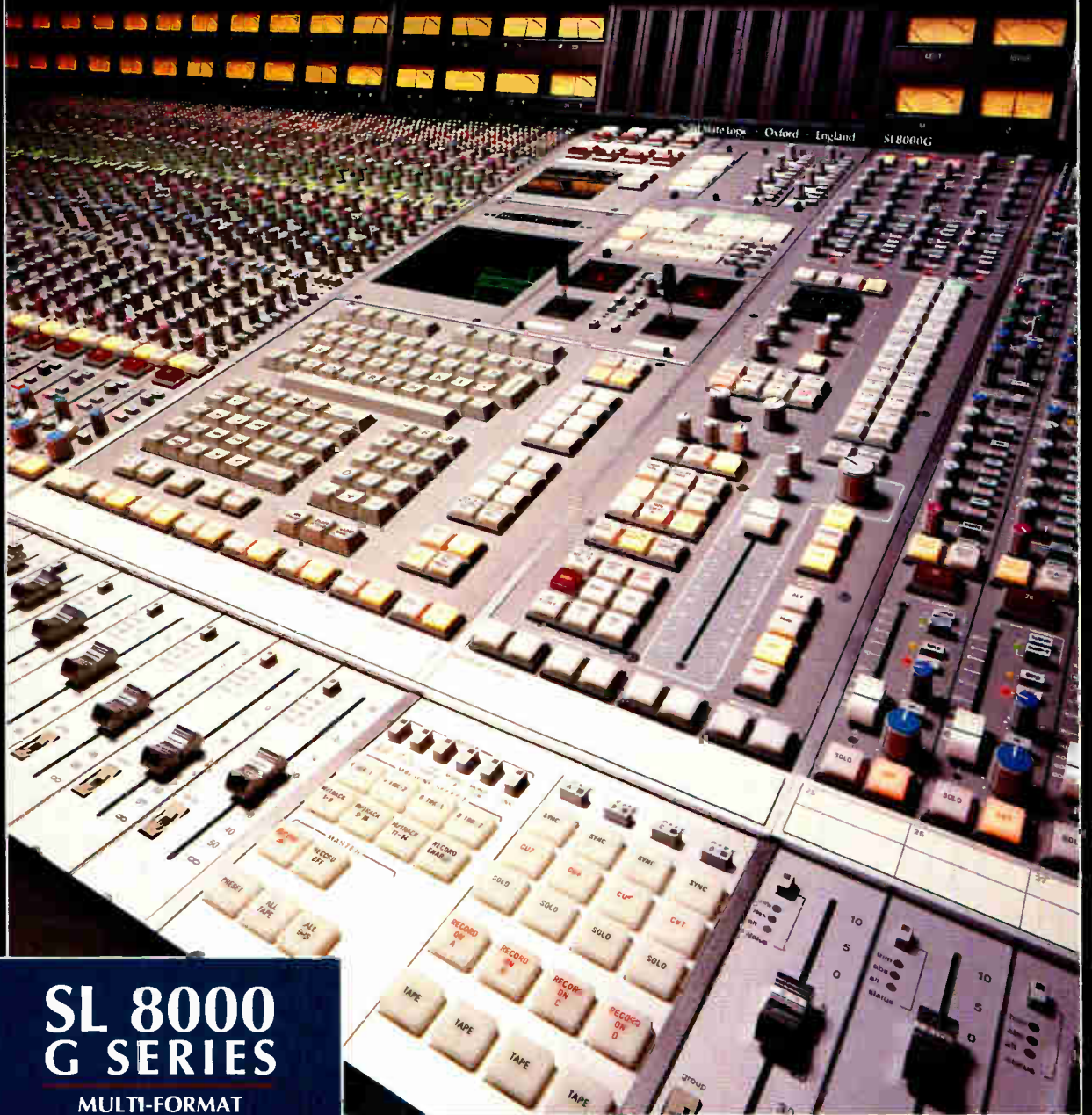
STUDIO SPOTLIGHT

YUME STUDIOS

Yume Studios Japan installed a Soundtracs Quartz 3200 production console in its recording complex in Maebashi City, Japan. Other equipment in the studio includes an Akai A-DAM DR 1200 digital multitrack, Akai DD1000 optical 4-track recorder and Yamaha NS-10 close-field monitors. Signal processing equipment includes a Yamaha SPX1000; Sony MU-R201, DPS-R7 and DPS-D7; dbx 160; and UREI 1178.



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—FROM PAGE 193, MONTREUX

at the top of the stem. In order to provide even coverage to the audience, the house sound was oriented as three separate stereo systems.

HOLLYWOOD COMES TO CAPRI

"I guess the Hollywood Bowl Orchestra was considered a very high-grade plug to fill the hole when the Boston Pops left Philips Classics to record for Sony," reports recording engineer Joel Moss. Pictured left to right at the Capri Digital Studios' mixing sessions for the Orchestra's new recording of *The King and I* movie score are Carloquinto Talamona, studio owner; Joel Moss; John Mauceri, orchestra conductor; and Michael Gore, producer.

The Orchestra, recently reformed (after a 40-year hiatus) with top L.A. session musi-

each feeding a section of the cloverleaf.

"The extreme upstage positions were filled in with MSL-3s," says Meyer Sound's Mark Johnson, "and this year we wanted to include DS-2 loudspeakers for that mid-bass chest

thump. If we were going to hang them individually like we did in previous years, it would have gotten very unwieldy. So we were able to get Andrew Martin to supply the ATM flying rigs, which made it easy to get the clusters of three together

cians, recorded the original tracks in four days at Sony's scoring facility in Culver City, the former MGM scoring stage, using a Sony 3348 digital recorder. Vocalists on the tracks included Julie Andrews, Ben Kingsley, Marilyn Horne, Peabo Bryson and Lea Salonga. The European mixing site for the project was chosen in part to accommodate Mauceri's spring schedule as the conductor of the Scottish Opera Company.

"There's little more to say about the mix process other than the availability of two of everything one might need to accomplish the job," says Moss, "and a terrific support staff that makes the mixer's job a breeze. It's amazing how efficient one's output becomes when breaks

include superbly catered meals and leisurely strolls through the timeless beauty of Capri." ■



Pictured (L-R) at Capri: Carloquinto Talamona, Joel Moss, John Mauceri and Michael Gore.

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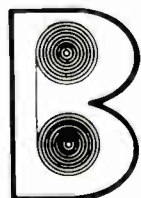
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and suspended from one point. We had six hanging points, one stage-right-rear for a left channel, two points stage-right-front for right channel to the right audience area and left channel to the front of the house, and the reverse on the other side. Actually, we also used some UPAs for front fill because of the size and positioning of the main system. So that really made for four stereo systems to the house. We added little UPM systems on delays in mono to cover overflow areas and

the Gallery, which was the balcony area."

The main house console used by most artists was a 40-channel Midas XL-3. The signal from the board went into what Johnson calls a "scratchpad EQ, which consisted of a [Meyer] CP-10 parametric and a Klark-Teknik graphic. Because we SIM the system [Meyer's Source Independent Measurement system compares the output of the console with the output of the loudspeakers, allowing the system to be aligned using the stage performer as the source in an audience-present sit-

uation], we like to take it to flat as the first step. The analogy we like to use is that taking it to flat fixes the canvas for the painter, or the mixer in this case. And from there they can do whatever they like with it.

"Then we had one more CP-10 combined with a BSS 820 digital delay for each stereo channel of the system, because we delayed everything back to the stage," he continues. "During our original SIM'ing of the system, we determined the position of the loudest acoustic source onstage. We wanted to know without the benefit of a P.A. what was going to generate the loudest noise; probably a drum kit. So in that small room, if you have a drum that may have as much acoustic output as the P.A., you want the two sound sources time-coherent, which necessitated a delay of 20 milliseconds or so on all of the main reinforcement systems.

"This type of delay system is a practice that started being used on theatrical productions, and is now becoming more common in popular music," Johnson adds. "It's quite a nice effect. I likened the resulting sound to sitting in the living room listening to your hi-fi. But it was really powerful, obviously, with a total of ten MSL-3s and six DS-2s.

"As far as signal processing," Johnson says, "with 16 days of shows and sometimes four different artists per night, Chris wanted to have lots of processors to satisfy the variety of mixers who would be passing through the sound booth. The limiting/gating rack had some Drawmer gates, some dbx compressors and some BSS gates. The reverb rack had the standard Lexicon 480, a REV 5, PCM-70, a couple of SPX90s, and everything came to a patch bay. The main goal was to make the whole thing as easy to adapt to as possible so that a mixer could walk in and there wouldn't be any surprises."

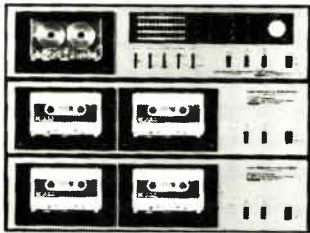
Getting a major arena artist such as Eric Clapton to play such a small venue has a lot to do with the ease of getting in and out of the show with a minimum of setup and a high confidence that the sound and other support services will showcase the artist nicely. Little amenities, such as presenting band members with audiophile-quality cassettes

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of their performance as they leave, also make this event a class act.

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Mix Editor-in-Chief David Schwartz drew the short straw and had to make the trip to Montreux this month. Better luck next time.

INTERNATIONAL BITS AND PIECES

MEXICO

Radiopolis Mexico, an FM transmitter chain, is equipping its studios with Studer's 962 and 963 mixing consoles, as well as several Studer recorders, CD players and monitor speakers.

JAPAN

Sunfield Crescent Studio, in the Kinuta district of Tokyo, took delivery of a 72-input Focusrite desk.

AUSTRALIA

Fairlight ESP (Sydney) appointed John Lancken as international sales manager. Andrew Bell was promoted to marketing manager.

UNITED KINGDOM

Dublin's Ringsend Road (comprising former Ringsend Road and Windmill Lane studios) complex was due to be completed in June with the opening of Windmill Lane's Studio 2. Brian Masterson and Andrew Boland serve as house engineers; Mick O'Gorman is manager of the complex...The first deliveries of Solid State Logic's Scenaria system were scheduled for August. Orders for the digital console/recorder/video post system have come from Europe, America and Japan... Abbey Road installed a Neve Capricorn console in its Penthouse studio...CEDAR Audio (Cambridge) chose London-based HHB Communications to handle sales of its audio production system and the DC-1 real time stereo de-clicker...Glas-

gow's Scottish Television bought a 16-channel DAR SIGMA SoundStation.

CANADA

The Banff Centre received the first annual Corel Systems Multimedia Award for its innovative use of multimedia technologies in the arts... The Canadian Broadcasting Corporation purchased three Neve 72-input consoles for the CBC Toronto studios.

EUROPE

Westdeutscher Rudfunk, a large

radio station based in Köln, Germany, engaged Studer Digitec to equip a post-production studio for the station...Zurich's Swiss Television chose Studer 990 consoles for the company's post-production studios 1 and 2...Portugal's national TV organization, Rádiatelevisao Portuguesa, upgraded with DAR's SIGMA system.

Want to see your facility in *Mix*? Send information and pictures (we prefer color slides or transparencies) to the magazine at 6400 Hollis St., Ste. #12, Emeryville, CA 94608, USA, attention Terri Stone. ■



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—FROM PAGE 193. LETTER FROM LONDON

legendary British missionary and explorer. Rumors that the place is haunted by someone who objects to its impending rock 'n' roll future are to be taken with a pinch of salt, a garlic necklace, a silver crucifix and a mug of holy water. Incidentally, Chrysalis' other studio, Wessex in north London, is also well-known for being haunted.

Mayfair Studios, which recently bought its way out of receivership, has acquired a bright pink Neve V Series. The console was first seen at the European AES show in Vienna and caused quite a stir. The price paid for this custom paint job is unknown.

Prince (the miniature one from Minneapolis, not the big-eared, balding one from Buckingham Palace) recorded at the exotic Metropolitan Studio late one night in June, and his minders called from the limo every few hundred yards to keep the bewildered studio

staff informed of his progress toward them. They were further confused when the call came through to say that he was waiting outside and would someone go out to welcome him. His Purpleness has used the converted power station before, but the precision of the operation this time did seem a little over the top.

Peter Gabriel was cornered backstage at the WOMAD World Music Festival and given an impromptu performance by six Cuban a cappella salsa players. He promptly agreed to sign them to his Real World record label and had his staff running round like headless chickens to fit them into the Real World studios the following day. As his exasperated helpers tried to coordinate things, he winked and said, "Yes, I am a bit of a devil, aren't I." His extramural activities have certainly bedeviled Virgin Records for the six years since *So*, but his new album, *Us*, will be re-

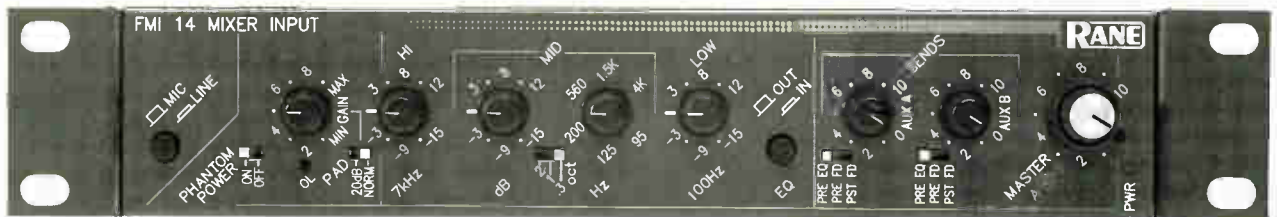
leased in September, he promises. In the meantime, his Real World recording week in August will probably result in half-a-dozen complete albums within several days. He is nothing if not unpredictable.

Swanyard Studios of Islington has suspended share-dealing pending an announcement. Tension is running high as we wait to see what the announcement may be. The company has been the target of incessant press speculation since they floated the company on the stock exchange four years ago. A rights issue to raise cash for a New York studio project that later collapsed caused further adverse publicity. But the company soldiers on, dealing with the press and previous employees only through its lawyers. I dare not say more.

Au revoir, mes amis. ■

Colin Paulson observes the British media production industry from his home base in London.

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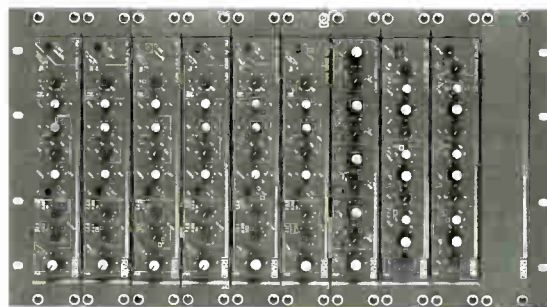


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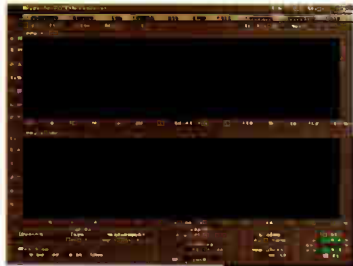
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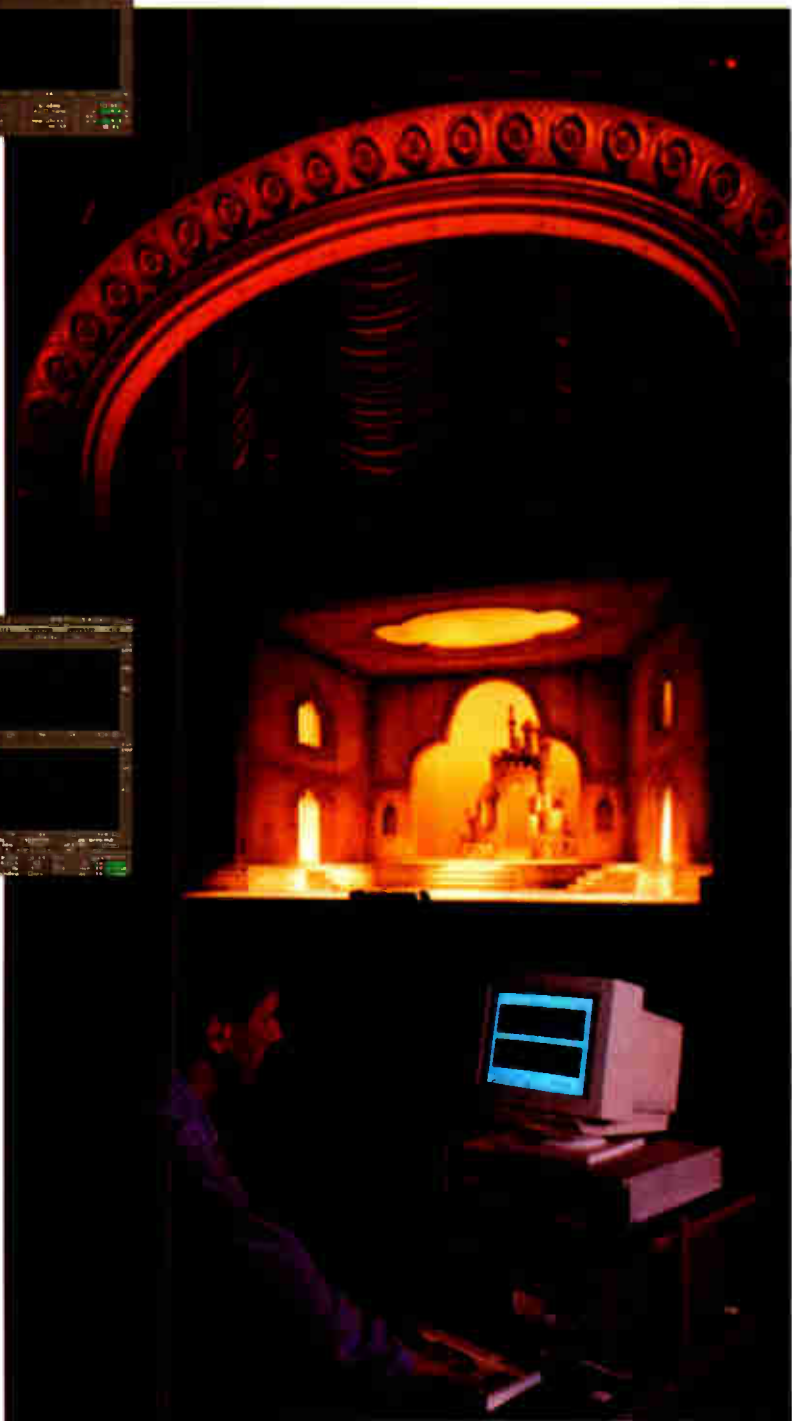
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RECORDING SESSIONS

Los Lobos Paint Their Masterpiece

If all you know about Los Lobos is their 1987 smash hit version of "La Bamba," it's time to start digging a little deeper. The group's latest album, *Kiko*, is unquestionably their most mature effort to date, ranking with the best

Los Lobos, I to r, Cesar Rosas, Louie Perez, David Hidalgo, Steve Berlin and Conrad Lozano

discs by *any* band in the last couple of years. A work of, at times, startling originality and depth, *Kiko* is nearly impossible



PHOTO: JAY BLANKENBERG

to characterize. Its lyrics are often fragmentary and surreal, as if they describe dreams; and the music is all over the map stylisti-

cally, mixing a huge range of electric and acoustic stringed instruments, keyboards, sax

—CONTINUED ON PAGE 202

Rocking In the Studio with Ringo

by Iain Blair

Ex-Beatle Ringo Starr may be the most famous drummer in the world, but that didn't prevent him from having "the worst attack of nerves ever" when he

went into the studio to record his latest solo album, *Time Takes Time*.

"It's true," admits Ringo. "It's my first solo studio album in nearly ten years, and even though a lot of good friends like Tom Petty and Brian Wilson of the Beach Boys were helping me, I was so

scared I actually ran away. It was very, very strange, and I was frightened that I'd lost my touch. I didn't know where I was or how you did it anymore, so I took off."

It's hard to imagine him almost calling off the entire project because of nerves. After all, Ringo has recorded ten solo albums since the breakup of the Beatles, scoring such big hits as "Photograph," "It Don't Come Easy" and "You're Sixteen."

Fortunately for his many fans, Ringo got his nerve back, and the result is his strongest record in a long time. Recorded at a variety of L.A. studios over the past year—Conway, Rumbo, Westlake and Capitol, among them—*Time Takes Time* was overseen by Don

—CONTINUED ON PAGE 204



PHOTO: JAY BLANKENBERG

Teenage Fanclub: Indie Roots

by Adam Beyda

Since releasing their second album last November, Teenage Fanclub have been caught up in a minor eruption of media hype. They have appeared on *Saturday Night Live* and been featured in *Rolling Stone's* "Hot" issue. But these guys ain't no glamour boys; beneath it all lurks a post-punk band.

The Glasgow, Scot-



PHOTO: MICHAEL LAVINE

land, quartet's first album, the grungy and melodic *A Catholic Education*, is a gloriously independent

work. Released two years ago on the small, New York-based Matador label, the LP's rough

Teenage Fanclub, l to r, Norman Blake, Raymond McGinley, Brendan O'Hare and Gerry Love

sound is the result of an inspired, cheap and brief recording effort. The band spent one week on the self-produced LP. Of course, they'd had plenty of rehearsal time, since they formed the group two weeks before going into the studio!

"It was like a rehearsal room LP," concedes guitarist Raymond McGinley.

—CONTINUED ON PAGE 210

Ed Sullivan's "Rilly Big Sheww" Lives Again

From 1948 until 1971, watching *The Ed Sullivan Show* on Sunday nights was as much a part of American family life as summer barbecues, inedible TV dinners and picking up your teenage brother or son from the police station.

This was the variety show that had something for everyone: top comedians, acrobats, big bands, ballet dancers, rock 'n' roll groups, classical virtuosi, sports figures. You had

The Animals as they appeared on *The Ed Sullivan Show* in the mid-'60s.



to love a show that could feature the little Italian mouse puppet Toppo Gigio and the Rolling Stones in the same hour. Not to mention Sullivan himself, who always seemed to be doing an Ed Sullivan imitation.

Now, some of the best comedy and music from those old shows has been compiled on a series of TVT Records compact discs (and cassettes),

known collectively as *The Sullivan Years*. Among the first batch of discs were titles like *Born to Be Wild: Rock Classics* (featuring Jefferson Airplane, Joe Cocker, Santana, The Band, etc.); *Happy Together: Sixties Rock* (The Turtles, Grass

—CONTINUED ON PAGE 209



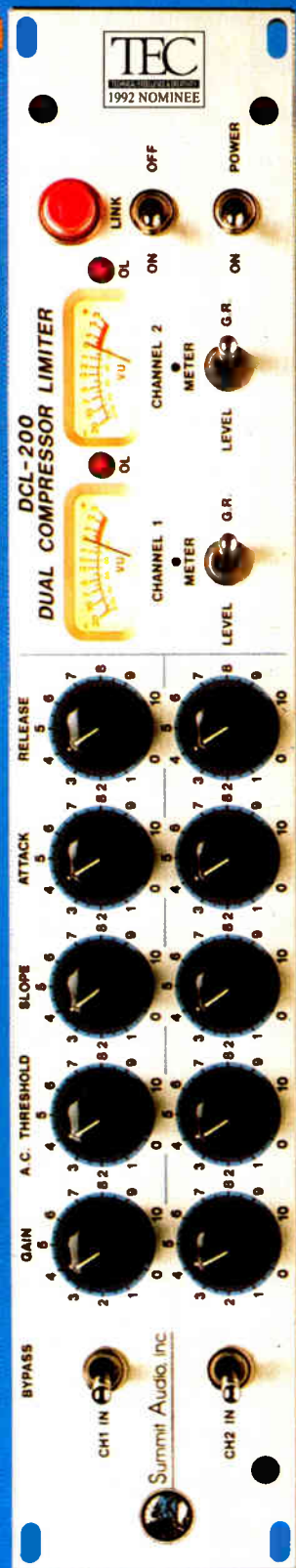
Artist's Studio:

Gary Lamb's Mountain Hideaway

"I feel my music is pop more than anything else," says Santa Cruz, California, keyboardist/composer Gary Lamb, who has landed a succession of albums made for his own Golden Gate Records label onto *Billboard's* New Age chart during the past couple of years. "People in some places hear the term 'new age' and they think of a skull and crossbones. That's definitely not where my music is coming from," he laughs.

—CONTINUED ON PAGE 211

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—FROM PAGE 200, LOS LOBOS

and unusual percussion in unpredictable combinations.

A few songs hark back to the familiar roots-rock territory of the band's earlier days, but, in general, the approach is completely new for the group. Miraculously enough, though, there isn't a song among the 16 on *Kiko* that doesn't sound like Los Lobos; such is their chemistry after nearly two decades of playing rock 'n' roll, R&B, Mexican folk music and their own unique amalgam. In its deceptive simplicity and thoughtful eclecticism, *Kiko* has some of the feeling of a record by another timeless, quintessentially American group: The Band. Clearly, Los Lobos are now in that league.

"This was really an exciting record to work on," says producer Mitchell Froom, who first worked with the group on the "La Bamba" single. "It was a real breakthrough for the band and for me and my engineer, Tchad Blake. It was all very natural and spontaneous and a lot of fun. In fact, I think we didn't realize how really *good* it was until a little later."

Actually, the genesis of *Kiko* predates Froom's involvement by a few months. Early in 1991, principal Lobos songwriters David Hidalgo and Louie Perez traveled to Woodstock, N.Y., to work on songs with members of The Band for a new album by that group's remaining members. Although The Band project was never completed, the experience put Hidalgo and Perez into serious writing mode; when they returned to Los Angeles the songs started flowing, and the band booked time in a downtown studio called Paul & Mike's Studio. After a few songs had been tracked, Froom's always busy schedule opened up and he eagerly took the reins, moving the project over to Sound Factory West.

"The general approach was that David and Louie occasionally made some home demos of songs, and we referred to the general feeling of those; there were usually quite a few clues in those as far as the way to go," Froom says. "These were really cool demos—the best demos you would ever hear in terms of character. For example, their [4-track] recording machine had so much distortion and compression on things that it gave us the idea of how the

percussion should sound. That creates a whole different emotion in the music.

"Normally I like to do a lot of pre-production with a group and really work on the songs," Froom continues. "But on this record we'd mostly work on one song, try a whole lot of different ideas, essentially finish it in a couple of days, then start on another one from scratch, changing everything again. I don't think we ever spent more than three days on a song. We'd do a quick rough and then move on. In fact, I think two or three of those roughs made it onto the record."

The decision was made early on that rather than coming up with full band arrangements for every song, each tune would be taken individually and arranged according to the dictates of the song's feeling. This means that not every member of the band plays on every cut, and that a number of songs feature instrumental blends the group will never be able to re-create on stage.

"I really think that this was kind of the liberation of David Hidalgo musically," Froom comments, "because the songs didn't suffer under the tyranny of their being a live representation of what was going to happen. They wanted to get cool noises and make it a cool record; then they could reinvent it live later. That gave them the room to really be adventurous."

"Basically, the way it would go was whoever was around and could add something to the track was welcome to try something. The depth of this band is astounding, and they all have good ideas. You have people who can sing and play guitars like David and Cesar [Rosas], and then you also have a guy like [sax player] Steve Berlin, who's also a producer, with lots of good ideas to bring to the table—how to address some rhythmic problem or something. It was a real generous situation; there were no egos on anyone's part as far as I could tell." So much so that Perez relinquished his role on many songs to the redoubtable British skinsman Pete Thomas, who, Froom says, "brought an interesting tension and edge to the music." (Perez, it should be noted, is the group's principal lyricist, and he also plays percussion throughout the album. He sings lead on the haunting "Saints Behind the Glass.")

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The working relationship between Froom and Blake dates back seven years and a slew of albums. "It's a real partnership," Froom notes. "We've developed a lot of ideas about recording together; we have our own ways of distorting things and turning them upside down. We like to experiment, and on this album that was encouraged. We'd be working on a song one way, and then we might suddenly say, 'Let's change everything and see what happens.'"

"We didn't have preconceptions about how it should sound," Blake says. "Like the drum kit changed with every song, sometimes radically. We might have a snare but no kick, or a conga would be set in place of a snare, or instead of a hi-hat we'd have some sort of can or a couple of little cymbals taped together to make a hi-hat."

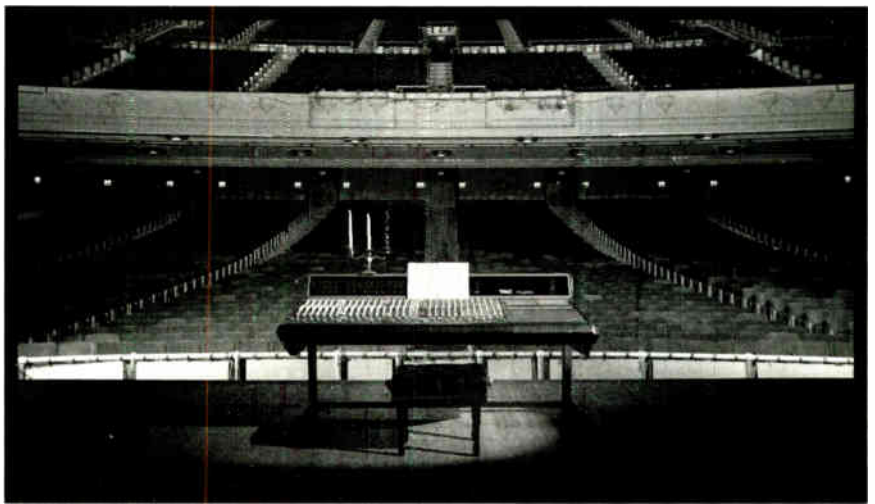
"We mainly recorded the drums in a little vocal booth, sometimes just using a Calrec [Soundfield mic] through some really rotten compressors," Froom says with a laugh. Blake adds, "We like grungy, dirty, squashed sounds."

Sometimes the basic tracks consisted simply of a Hidalgo guitar part and Thomas on drums, but others were more elaborate, such as "Angels with Dirty Faces," an intriguing song about homeless people. Part of that basic's foundation was an Optigon, a cheesy-sounding keyboard that was sold at Woolworth's and Penney's in the late '60s and early '70s as a "home entertainment center." "It sounds like a record scratching or something," Froom says. "It makes a mellotron seem hi-fi. Anyway, we made a loop from that and then everyone just played along with it—Louis had a shaker, David was playing an electric sitar, I was playing piano real quietly, and some other guys were clapping. We set up a Calrec, got a balance, and that essentially was the track."

Blake says that the band rarely used a full 24 tracks, "and half were substantially under 24. There are a few on there that probably only use eight tracks."

Surprisingly, Froom says that this approach actually made mixing easier later: "It was easier because if the first thing you hear back is a real interesting noise, then everything sort of defines itself, and you're not fac-

—CONTINUED ON PAGE 204



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ing this thing where you're listening to the bass drum, then listening to the snare, and then you put the bass in and one guitar and it sounds like every other record you've ever heard. We started from a radical place on quite a few songs, and we weren't fussy about whether something sounded professional; in fact, that became a dirty word to us."

Froom and Blake eschewed using a lot of reverb or effects in the mix stage. "The most amount of effects used," Froom notes, "was maybe three faders up—maybe one thing in stereo and one slap. We didn't use any reverb at that stage. We were in this incredible mix room and not using any faders!"

Despite all the experimentation, "It ended up being one of the fastest and easiest records I've ever worked on," Froom says. "In just over a month we recorded 11 songs and did some work on the other five [recorded earlier at Paul and Mike's]. The spirit was tremendous."

And what does Froom think of the chances that so bold an album will actually reach a large audience? "You can never predict," he says,

"but it's real and it's honest, and one of the things I like about this time in music is that all the rules about what it takes to make a hit don't mean anything. Los Lobos' best chance at long-term survival may be to radicalize the whole idea of what a band is." And with *Kiko* they've taken the first step in doing just that. ■

—FROM PAGE 200, RINGO

Was, who produced five tracks, including the first single, "Weight of the World," which was mixed by Bob Clearmountain. The project was also co-produced by Jeff Lynne and Phil Ramone, who contributed two tracks each, and Peter Asher, who produced one song.

Sitting in a luxury hotel in Bel Air wearing a denim jacket, with his fingers covered in his trademark rings, Ringo talked about the making of his new record and his revived solo career.

I've heard that this is probably the first album you've made sober.

It's not "probably"—it *is* the only

album I've ever made sober. But that's not to say that the other albums, like the *Ringo* record, were drunken sessions. We did a lot of work on them sober, but we did have our nights, like on *Goodnight Vienna*. And I think that if you listen to the records, they definitely went downhill from *Goodnight Vienna* on because I was going downhill, too. I was taking less and less interest in my career. I was just turning up, it just wasn't happening. And, of course, being Ringo, I was allowed to get away with it, so it all suffered.

Were you very nervous when you started recording clean and sober for the first time?

I was very nervous. Thank God I've got three years clean and sober behind me now. The last tour, when I was only eight months sober, was really strange the first week, because at the end of a show, your whole body and brain says, "Let's get crazy," and this little spark says, "We don't do that anymore." So then when it came to making this record, I went in with Jeff Lynne



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first, and after the first week I had to go on holiday because it was very, very strange. I didn't know where I was and how you do it anymore. It was a completely new learning process, so I took off and just went down to Baja California for a week and sat on the beach and meditated, and then came back because I'd sorted myself out.

Is it true that you went into the studio not quite sure of the kind of record you wanted to make?

Well, we went in with some clear ideas, and I'd already found a lot of songs I wanted to do, so that's not strictly true. I'd written four songs, and I knew I was going to record them, and then we had "Golden Blunders" by The Posies and "I Don't Know a Thing About Love" by Stan Lynch, the drummer in The Heartbreakers, and Richard Feldman, so we did have some direction. But we didn't know the exact, final direction, it's true. We didn't know exactly what final sound we'd have, although I knew I wanted it very guitarish, which it is. The other whole thing was whether to make a '60s-sounding album. It's not '60s, it's more '90s, but it's got a '60s feel.

It sounds like that worried you a little.

It did. At one point I was backing off because some of the tracks were sounding just too '60s for me, and let's face it, we've been there already. So I had some serious doubts.

What convinced you?

It was Don Was. He just said, "Everyone out there is trying to imitate you and get that sound, and you were at least one of them and you can do it." So that really relaxed me, because I hate harping on the past and using it. I want to look forward like anyone else. But the sound works and the record works, and once I relaxed, everything flowed naturally. And I think that shows on the album.

How did you choose the producers for the album?

We started off with Jeff Lynne because I knew him and we'd worked together on George's album. He did the "I Call Your Name" track we did for John's foundation in Liverpool, and I played drums on a track he

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produced for Little Richard. So it was an obvious choice, and in a way it was playing safe. So I went in with Jeff, but like I said, after the first week I had to leave and then come back. At that point I felt we should just finish the whole album together, but he was busy with some other projects. Then I started speaking to Phil Ramone, and he had time, and then I wanted to finish the whole record with him.

Did you know him from before?

No. Well, we'd bumped into each other a lot over the years, he told me. Actually, a lot of people are

telling me the same thing now that I'm sober. [Laughs] So I didn't remember meeting him, but we got on great, and then we called Don Was up and he had some time, so we went in with him. But it's not like we just called up and went straight into the studio. It took five or six weeks to get it together.

Anyway, I really had a great time with Don. He was so cool, and we played everything live, which I much prefer. Both Jeff and Phil like to use click tracks, which is just a bane for drummers. I hate them really, although the tracks still worked out well. Anyway, then Private

Music mentioned Peter Asher, so I said "Sure," and we went in and recorded The Posies song, "Golden Blunders," which he brought to the project. Then we decided to cut two more tracks, and it was my choice, so I decided to go with Don again, because he is Mr. Cool.

Did you ever worry that with four producers the finished album might sound schizophrenic?

Of course, but I didn't worry enough, and in the end it all evened out because Don was in charge of remixing the tracks produced by Phil and Peter, and Ed Cherney came in and remixed everything to give them a consistent sound. Then when we played those to Jeff, he went back in and remixed his tracks at Ocean Way, so it ended up sounding fairly consistent I think.

Give us some sense of the differences in approach and styles of the four producers.

With Jeff Lynne you record every single track separately—even with the drums, so that the bass, the snare, the cymbals are all miked and recorded individually, and then he builds up the layers into the finished track. Phil Ramone is totally different. He'll start with a click track, and then add the rhythm section. He has that New York attitude and approach, while Peter Asher is very meticulous. Don is perhaps looser—really cool to work with. For instance, on "Weight of the World," we'd just play it live in the studio until the basic track was there, and then Don added all the backup vocals and my percussion later.

There are quite a few star guest performances on the album.


Yeah, Brian Wilson arranged and sang all the harmonies on "In A Heartbeat," which was written by Diane Warren.

How was he to work with?

The truth is that I wasn't even there on those sessions. I was in Europe at the time. Brian came in because he's a friend of Don's, although, of course, I've known him for 200 years also. Don thought he'd be great on the track, and of course he was right. Then Benmont Tench from The Heartbreakers played

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Hammond on it, and Bonnie Raitt's bassist Hutch Hutchinson played bass, so it all just kind of flowed together naturally. A lot of the musicians on the album have all worked together many, many times in the past, like Jeff "Skunk" Baxter, Waddy Wachtel, Andrew Gold and Harry Nilsson, so I think the result sounds more like a band than just a bunch of session guys.

Are you a tech head?

Not at all, but it's certainly changed a lot in the last few years. I used to drive them mad when we'd stretch something and we'd want to shorten the track, and I'd say "Just cut the bloody 24-track!" And they'd look at me and say, "No, no, we don't do that anymore. We do it electronically now." [Laughs]

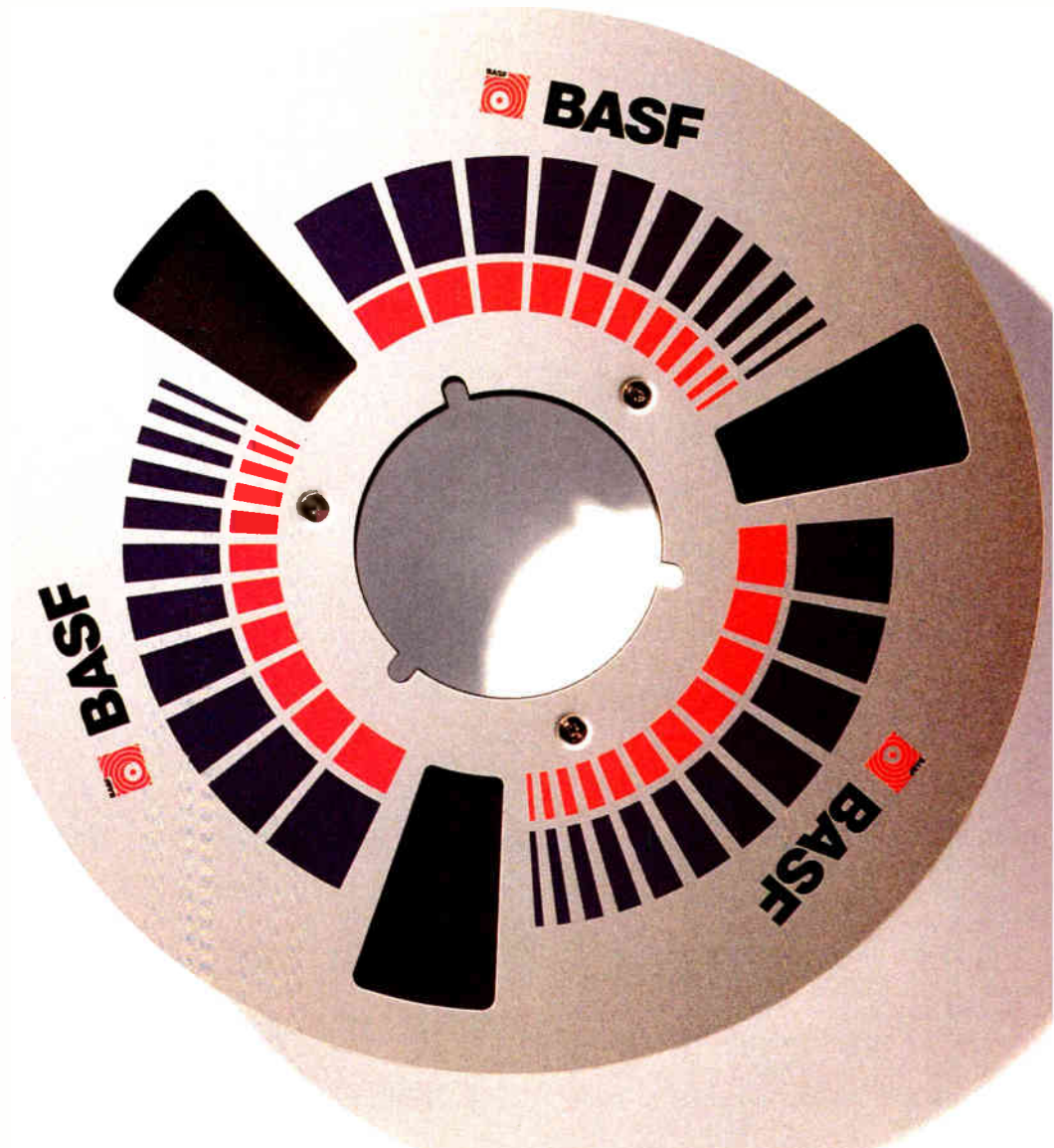
Did you ever feel that you were a bit out of touch with all the high-tech equipment in studios today?

Not really, because that's not my job. That's the producers' and engineers' job. I just play the drums and do the vocals. I don't deal with the EQ and all the fancy outboard gear. Obviously, recording methods and studios have become more and more sophisticated, and we recorded tracks at some of the top places, like Conway, Westlake and Capitol, and used all the latest computerized gear. But I totally rely on the technical guys to pull all that together, and we had some top guys, like Rik Pekkonen, Bill Drescher and Ed Cherney, engineering.

Back in the '60s there was a definite shelf-life mentality to rock 'n' roll—the whole "Hope I die before I get old" attitude, and Jagger saying he'd never be performing "Satisfaction" when he hit 40. You'll be 54 this year. Do you ever think of retiring?

We all said, "Hope I die before I get old," but there's no reason why we shouldn't keep recording and performing. Look, Jerry Lee Lewis is still out there, Chuck Berry's still working, and that's the great thing about being a musician or singer—as long as they'll have you, you can keep doing it. There's no rule that says you have to retire. I'm sure once we all get to 60 we'll call ourselves "blues singers." [Laughs hard] ■

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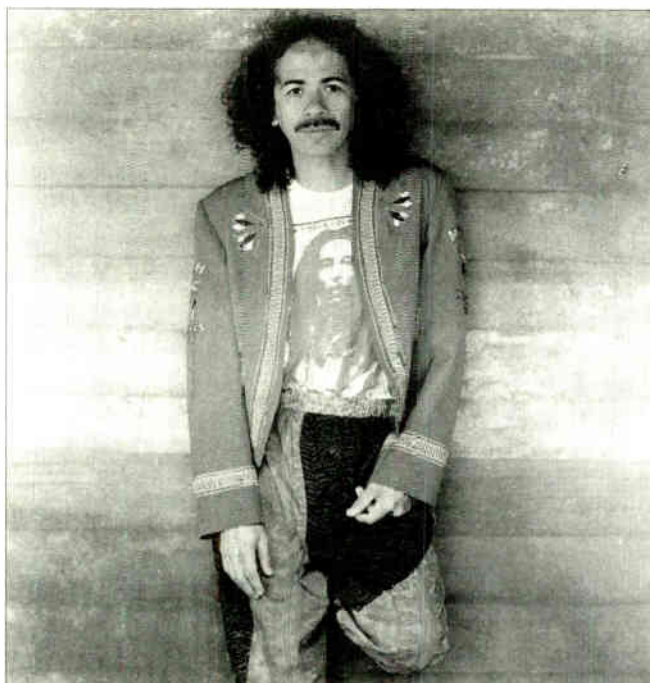
World Radio History

—FROM PAGE 201, BY SULLIVAN LIVES AGAIN

Roots, Lovin' Spoonful, etc.); *Big Band All Stars* (Glenn Miller, Woody Herman, Benny Goodman, Count Basie, etc.); *Comedy Classics* (George Carlin, Mel Brooks, Alan King, Flip Wilson, etc.), and several others. More recent titles include *Best of Broadway*, *Soul Heroes* and *Roots of Rock*.

The first step in putting together the CDs was to transfer the roughly 9,000 performances in the Sullivan library from 2-inch quad videotape to DAT. From there, the mono DAT masters and a list of probable selections for the discs were sent to Allan Tucker, owner and president of Foothill Digital Productions, one of the leading premastering houses in Manhattan. Tucker was one of the original users of the Sonic Solutions Sonic System (his studio was a beta site), and that remains his primary tool for restoring these tapes.

"Sonically, the material runs the gamut, because you have performances from the late '40s to things from 1971," Tucker says. "You have to remember that nobody gave a damn about the sound quality be-



Santana appears on the "Born to Be Wild: Rock Classics" disc in the compilation, *The Sullivan Years*.

cause it was coming out of a crummy little TV speaker. [The engineers] rolled everything off, so there wasn't much below 500 cycles, and there really wasn't anything above 4,000 to 5,000. But now it's possible—with the use of EQ, shelf filters, tiny little

notches and various other things—to warm it up a little and create some depth to this stuff that had been really badly squashed." Tucker says that quad tape was capable of excellent sound, but early engineers didn't use it to its potential. "Still,



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some of the '60s performances are almost record-quality," he adds.

Typically, Tucker makes an unprocessed DAT safety from the master before loading it into the Sonic. "Different tracks needed different things," he says. "Some were boomy, others were not. Some were warmer than others. Some needed to be de-essed because of sibilance on some of the singers." After a sample sequence is developed on what Tucker calls the EQ Edit Reel, "we have a new set of problems, which is creating applause and Sullivan speech segues, which may go from 1956 to 1968. The problem was finding a

common denominator, because you might have this shrill old recording, and it has to crossfade into something that is a lot prettier. We did the applause segues using the 4-track capabilities of the Sonic by establishing the flow of things on the basic stereo track and then synchronizing applause slugs, which we would usually lift from other Sullivan shows so that they sounded the same. I have a few favorite applause slugs that we use quite often. We fly those and it doesn't disturb the pacing of the basic show, which is on the upper tracks."

There have been legal hurdles to

getting *Sullivan Show* performances by bands like the Beatles, Stones and Doors onto CD, but with thousands of hours to choose from, T.V.T. doesn't face a shortage of great material any time soon. And the CDs they've put out so far sound great—in fact they sound like Sunday nights. ■

—FROM PAGE 201, TEENAGE FANCLUB

"We went in there and bashed it out and that was it. We had this idea to make it really straight and flat-sounding, just a basic recording, and I think it came off a bit too flat. We didn't put any effects on it except a little bit of reverb." As with taste, however, there's no accounting for form. With its solid songs, the LP went over big in the UK, which brought a bevy of majors a courtin'. The band finally signed with DGC, a Geffen subsidiary, and after a slightly controversial departure from Matador, they recorded their second U.S. album, *Bandwagonesque*.

The melodies implicit in the first LP are the strong suit of the second album. The thrashy elements of *Catholic Education* have been toned down into a rough underside. The harmonies and lush, edgy guitars of *Bandwagonesque* evoke a '60s guitar-band feel, but, despite guitarist Norman Blake's resemblance to Tommy James, you wouldn't mistake these guys for The Shondells—the retro quality of the LP is tempered by the very '90s cynicism and tongue-in-cheek humor of the band. Even so, *Bandwagonesque* has riled indie purists who preferred the first LP's rawness.

However, the new record's smooth, constructed sound reflects circumstances, and the efforts of producers Don Fleming and Paul Chisholm, rather than a change in the band's attitude. "I think if we'd had the money and time for the first album," says drummer Brendan O'Hare, "it would have been more similar soundwise to *Bandwagonesque*."

Though they're on a major label, Teenage Fanclub's indie roots run deep. They co-produced the new album, and the bash-it-out attitude of the first LP is reflected in the group's intuitive approach to recording and their casual, if not haphazard, work habits. "If we listen to a track back and it feels right, sounds



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technically correct," says bassist Gerry Love, "we'll probably go for that rather than trying to make it perfect, because I think it loses a lot of life that way."

"We haven't had the time yet, even with *Bandwagonesque*, to sit down and think of the whole sound and setup," adds McGinley. "We more or less enter the studio and it's laid out a certain way—a send here and a send there. We spent a bit longer getting it right, but it wasn't like we spent a lot of time thinking about the overall sound. What we got was what we got."

The major-label contract allowed for a month of recording and mixing the album, so they got a little extra time to do things like overdubs (there are few on the first album) and tweaking and fine-tuning the mix. "We went through and spot-erased on all the vocal tracks, to take out all the mouth pops and clicks," says McGinley. "We spent two days doing that!"

They are avid devotees of tube mics, recording all of the *Bandwagonesque* vocals on Neumann U87s, run through their own Tube-Tech EQs, equipment which they also use on their demos. Of demos, O'Hare says, "We have a Fostex R-8 8-track setup, and we all have Yamaha MX 4-tracks. Whoever writes the song will use a drum machine and put down all the tracks that they think up, very basically."

"Some people are into making their demos sound good," McGinley adds. "We really do a demo as a demo—they sound pretty rough. We just do it to get the thing down on tape. I think if we had our own studio, rather than do demos we'd just go straight in and do 'em."

Currently, the guys are looking forward to returning to the studio because it will mean some time at home. They've exhaustively toured the U.S. and Europe, and now they hope to return to Glasgow to record their next album. ■

—FROM PAGE 201. GARY LAMB

To say the least. No one who has heard Lamb's lush, highly melodic—some might say saccharine—instrumental music will confuse it with Iron Maiden. Yet something in his music has obviously touched a nerve in a lot of people and allowed him to thrive in the overcrowded

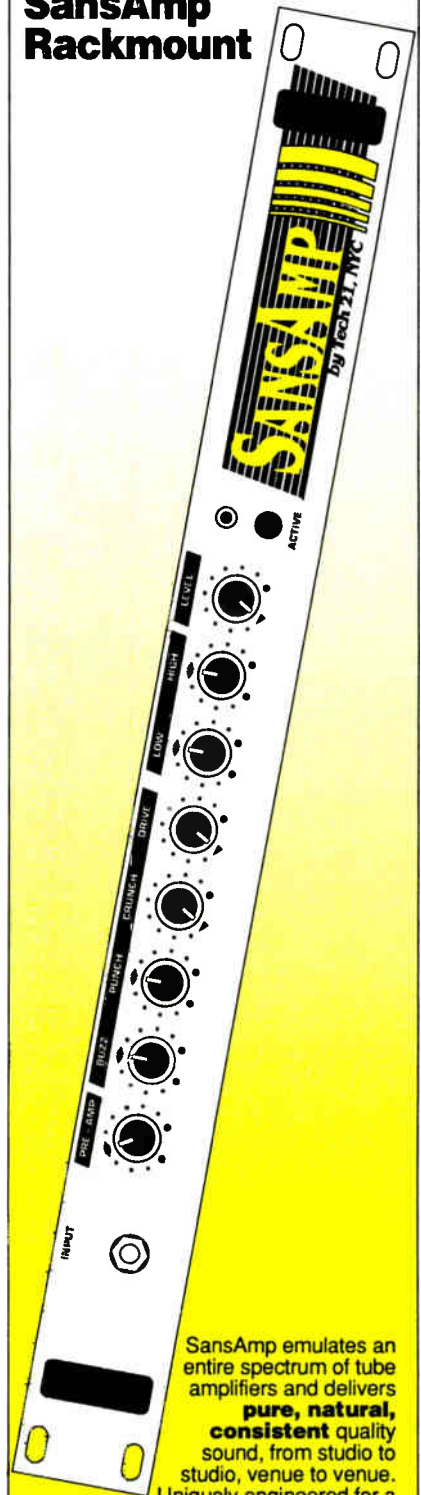
(pick one) new age/adult alternative/mood instrumental market. Just a few years ago, Lamb was playing his original piano music in Northern California restaurants. For a scant \$400, he recorded a few of his tunes and put out a cassette, which, to his amazement, sold very well. Next time out, he went to a big San Francisco studio and put together a more polished effort. It, too, fared well locally. It was his third record, *Watching the Night Fall*, that first earned him national airplay, and now, with such discs as *Distant Fields*, *Imaginations* and *Love Themes* racking up impressive sales as well, Lamb is a true indie success story.

Golden Gate Records now has a staff of ten, and sales of Lamb's music financed his own studio, dubbed Vine Hill, in the heart of the beautiful Santa Cruz Mountains. "It's a nice, pretty good-sized A-frame with a 24-foot vaulted ceiling and a loft for the MIDI gear," the affable Lamb says. "It's really a great place to work." Lamb writes most of his pieces on a Yamaha C7-S grand piano, but records them with a Kurzweil 1000 and a KX88 controller. He also works on a Korg M3R synth and a Proteus 2M sampler. The heart of his MIDI system is a Macintosh SE30 with Vision software. Vine Hill has a Soundcraft Delta console, which Lamb says is "maxed out at this point. It's a very clean and quiet board." His current favorite processing device is the Eventide H3000SE, though he also employs boxes by Lexicon and Alesis.

While Lamb does work with a favorite engineer—Russell Bond—"I've also learned to engineer for myself through the years," he says. "Coming from a strictly musical standpoint, the learning curve has been pretty steep, but fortunately I enjoy it. I'm a great one for sitting here with a manual hour after hour, figuring out how things work."

And Lamb notes that his interest in electronic instruments now affects his writing from time to time: "The more I've gotten into the idea of designing sound and then creating the sound I hear in my head, the more I'm finding that the search for those sounds can dictate the kind of compositions I write." But the litmus test, now and always, is "music that moves me in some way. I want to touch people with my music." ■

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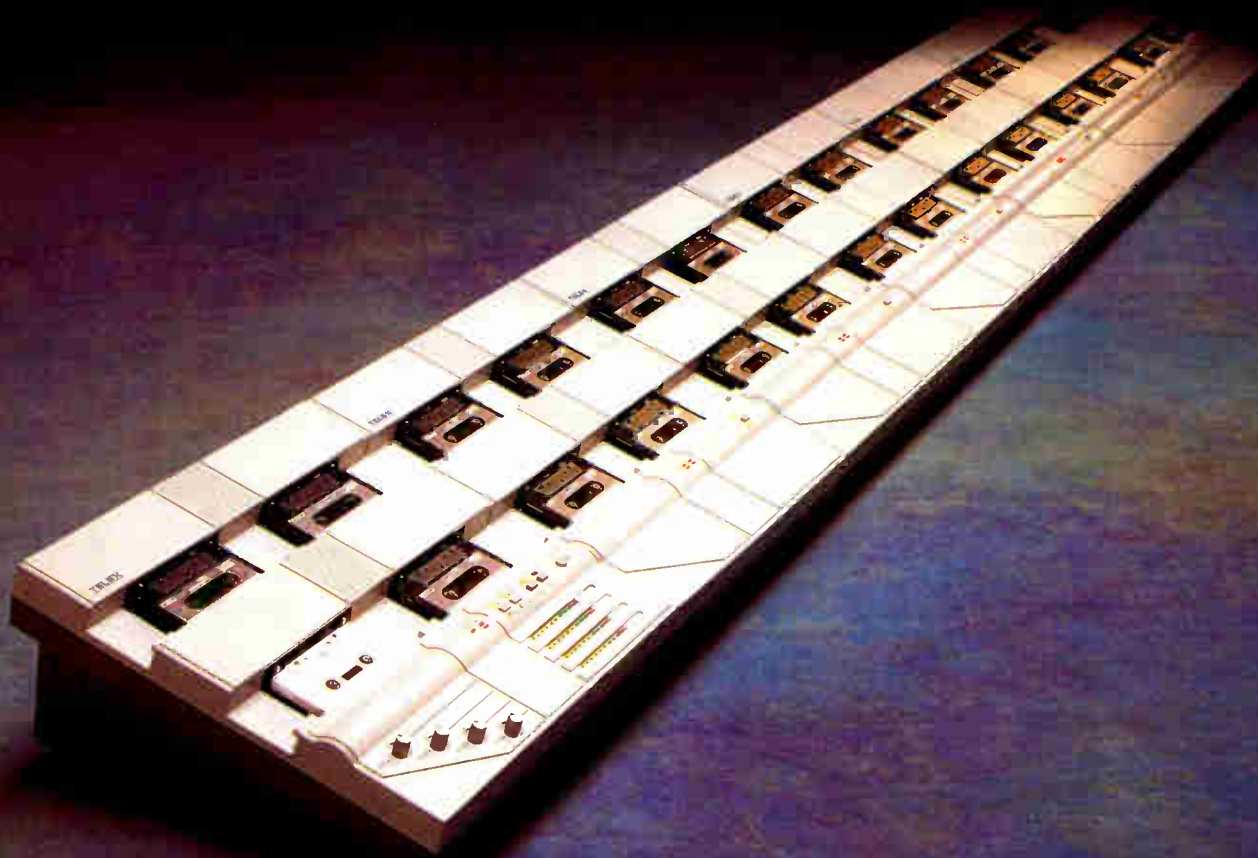
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by Philip De Lancie

DOLBY DOES DIGITAL

IS THE FUTURE OF SOUND SURROUND?

Dolby Laboratories has been involved in film sound since the mid-1970s with its Dolby Stereo and 6-track 70mm theatrical playback systems. More recently, the company has brought theater-style "surround sound" into consumers' homes with Dolby Surround and Pro Logic. At the same time, Dolby has had an ongoing involvement in digital audio-coding techniques, with systems in use for broadcast and satellite transmission since 1983. But despite the diversity of the company's activities, the Dolby name is still best known worldwide for noise-reduction systems for analog tape recording, particularly in the consumer market.

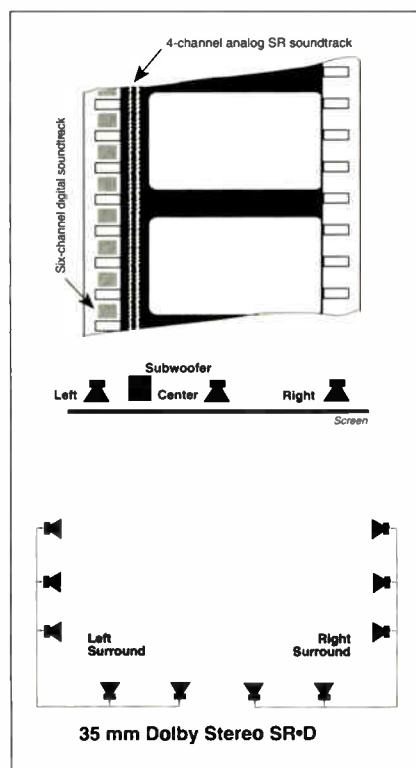
There's little chance that Dolby licensees will be dropping Dolby NR systems from their products any time soon. But the era of consumer analog tape, at least in the music business, does seem to have begun winding down. So the question arises: What place does Dolby see for itself in an audio future dominated by digital? And what do Dolby's plans indicate about the outlook for the prerecorded music market in general?

According to company literature, one important trend at work is the integration of the movie, television and music industries, and the media used to distribute their products. One example of this is the Combi-player: one device, hooked to both stereo and TV, that plays both music and video discs. Another is the way that the surround sound format, developed by Dolby for theatrical film, has found its way into the home hi-fi setup. Dolby's Dennis Staats, software licensing manager, sets the installed base of Dolby Surround and Pro Logic decoders at more than ten million, with sales tripling every year. That's enough to convince the com-

pany that consumer interest in multi-channel (more than two) sound is very strong.

The most obvious application of surround in the home is to re-create theater sound for home viewing. With Dolby Surround, that means adding a rear "surround" channel to the normal left/right stereo setup. Pro Logic goes a step further, adding a center channel in front for full emulation of the Dolby Stereo setup in

—CONTINUED ON PAGE 216



Dolby Stereo SR-D prints carry both analog and digital soundtracks, so they can play in any theater. In theaters equipped with digital decoding equipment, separate left and right surround channels reproduce what the industry calls "stereo surround."

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Tape & Disc News

SHAKEOUT AHEAD FOR CD PLANTS?

The CD replication industry has a history of swinging from shortage to glut. While capacity and demand have been fairly well-balanced lately, the possibility of oversupply is again on the horizon. *Billboard* recently surveyed six companies that operate nine North American plants: WEA, DADC, Cinram, Denon, Nimbus and Disc Manufacturing Inc. All were in the process of adding substantially to capacity in anticipation of substantial market growth in the coming year.

At the same time, the magazine reported that Sonopress will begin CD replication at its plant in Weaverville, NC, December 1. The BMG-owned company, which already makes 90 million cassettes annually at the site, plans to make 40-50 million CDs a year on in-line systems developed at its sister plant in Germany.

Billboard didn't total all the numbers, but the combination of the Sonopress move and the six reported plant expansions (there are probably others who plan to expand as well) will boost 1993 North American CD capacity by about 325 million. Considering that net CD shipments by RIAA member companies in 1991 were 339 million (up 51 million from 1990), the new capacity is likely to be more than needed to absorb market growth.

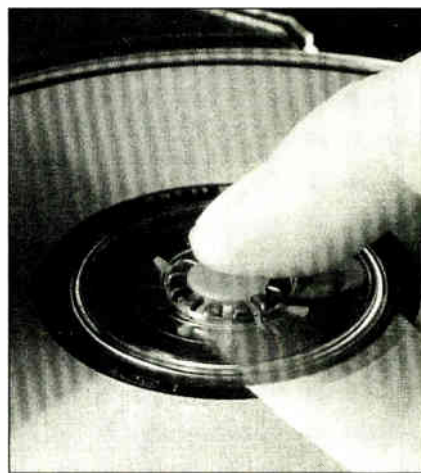
Might the increase in supply translate into lower CD prices for consumers, which might in turn spur demand? Not if record companies have any say in the matter. The labels' existing CD pricing practices have maintained high prices even though their cost for discs has long since dropped drastically. *Billboard* puts raw disc (no packaging) prices in the 70-90 cents/unit range, which leaves little room for replicators to sell for less to attract label clients as supply grows. So the net effect of all the expansion plans may be a shakeout of those companies without the resources to weather another CD glut.

NEW AUSTRALIAN CD PLANTS

North America isn't the only area where replication capacity is about to mushroom. Australia has three new CD plants scheduled to begin production within the next few months. The country's second plant, A.C.D. (Australian Compact Disc), is expected to be up and running this fall with an initial annual capacity of 4 million. While noting the presence of 32 plants in nearby Asian countries, the independent operation hopes to lure local independent record business and major label overflow by emphasizing fast, reliable delivery and protection against piracy. By early next year, A.C.D. will be joined down under by new plants owned by Sony and EMI.

ITA VIDEO STUDY

The ITA has announced plans to gather, compile and disseminate statistics on the video duplication industry. The study will cover all modes (SP, EP, LP) and look at three basic categories: consumer premium, consumer entertainment and music/business video. According to a statement, the major duplicators have already agreed to participate, but the association hopes to include as broad a range of duplicators as possible. Data will be gathered with strict security precautions to ensure anonymity. Interested duplicators may contact Henry Breif at (212) 643-0620.



E Media's new CD PopUp

SPLICES

E Media (Kennebunkport, ME) has devised a new CD packaging feature to make CDs easier to remove from

jewel boxes. The CD PopUp is a disc ejection button that snaps into a standard jewel box tray. When pressed, the PopUp releases the disc from the grip of the tray hub, making it possible to remove the disc without stressing and distorting it by pulling on its edges...**JRF Magnetic Sciences** has spun off a new company devoted to DAT maintenance. Using factory-trained technicians, **NXT Generation Inc.**, based in Greendell, NJ, will provide routine maintenance and periodic overhauls of Sony professional DAT machines... DCC Maxima, BASF's DCC cassette, was among 200 products cited with an EIA/CEG Design and Engineering Innovation Award. The first cassette available for the new format, the Maxima was recognized as one of the most innovative consumer electronics products of 1992. BASF received the award at the summer CES in Chicago...**Capitol/EMI Records** has added three P-2508 twin slave units from Lyrec to its Jacksonville, IL plant. The Dolby HX Pro-equipped units feature two slaves mounted vertically, running at ratios of 64:1 or 80:1...**interMedia**, the international conference and exposition on multimedia and CD-ROM, has been scheduled for March 30-April 1 at the San Jose (CA) Convention Center. **Reed Exhibition Companies** (Stamford, CT), which produces the conference, has also announced the broadening of the *interMedia* advisory board with the addition of seven new members...**Photographics Inc.** of Ardsley, NY, is now making custom full-color inserts for CD or cassette in quantities as low as 50. The company works from pictures or artwork, with no color separations required, and offers seven-day turnaround time...**Nashville's Disc Mastering Inc.** has announced that it mastered six of the top 15 albums on *Billboard's* New Age chart (June 27 issue)...**Barry Diamant Audio** (Riverdale, NY) has completed mastering work for a new project by former Ten Years After guitarist Alvin Lee, featuring guest artist George Harrison...**Giant Records** act Xtra Large was in *Different Fur* (San Francisco) to edit and master with engineer Matt Murman... Last but not least, the photograph accompanying the "DCC at ITA" feature in August's issue was mistakenly flopped. Honest, we know what an analog cassette looks like! ■

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—FROM PAGE 213, DOLBY DOES DIGITAL

theaters. Both systems use the same analog matrix-encoding/decoding techniques that allow the four channels used in Dolby Stereo films to be stored within and derived from just two tracks of information, which is all that is available for audio on 35mm film.

With surround gaining in popularity, some record companies have been releasing surround-encoded audio recordings to appeal to their Pro Logic-equipped customers. According to Staats, more than 300 such CD and cassette titles are already on the market from labels like BMG Classics and Concord Jazz. At the same time, Dolby Surround is being used in television broadcast for both specials and regular series.

As surround activity builds upon itself across industry lines, the advantages of a "cross-platform" or "medium-independent" approach to multichannel sound delivery are clear. But Dolby does not believe that the analog matrix approach now used is the ultimate answer. When played back in a regular two-channel setting, matrix-encoded program is virtually indistinguishable from non-encoded material. But matrix systems don't offer unlimited freedom to place multiple sounds in different locations without interaction between sounds. That fact has convinced Dolby to apply its knowledge of digital-coding techniques to multichannel audio delivery.

The first product to come out of this effort is Dolby SR•D. SR•D uses a digitally encoded optical track between the sprocket holes of 35mm film to provide six audio channels for theatrical playback: left/center/right in the front, left/right in the back ("stereo surround") and a sixth bass-only track for subwoofers. (Traditional, matrix-encoded, Dolby Stereo, four-channel sound is provided on the same print to avoid the need for multiple print formats.) *Batman Returns* was the first regular release to use SR•D.

The digital-coding system at the heart of SR•D is AC-3, which is an outgrowth of Dolby's AC-2 coding. AC-2, like the coding techniques used in DCC and Mini Disc, is a psychoacoustically based approach to coding in which knowledge of what humans

can and cannot hear is used to minimize the data rate requirements of the system. The resultant bit-rate efficiencies allow full-range sound to be stored and transmitted using a fraction of the data-handling capacity required with the 16-bit PCM encoding used for CD.

In AC-2, an incoming PCM audio signal is divided into a multitude of frequency bands by a DSP chip using a Fast Fourier Transform (FFT) based coder. These bands are grouped into approximations of auditory "critical bands." A critical band, in psychoacoustical terms, is a slice of the audio spectrum within which it is possible to hear no more than one sound at a time. That is, the loudest sound in a critical band will mask

"The same little disc you put in your personal portable for playing back in two channels should be able to deliver five channels in your car."

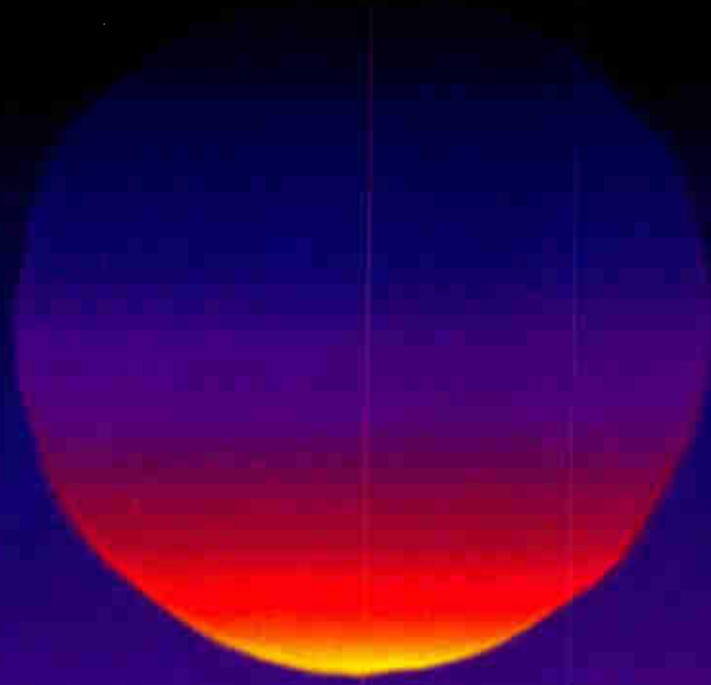
—Roger Dressler

any other sounds within the same band. The AC-2 algorithm, analyzing the content of each band and the interaction between them, adaptively allocates coding bits to areas of audible activity and ignores the inaudible.

AC-3 builds on AC-2, but adds the multichannel element. By coding 5.1 channels together (five full range; one bass-only) and eliminating redundancies between tracks, AC-3 achieves even greater economy of per-channel data rate. For SR•D, Dolby has chosen an audio data rate of 325 kilobits/second for the entire 5.1 channel datastream (excluding data redundancy for error correction).

Beyond SR•D, Dolby sees AC-3 as the audio-coding scheme of choice for a future generation of multichannel-capable consumer formats. Because its low data rate makes it usable on a wide variety of media, Dolby argues that AC-3 could be universal, and thus avoid the problems of non-compatibility that sank Quad. To find out more about the system, and how it might apply to the prere-

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corded music market, I spoke with Roger Dressler, technical director at Dolby Laboratories Licensing Corp.

How does Dolby envision the application of AC-3 to the prerecorded music market?

Simply put, there should be something like a CD that has five-channel sound on it. And a recordable/playable audio-only medium that has five-channel sound. And that goes for videotape, laserdisc and radio broadcast as well. Everywhere you deliver sound to a consumer there should be—eventually—multichannel. And the same little disc you put in your personal portable for playback in two channels should be able to deliver five channels in your car.

Why is it important that the music industry embrace multichannel sound delivery?

Our view is that there is no reason for two-channel delivery. It's just a tradition that's been around for years. If you look back to 1930 when Western Electric did their experiments with sound, they said that you need at least three channels. We didn't get three. We got two, because until recently it has been a physical problem to deliver more. Now it is well known by lots of consumers that multichannel sound is a lot more exciting and involving and gives better sound field stability.

What will AC-3 do that existing audio compression/encoding schemes can't?

All audio program is produced in a given environment, where it sounds fine. Movies sound good in a theater, and recordings sound good in a studio. But consumers have a wide range of listening environments, from headphones to living rooms to cars. And all the environments have different requirements for good sound reproduction. So in some cases you have to compromise certain aspects of the original production to make it suit consumer listening conditions. For instance, a studio producer delivers one version of a song, but a radio station, knowing that its audience will be listening in cars, hammers down the dynamic range. That's a step toward correcting the situation for people in a noisy environment.

We would rather see consumers make choices about corrections with their own equipment, rather than having some radio engineer do it for them. And we think AC-3 can do that in the digital domain. We want it to be adaptable over a wide range of consumer needs, including not only the dynamic range of the listening environment, but the number of channels available for playback.

So we are talking about a system in which program is stored as a sort of audio database, and the consumer defines the final form in which that audio data is reconstituted for playback.

Yes. For instance, AC-3 can deliver five channels of 20-20kHz sound. But nobody needs five full-range speakers, because you don't hear bass directionally. That's how you can play the game of subwoofers and satellite speakers. So if you told this decoder how many woofers you have, it could redirect portions of the spectrum to where it will be most properly reproduced. At the same time, you can't expect everyone to have five-channel headphones, so you have to be able to reproduce in two channels as well.

Does the front end for any of this exist, or is it all theoretical at this point?

It's all theoretical, because no consumer-delivery mechanism exists yet for delivering AC-3 signal. If and when it does exist, all these features and definitions will be worked out.

What is it that makes AC-3 particularly well-suited to this concept of user-definable playback modes?

Existing compression schemes can deliver any number of channels point to point, but so far they can't do that at quite the data-reduction rates that we are talking about here. You would have to have a full-fidelity encoder averaging only 64 Kb/second per channel to match the data we deliver with AC-3. So far, nobody can make a decent-sounding 64Kb/second encoder. So the only way you can get down to that data rate is to use more knowledge of psychoacoustics in multichannel playback.

One other point is that we are looking at AC-3 only as a final consumer-delivery format, not for intermediate production or point-to-point

transmission applications. Once the signal has passed through AC-3 encoding and decoding, you wouldn't want to take all (or part of it) and do any further processing because of the co-channel dependency or intermingling.

Explain some of the differences and similarities between the data compression used in AC-3 and the coding techniques used in DCC (PASC) and Mini Disc (ATRAC).

ATRAC is based on FFT, and if you look at a description of it, it reads a lot like AC-2. The systems are different in certain particulars, but conceptually they are similar. The difference between AC-2 and ATRAC versus PASC and Musicam is in the way you start off dividing up the spectrum. Instead of doing FFT, and then grouping the resultant bands into critical bands, PASC goes directly to the critical bands by digitally creating a number of filters that are adjusted according to their psychoacoustic model. The main difference with AC-3, though, is that both MD and DCC, somewhat shortsightedly, carry on the two-channel tradition.

Are these new data-compressed audio formats technically capable of being adapted to carry an AC-3 signal?

The data rate of DCC could handle AC-3 instead. But then it's not DCC anymore, it's something different. Mini Disc does not move enough data. Its data rate is 256 Kb/second, and we'd like to be somewhere over 300. But if you wanted to accept shorter time on the MD, you could make the tradeoff for more channels.

What kind of fidelity is AC-3 capable of delivering, and how does it compare to 16-bit PCM?

The same question of fidelity affects all of these new psychoacoustic-based coders, and it's not an easy one to answer. When you discuss psychoacoustic coding, you find that traditional types of measurements don't mean a whole lot once you get beyond the point of saying it's flat and has a wide dynamic range. Everybody is still trying to figure out their attitude about it.

That said, we can look at a few traditional things like frequency response and dynamic range. As Philips has pointed out with PASC, you

can go well beyond the dynamic range of 16-bit PCM. Our system can be loaded from 18-, 20- or 24-bit A/D converters. And, of course, the frequency response is as flat as any other digital system. We quote 20 Hz to 20 kHz. Distortion is extremely low. In many cases the distortion and dynamic range are limited by the DAC, and not the coder itself.

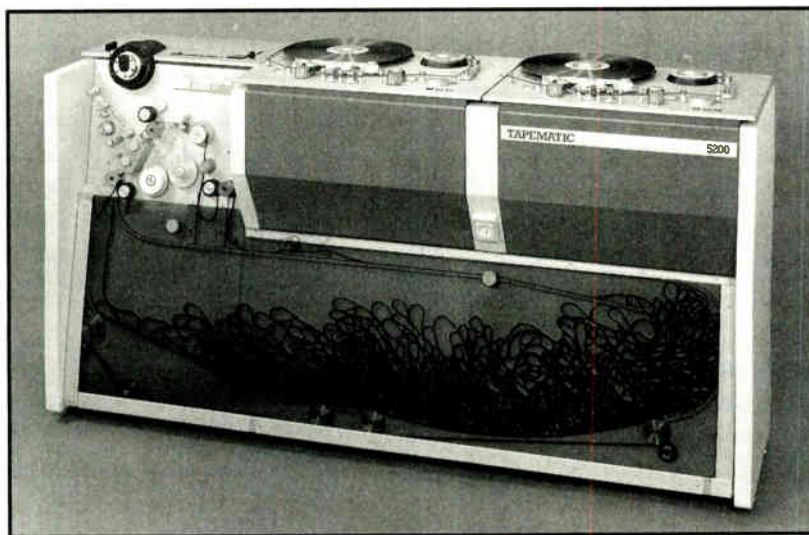
How do you respond to those who feel that this "subjective" approach to encoding—discarding that portion of the sound that we don't think humans can bear—is by definition inferior to more "objective" approaches like PCM, which try to record everything?

My personal reaction is that if I don't hear the difference, why should I care? But arguments have been raging in some of the audiophile magazines. It's difficult to tell people how the human hearing mechanism works and ask them to believe it. There is no way you can appease someone simply by describing the fact that you are tossing out a lot of information and hoping they don't notice it.

—CONTINUED ON PAGE 270

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C O A S T

L.A. GRAPEVINE

by Amy Ziffer

Back in July I told you that Signet Sound is the new name of the former Soundworks West facility. This past month I went on a tour led by president Andrew Golov and met with general manager Dave Dubow. Golov, who was a producer and post-production supervisor for numerous television and film projects, has said that the likes and dislikes he had as a client for certain studios will definitely influence Signet's ap-

—CONTINUED ON PAGE 222

Formerly Soundworks West, and before that Motown-Hitsville, Signet Sound Studios has opened in Hollywood. The renovated Studio A with its Neve VRP72 is shown here.



NASHVILLE SKYLINE

by Dan Daley

Belmont University, which has run a music business/technology program for the past 18 years, is expanding its on-campus studio facility. The single-room studio will move to another building where it will operate as a two-room facility using the current technology mix of a Sony MXP 3036 console and an MCI JH-56 Series desk, with a Sony 3324 digital multitrack and a Studer A800 analog deck. Two more machines, one digital and one analog, will be added for the second room, all operating out of a common machine space. Russ Berger did the acoustics for the 9,000-square-foot space; the architect is John Cain & Associates.

Program director Robert Mulloy says that, depending upon funding, a new console—either an SSL or a Neve—

will be purchased. A Digidesign workstation will also be added. Opening of the new facility is slated for January. Mulloy notes that Belmont's program, unlike a similar program at nearby Middle Tennessee State University, emphasizes the business aspects of the music industry while providing technical learning options as well.

Speaking of Belmont grads, Trey



In Nashville, Recording Arts' studio manager Lou Johnson and producer Val Garay were working with Warner Brothers artist, Teresa.

Smith (class of '84), owner of Sound Barrier on Gallatin Road, boasts the first commercial installation in Nashville of the Akai digital recording system, and he is the first in town to have a 24-track configuration of the system running through his automated Harrison 2824 console. Sound Barrier does a lot of mid-budget album work, according to Smith. "The Akai lets me offer digital quality at analog rates," he says, noting that he's getting \$650 per day with an engineer for the Akai, as opposed to \$400 a day with his MCI analog deck.

Smith acknowledges some resistance to the relatively new Akai format, but once prospective clients try it they usually react favorably. "Nashville runs on trends: If people think a certain piece of equipment is hip, then that's

—CONTINUED ON PAGE 227

C O A S T

SESSIONS & STUDIO NEWS

by Jeff Forlenza

NORTHWEST

R.E.M. stopped in at the new Bad Animals' (Seattle) Studio X to work on their upcoming Warner Bros. album with producer Scott Litt, engineer Cliff Norrell and assistant Ed Brooks...At Studio D in Sausalito, CA: Chris Isaak tracked his latest album with producer Eric Jacobson, engineer Mark Needham and assistant Larry Brewer; Grammy nominee Peter Rowan worked on his next bluegrass release for Sugarhill Records with engineers Joel Jaffe and Larry Brewer; and Gary Markis recorded his piano album *Past the Nightwatch* with engineers Joel Jaffe and Moira Marquis...At San Francisco's Different Fur Recording, IRS Recording's Monks of Doom (featuring ex-Camper Van Beethoven members) were in mixing with producer Dan Fredman, engineer Ron Rigler and assistant Nancy Scharlau...At Jeff Roth's Focused Audio in San Francisco, Godzilla in 3-D is not unusual; A recent session for Nike features a 3-D sonic system developed by inventor Jeff Gold at Focused. The Barnaby 2000 Sonic Imaging System, named after Gold's mannequin Barnaby, is a method of 3-D recording where two microphones are placed in a dummy's (Barnaby's) ears to simulate human psychoacoustic sound recognition. The commercial spot, which features Charles Barkley versus Godzilla in a one-on-one game of hoops in downtown Tokyo, premiered on the MTV Music Awards broadcast...

SOUTHEAST

At Criteria Recording Studios (Miami), rock legends Jimmy Page and David Coverdale were hard at work with drummer Denny Carmassi tracking and producing a Geffen Records project with engineer Mike Fraser behind the

board. The 48- and 72-track sessions were assisted by Keith Rose and Delwyn Brooks in Criteria's SSL6000G-equipped Studio E...*The Creole Gumbo Radio Show*, a weekly Louisiana music show, is bubbling out of Ultrasonic Studios in New Orleans. The program spotlights local musicians in performance and interviews. Jerry Embree is the producer and Bruce "Sunpie" Barnes is the host. The show is scheduled to air in 35 U.S. cities via the National Public Radio satellite system...At Musiplex, Atlanta, Chris Robinson of the Black Crowes was in cutting vocals tracks for "Take What I Want" for the new Kinsey Report album...At Sound Stage Studio, Nashville, producer Barry Beckett and engineer Justin Niebank worked with Atlantic Records artists Confederate Railroad. Craig White assisted the sessions...Legendary engineer/producer Tom Dowd tracked and mixed Copperhead for Mercury Records with help from Rodney Mills at the SSL at Southern Tracks in Atlanta...At Flamingo Studios, Tallahassee, FL, Rick

—CONTINUED ON PAGE 224

N.Y. METRO REPORT

by Dan Daley

The venerable RCA Studios on Sixth Avenue will pass away in March according to informed sources. The studio complex, which has been in constant operation for over 40 years, is a victim of New York's typical vertical real estate squeeze, which has hurt many large rooms. The lease renews in 1994 but payments must be made earlier, and at \$30 per square foot, the price is simply too high for the exten-

—CONTINUED ON PAGE 223

At Clinton Studios (New York) engineer Ed Rak, composer/producer Tom Corwin and Patti LaBelle as they work on a remake of Rodgers and Hammerstein's "You'll Never Walk Alone" for an AIDS Walk PSA.



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—FROM PAGE 220, L.A. GRAPEVINE

proach to serving clients. This can only be a plus.

On the inside, the facility has changed dramatically in the years since it was known as Hitsville and run by Motown. The scoring stage attached to Studio A is about the only room to not have been significantly altered, although that, too, has been modified. A Barco projector and a Stewart 9x12-foot screen were installed to make the room suitable for ADR work.

Signet has retained all of Soundworks West's equipment and added some. Studio B was recently certified as a THX dubbing stage. Both Studios A and B have Neve VRP72 consoles with Flying Faders, Total Re-

call and multiple monitoring systems. A considerable roster of recorders, both analog and digital, is available.

Studio C (in which I fondly remember working on more *Defenders of the Earth* cartoons than I can count) is a smaller but more flexible room that can be used for anything from music overdubs (Manhattan Transfer did vocals there for *A League of Their Own*) to posting. Signet has an in-house sound effects designer in Bruce Nazarian (see below for more about him), and composer Gerald Gouriet has set up shop on the site. (His credits include features and movies of the week such as *Madame Sousatzka*, *Mad at the Moon* and *Child of Rage*.)

The upstairs telecine/transfer room

AES ROUNDUP

The following workshops will be presented by the AES at their 93rd convention, October 1-4 at the Moscone Convention Center in San Francisco. (Note: Only the chair is listed below; each workshop features a panel of industry experts.)

Thursday, October 1:

- "Unifying Transport Control in the Studio: MIDI Machine Control and MIDI Synchronization," Gary Lester of TimeLine Vista; 9 a.m.-noon, Room 301.
- "Grounding and Isolation: The Shocking Realities," 1-5 p.m., Room 301.

Friday, October 2:

- "The Future of Women in a Man's Field," Ellen Goldstein, Pro Media; 9 a.m.-noon, Room 309.
- "Data Compression Techniques and Pitfalls," Terry Shultz, Motorola Semiconductor; 9 a.m.-noon, Room 301.
- "Digital System Controllers for Touring and Fixed P.A. Systems," David Scheiman, Concert Sound Consultants; 1-5 p.m., Room 301.

Saturday, October 3:

- "The Light at the End of the Tunnel: Fiber Optic Technologies for Studio and Touring," Tom Scott, Entertainment Digital Network; 9 a.m.-noon, Room 301.
- "The Ups and Downs of Concert Rigging," Harry Donovan, Donovan Rigging Inc.; 1-5 p.m., Room 301.
- "MADI: Another Unimplemented Pro-

tocol," Ken Pohlmann, University of Miami; 1-5 p.m., Room 309.

Sunday, October 4:

- "Care and Feeding of Hard Disks in the Studio," Gary Hall, Sonic Solutions; 9 a.m.-noon, Room 301.
- "Concert AC Power Distribution Techniques," John Campion, Showpower; 1-5 p.m., Room 301.

There will also be technical tours of some of the Bay Area's internationally known audio facilities:

Thursday, Oct. 1:

- Silicon Graphics, Mountain View (9:30-11 a.m. and 1:30-3 p.m.).

Friday, Oct. 2:

- Dolby Laboratories, San Francisco (9:30-11 a.m. and 1:30-3 p.m.); The Plant Recording Studios, Sausalito (10-11:30 a.m.).

Saturday, Oct. 3:

- Charles M. Salter Associates, San Francisco (9:30-10:30 a.m.; 11 a.m.-noon; 1:30-2:30 p.m.; and 3-4 p.m.); Fantasy Recording Studio and Saul Zaentz Film Center, Berkeley (9:30 a.m.-1 p.m.); Ultrasound, San Rafael (1:45-3:15 p.m.).

Sunday, Oct. 4:

- Center for New Music and Audio Technologies, U.C./Berkeley, 9:30-11:30 a.m.

For more information, contact the AES at (415) 781-6306, or fax (415) 495-0631. ■

is being revamped, and those services will be emphasized as part of Golov's plan to make better use of all the rooms in the three-story facility. He will continue to be involved in the production end, and there are several editorial suites for companies that choose to bring their pictures in-house under his supervision. All in all, it's a promising (re)start for a historic facility.

With the demise of New England Digital, an effort is underway to "get the word out so that everyone who owns a Synclavier knows that there is a mechanism for service and a conduit for ongoing information," says sound effects designer and composer Bruce Nazarian. Owners and interested users in the L.A. area can contact the Los Angeles Synclavier Owners Consortium (LASOC) through Nazarian's office at (310) 478-8060.

On August 12, Woodholly Productions on North Seward had an open house to introduce clients to the facility's new online video editing bay. Chief engineer David Masnica says that such manufacturers as Abekas, Zaxcom, Sony and Panasonic gave demonstrations to a crowd of about 40. In addition to the new room, Woodholly has an offline room and four audio sweetening suites. (If you were sitting at home that night, you could have watched *The Marilyn Files*, the first project to be online in the new room.)

Last but not least, the International Teleproductions Society is planning to have a luncheon meeting in the last week of September. The tentative discussion topic is Internal Revenue Service requirements that make it difficult for facilities to employ freelancers. For the exact date and time, a finalized program and more information call the president of ITS at (818) 956-7912.

Give L.A. studio news to Amy Ziffer by calling (818) 567-1429; call also for faxing instructions. ■

—FROM PAGE 221, N.Y. METRO
sive multiroom facility.

Business remains steady, sources confirmed; Broadway shows (which had an excellent season for the first time in nearly a decade), classical recordings and film scores all contributed regularly to the bottom line. That wasn't enough in light of the fact that RCA/BMG Records has purchased a 40-story building at West 45th Street and Broadway to house all of its opera-

tions. But mastering and editing rooms for in-house catalog work are all that is slated for that location's recording facilities. Thus, unless another party can take over, RCA Studios will join other major label-sponsored New York studios in magnetic heaven. These include the old Columbia Studios on East 30th Street (now a high-rise apartment building) and Decca Studios.

Speaking of passings, the Yamaha Communications Center (YCC) has announced that it will close on January 1, 1993. The multipurpose R&D/showroom facility on West 57th Street opened in December 1987, and it has been the locus of a number of music and tech-

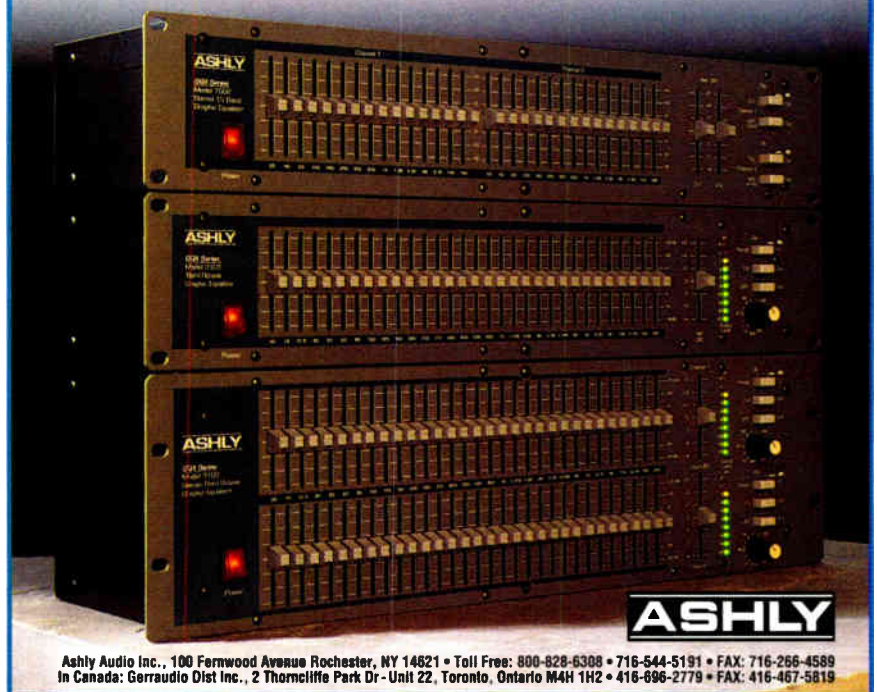
nology events.

A Yamaha spokesman cited the recession, the cost of maintaining Manhattan real estate, and the company's decision to shift away from a cost-center to a profit-center approach as reasons for the closure. "The shift is from R&D to marketing," he said, adding that the R&D performed at YCC will continue at other Yamaha locations in the U.S.

Jim Williamson, former chief engineer at East Side Film & Video, has taken over that post at Skyline Studios effective July 6. He replaces longtime chief tech Fran Manzella, who left to freelance. The reason for his move

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from a post house to a primarily music recording studio, Williamson says, was to be better able to apply his background in music engineering. He was at East Side for nearly three years; before that he was a field engineer for Studer. Williamson's first projects at Skyline include expanding its relatively new MIDI production room and effecting the choice of a new 48-track digital deck.

BearTracks' Recording, up in the 914 land of Suffern, N.Y., celebrates its tenth anniversary this year. The SSL-equipped facility, owned by saxophonist Jay Beckenstein of Spyro Gyra, began in 1982 when a huge, 1,700-

square-foot, oak-and-cedar studio was built into a stone barn complete with a George Augspurger-designed control room. Today BearTracks is completing a MIDI pre-production room and adding a client lounge.

An indication that DAT has hit its adolescence, so to speak: A company has been formed specifically to service and maintain Sony DAT decks: NXT Generation Inc., a spinoff of Jersey-based head-reconditioning specialists JRF Magnetic Sciences. "Many of the DAT recorders used in studios today have now logged enough hours to be in need of thorough maintenance," explains John French, co-owner of JRF. ■

—FROM PAGE 221, SESSIONS & STUDIO NEWS

Rubino tracked and mixed Atlanta-based recording artists **Two-Eighty-Five...** At **Charico Studios** (Clearwater, FL), the home of the original Trident A-Range console from Trident Studios in London, **UROK** worked with producers **Tim Brownell** and **Joe Johnson**, and engineer **Scott Seahawer**, for a **Bing Bong Records** project...

NORTHEAST

At **Baby Monster Studios** (NYC) **J. Mascis** of **Dinosaur Jr.** was in recording vocal and guitar tracks for their new album with **John Agnello** engineering... At **Studio 4** (Philadelphia), producers **Joe Nicolo**, **Phil Nicolo** and **Andy Kravitz** completed remixes for the **Kriss Kross** single "I Missed the Bus." **Manuel Lecuona** assisted the sessions... At **D&D Recording Studios** (NYC) producer **Jr. Vasquez** and keyboard wizard **Joey Moskowicz** remixed **Michael Jackson's** hit "Off the Wall" for a soon-to-be-released remix album. **Eddie Sancho** worked the board, and **Luc Allen** assisted... Also in Manhattan, legendary bassist-turned-producer **Randy Jackson** worked with Sony Music artist **Trez Lorenz** at **Electric Lady Studios**. **Michael White** engineered the session while **Marc Glass** assisted... Miami-based rockers **Young Turk** recorded their Virgin Records debut at **Neon City Studios** in Scranton, PA. The album was produced by **Carl Canedy** and the mixing was done by **Nico Bolas** at **The Record Plant** in L.A... Producer **Kevin Doyle** was at **Prime Cuts** (NYC) doing overdubs and mixes of **Sarah McLachlan's** "Wear Your Love Like Heaven" for **Arista Records**... **Dean Fraser** "the dean of reggae music" was at **Lion and Fox Recording** (Washington, D.C.) working on his own solo album with producer **Fatis** for **RAS Records**...

NORTH CENTRAL

At Chicago's **Sparrow Sound Design** jazz sessions were in full swing: tenor saxophonist **Von Freeman** completed two CDs—**Nils Winther** produced the sessions for European jazz label **Steeplechase** with engineer **Joanie Pallatto**; and **Art Ensemble of Chicago** bassist **Malaci Don Favors** worked on two compositions for his CD on the **AECO** label... **Big Head Todd & The Monsters** were at **Minneapolis' Paisley Park Studio** recording their **Giant Records** debut with producer **David Z.**... **Al Green's** first producer, **Palmer James**, was at **Studio A** (Dearborn Heights, MI) mixing tracks for R&B artist **Stanley Will-**

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The "Producer/Engineer Techniques" panel at StudioTech '92 hosted by the San Francisco chapter of NARAS: (Back row L to R) David Schwartz (Studio Tech '92 chair), Mr. Bonzai (moderator), Tom Flye, Jay Henry; (front row L to R) Susie Foot, Bob Clearmountain, Terry Becker.

iams. Randy Poole was at the console with Ed Marx assisting the TWS Productions sessions...

SOUTHWEST

Cybortronik Recording Group of Dallas, TX, is cranking out techno-rave, hard dance and hip hop music: Producers David May and David Lee have put together a sampler including the sounds of Balance, Proxima, Liquid 25, Pullom Sound Machine, Transponder and Digital One... Ft. Worth guitar wiz

Willy Ray was working with engineer Randy McCoy at Longhorn Sound Studio (Clyde, TX) recording a project for release in Europe and Japan...

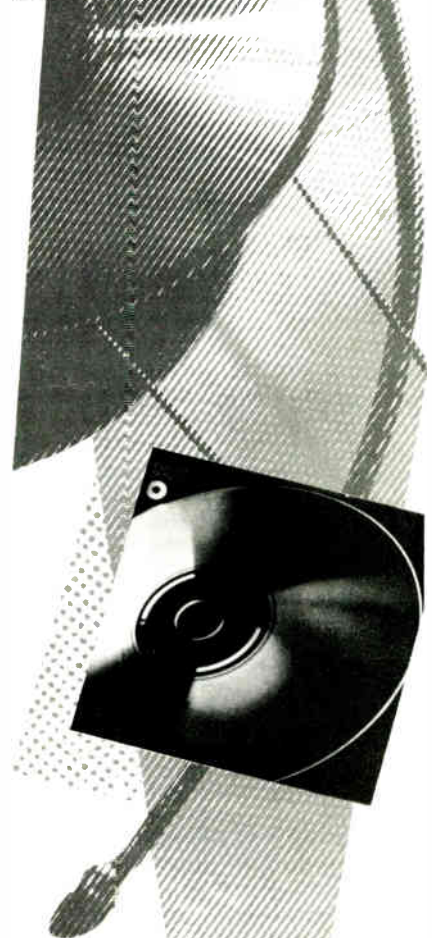
SOUTHERN CALIFORNIA

John Fogerty was at Lighthouse Recorders (North Hollywood) producing his latest Warner Bros. release with engineer Dave McNair and assistant John Lowson... At Devonshire Studios (North Hollywood), Motley Crue was in Studio 5 with engineer Bill Kennedy

"The Record Producer—The Personality of Sound" was presented by the L.A. chapter of NARAS. Pictured are (standing L to R) L.A. chapter execs Greg Knowles, Nik Venet, Bob Garcia, Harriet Wasserman, Susan Butler, and panelists Derek Bramble, Stix Hooper, Kenny Harris, Bill Bottrell, George Massenburg; (kneeling L to R) Max Norman, Michael Mavrolas, Marlon McClain and Bob Margoueff.



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PHOTO: ROSEANNE WHITAKER

Reed Ruddy and Paul Speer mix Music+Art at Bad Animals' Studio X in Seattle (room view shown left). See "Session Spotlight."



to overdub and mix their latest for Elektra Entertainment; and Ray Charles was in Studio 3 with producer Richard Perry and engineer Mick Guzauski mixing his upcoming Warner Bros. album...Motown artist Gerald Alston was at Encore Studios (Burbank) working with producer Stan Sheppard and engineer Barney Perkins...At Andora

Studios (Hollywood), CBS recording artist **Kenny Loggins** and his band were cutting tracks for a forthcoming album. At the console engineering and mixing was **Terry Nelson**. Engineer **Roger Nichols** and **Walter Becker** were also at Andora mixing **Rene** for the jazz label **Triloca Records**. Nichols mixed directly to recordable CD...**Elliot Easton** (former **Cars** guitarist) was at **Sunset Sound** (Hollywood) overdubbing and mixing tracks with vocalist **Danny Malone**. **Roy Thomas Baker** produced the project with **Eddie Delena** engineering and **Neal Avron** assisting...

STUDIO NEWS

Music Annex of San Francisco added two **Amek** consoles: a custom-built **Amek Hendrix** console with **Supertrue** automation went into their **Studio 4** for film and video mixing, and an **Amek 2520** console is now in **Studio 3** for **Foley**, sound design and music mixes...**James Harrington** of **Musical Infinities** (San Francisco) has developed a modular approach to recording that extends beyond the studio. **Octopus** is a combined recording studio and rental service based on digital workstations: **Pro Tools**, **SampleCell**, **Studio Vision** and **Sound Tools**. With **Musical Infinities** as the hub of the operation, clients can digitally record at the studio, take the digital masters and **Macintosh**-based editing systems with them (in **ATS** flight cases), and then return to the studio for final mixdown or layback to all video formats...**Bazzbo Productions**, a music production facility owned by **Tim Jaquette** and **Bob Somma**, opened in **La Verne, CA**. New equipment at **Bazzbo** includes a **32-input D&R Orion Series** console, a **Sony APR-24** multitrack, a **Panasonic 3700 DAT**, a **Sound Tools** system and miscellaneous outboard gear...**John Wicks** of **Third Story Recording** in **Philadelphia** opened a second room to do all of his rap and **R&B** productions. The room revolves around a **Roland DM-80** hard disk recorder, making it a "virtual room," according to **Wicks**, "where we have our **MIDI** system, synths and rhythm machines in sync with the **DM-80**..."**Dodge City Sound** (**Glendale, CA**) added a **Neve V2 48** console and a **Studer 827** multitrack recorder...**Shag Sound Studio** (**Toronto, ON**) acquired a **Soundtracs Solo 24**-channel mixer.

Send nationwide sessions and studio news to **Jeff Forlenza**, c/o **Mix** magazine, 6400 **Hollis St. #12**, **Emeryville, CA 94608**.

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SESSION SPOTLIGHT

One of the first mixing sessions at the much-heralded Studio X in Bad Animals, Seattle, was for guitarist Paul Speer's Miramar release *Collection 991: Music+Art*. Speer's instrumental project had humble beginnings and plenty of travel mileage before it reached Steve Lawson and Ann and Nancy Wilson's facility.

The project began at Miramar Recordings, Speer's home studio equipped with a JH-24 and Harrison MR-4 in Bellevue, WA. After initial tracking, Speer had to move to bigger facilities to accommodate guest musicians. So it was on to Triad Studios in Redmond, WA, to record David Lanz' 9-foot Yamaha grand piano with engineer Larry Nefzgar. Then it was down to North Hollywood to record Steve Reid (percussionist for The Rippingtons) at Reid's studio, which is specifically designed for recording percussion. From there Speer ventured across L.A. to Marina Del Rey where he worked at new age icon Michael Stearns' home studio. After capturing Stearns' galactic synth programming and "Beam" playing, it was back to the Pacific Northwest and Bad Animals.

The mixes were smoothly handled by Bad Animals studio manager Reed Ruddy and SSL expert Tod Lemkuhl on Studio X's 64-input console and massive TAD monitoring system. After Ruddy and Speer were satisfied, they mixed down to DAT and it was back to a home studio situation.

This time it was the home studio of Albert G. Swanson (Seattle audio guru and in-house engineer for the Seattle symphony) for digital editing via Pro Tools. The final DAT master went off to Nashville and Randy Kling at Disc Mastering.

After a lot of traveling, Speer's CD is seamlessly textured and ready for ambient, evocative enjoyment. ■

—FROM PAGE 220. NASHVILLE SKYLINE

it and there's nothing else till the next trend," Smith says. "But that's changing as these new, affordable technologies start making an impact down here."

New Kid In Town: I went to play a session for Bob Gaudio the other day and who turns out to be the engineer? Roy Cicala, co-founder of the original Record Plant in New York. Cicala, who came here to live last spring, adds another name to an influx of serious talent choosing Nashville. After the Plant closed in 1990, Cicala wanted out

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of the business and moved to Brazil.

He was back in the saddle shortly, though, producing Paul Simon's *Graceland* back-up band down there. Here, he's producing a Brazilian artist (Woodland Digital and Steve Durr's Imagine Sound have been his favorite Nashville rooms) and mulling over studio offers (although he doesn't feel like taking on the responsibility again). "This town does need some better tracking rooms, though," he says.

New Room In Town: Barry Sanders, former studio manager at 16th Avenue Sound and operator of his own room at that location, has left and opened Sanctuary Sound. He didn't have to travel very far: He went right across the street to Even Stevens' old studio, The Garage. Sanctuary is a single room with Sanders' 28-input Neotek Elan console and Studer A80 24-track. Sanders is aiming at the mid-budget tracking and overdub business, a category that's bustled lately with the country bandwagon. At \$500 per day, Sanders claims he should be able to consistently augment a client list. He is including producer Glenn Rosenstein, who will follow him across 16th Avenue. ■

—FROM PAGE 157, CONTROL ROOM DESIGN

worst, it will at least get them off the console or out from behind you. You might even have enough room for the slate sheetboard. They'll also swing Auratones or other reference speakers out of the way if they can't be hinged to drop them in front of the console during tracking sessions. This takes more Sonex™ but you'll be able to see the players.

While a good many of the preceding techniques may seem a little vague, construction details are available in the Owens-Corning noise control manual. Other sources include Armstrong, PPG, Georgia-Pacific, the USG Group, Klark-Teknik's Audio System Designer manual, Don and Carolyn Davis' *Sound System Engineering* (available, with other texts on acoustics and studio design, through Mix Bookshelf) and last but by no means least, your local building-supply store. ■

Chicago-based Malcolm Chisholm has worked as an audio engineer, acoustician and consultant to the recording industry for over 30 years.



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1993

Upcoming Directory Deadlines

October 7, 1992: Sound Reinforcement and Remote Recording

November 9, 1992: Recording Schools, Seminars and Programs

December 8, 1992: Northwest Recording Studios

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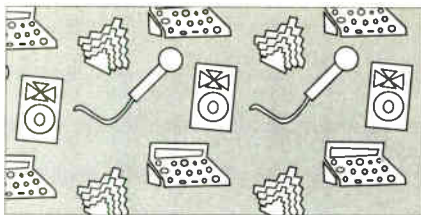
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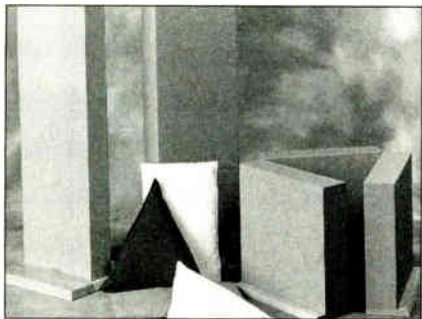
Acoustical Materials

ACOUSTICAL SOLUTIONS INC.

ALPHA AUDIO ACOUSTICS. PO 5403; Richmond, VA 23220; (800) 782-5742. Product Name: Alpha Iso Booth. Contact: Michael Binns, pres. **Date Product Introduced:** 4/92. **Product Description & Applications:** Portable isolation booth for audio productions, in-house or on-location.

ACOUSTICAL SOLUTIONS INC.

ALPHA AUDIO ACOUSTICS. PO 5403; Richmond, VA 23220; (800) 782-5742. Product Name: Alphasorb Acoustical Panel. Contact: Michael Binns, pres. **Date Product Introduced:** 4/92. **Product Description & Applications:** Alphasorb Acoustical Panel. Fabric covered fiberglass panel, class A fire rated, NRC 0.85 to 1.00.



ROOMTUNE INC.
RoomTune Acoustic Treatment

ROOMTUNE INC.

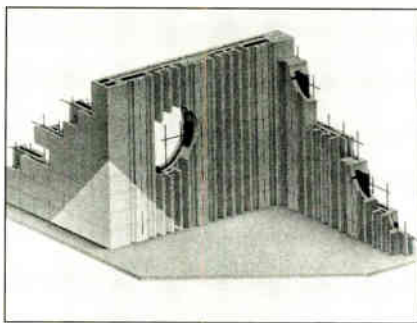
PO Box 57; Sugar Creek, OH 44681; (216) 852-2222; FAX: (216) 852-2363. Product Name: RoomTune Acoustic Treatment. Contact: Michael Finley. **Date Product Introduced:** 10/91. **Product Description & Applications:** The critically acclaimed acoustic room treatment system that works to eliminate pressure zones without overdamping the musical environment. The CornerTune controls upper corner loading by covering the entire intersection. The RoomTune is a free-standing, tuneable room mode absorber/diffuser. High frequency echo is treated by the wall-mounted EchoTune and/or the ceiling-mounted CeilingTune; and the BassTune is of course the tool for low frequency standing wave absorption. **Basic Specifications & Suggested List Price:** All RoomTune components are reasonably sized (one man installation), because it is a minimalist treatment. Average price to treat 2 studio or mix-down rooms is \$1,200. Specific application questions should be directed to the manufacturer.

RPG DIFFUSOR SYSTEMS INC.

651-C Commerce Dr.; Upper Marlboro, MD 20772; (301) 249-0044. Product Name: D'Antonio Performance Signature Series. Contact: Troy B. Jensen, gen. mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** The first offering in the D'Antonio Performance Signature Series is the new variable acoustics modular performance shell (VAMPS). The new VAMPS shell is manufactured and distributed jointly by RPG Diffusor Systems, L.I.C. and Hoffend & Sons, Rochester NY. The Shell consists of an open architecture steel rolling tower with 10 openings which can accept a wide variety of replaceable reflective, QRD diffusive and absorptive inserts. One shell can be used for bands, orchestras, choruses or smaller ensembles and soloists. **Basic Specifications & Suggested List Price:** A VAMPS section measures 4'(W)x10'(H)x2'10"(D) in its functioning mode. The upper 3' cantilevered section folds back to a height of 6'3" to allow passage through doors and storage. The shell is stabilized with a counterweight assembly which contains rolling and locking casters for easy location. Call RPG or Hoffend for pricing, which depends on the selections and finish of the acoustical inserts.

RPG DIFFUSOR SYSTEMS INC.

651-C Commerce Dr.; Upper Marlboro, MD 20772; (301) 249-0044. Product Name: DiffusorBlox™. Contact: Troy B. Jensen, gen. mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** DiffusorBlox™ are a patented new load bearing structural acoustic concrete masonry unit offering 100% absorption at 100Hz, broad-bandwidth sound diffusion using RPG's QRD Diffusor technology and an STC of 55. DiffusorBlox™ offer a very economical alternative to building music facilities since the acoustics can now be incorporated into structural walls in excess of 25" high, if plaster option is used. DiffusorBlox™ are produced using RPG automatic block machine molds under license qualified block producers close to the job site to minimize shipping costs. **Basic Specifications &**



RPG DIFFUSOR SYSTEMS INC.
DiffusorBlox™

Suggested List Price: The DiffusorBlox system consists of three blocks. A block measures 7 5/8"(H)x15 7/8"(W)x11 5/8"(D) and weighs 50 lbs. The B Block measures 7 5/8"(H)x15 7/8"(W)x11 5/8"(D) and weighs 39 lbs. The C block measures 7 5/8"(H)x15 5/8"(W)x3 5/8"(D) and weighs 14 lbs. DiffusorBlox offer two low frequency absorbing chambers with a 3/8"x10" slot for broad band absorption.

RPG DIFFUSOR SYSTEMS INC.

651-C Commerce Dr.; Upper Marlboro, MD 20772; (301) 249-0044. Product Name: FRG Omnifusor™. Contact: Troy B. Jensen, gen. mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** RPG has recently completed the development of a new fiber reinforced Gypsum molding technology, which allows the fabrication of low cost non-combustible diffusing and reflecting modules. The first offering is the 2'x2' FRG Omnifusor panel, which is a 2-dimensional QRD® Diffusor™ offering hemispherical coverage. Flat reflective panels are also available. They can be cut to fit border areas and can also be used for downlighting. Non-combustibility and highly decorative appearance make the Omnifusor an economical acoustical design element. **Basic Specifications & Suggested List Price:** The FRG Omnifusor can be Tegular mounted in a conventional t-bar suspended grid with a down hang of 3 1/4" or in RPG's new concealed grid mounting system. Inserted threaded inserts can be used for additional seismic support. The concealed grid also allows wall mounting. The panels measure 23 5/8" square x 4" deep and weigh 23 lbs. They are available in natural white or custom painted colors.

RPG DIFFUSOR SYSTEMS INC.

651-C Commerce Dr.; Upper Marlboro, MD 20772; (301) 249-0044. Product Name: Soundtrac™. Contact: Troy B. Jensen, gen. mgr. **Date Product Introduced:** AES, 10/92. **Product Description & Applications:** RPG has developed a new approach to Total Room Acoustical Conditioning called Soundtrac. All of RPG's palette of acoustical elements can now be integrated into a total room design using an extruded fabric fastener trac which also allows for future fabric replacement. The Soundtrac allows precision acoustical reflective/absorptive, absorptive/diffusive, reflective/diffusive interfaces which provide a unifying aesthetic design. **Basic Specifications & Suggested List Price:** The Soundtrac fabric fasteners comprise a complete mounting system for all types of inside, outside, mid wall, etc. room acoustical interfaces. A very wide selection of new designer fabrics is available. The Soundtrac system is applied by RPG field applicators ensuring the highest quality. RPG's computerized project estimating program insures quick pricing.

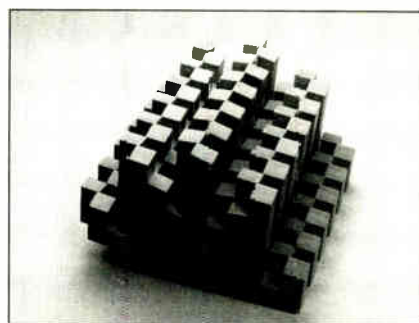
SYSTEMS DEVELOPMENT GROUP

5744 Industry Ln., Ste. J; Frederick, MD 21701; (800) 221-8975. Product Name: A° Diffusor Model LP. Contact: Bernard W. Chlop, pres. **Date Product Introduced:** 10/92. **Product Description & Applications:** The A° Diffusor Model LP is a two dimensional acoustic diffuser effective from 250Hz to 16kHz. The low profile squares can be arrayed where space is at a premium. The Model LP represents an economical alternative to older narrow bandwidth solutions, providing the studio professional with value and functionality. Ready to paint, these units accept a variety of coatings, from texture paints to fire retardants. Applications include studios, control rooms, gobos & concert shells, mobile vehicles and home theaters. **Basic Specifications & Suggested List Price:** List price: \$55.90. Nominal size: 14.875x14.625x4.5" (HWD). Material: rigid polyurethane. Bandwidth: 250Hz-16kHz. Dispersion: horizontal and vertical. Weight: 5.75 lbs. Recommended mounting: attach to walls with paneling adhesive. Shipping method: UPS. Painting instructions: prime first with oil base paint then desired finish latex/oil base/acrylic.

SYSTEMS DEVELOPMENT GROUP

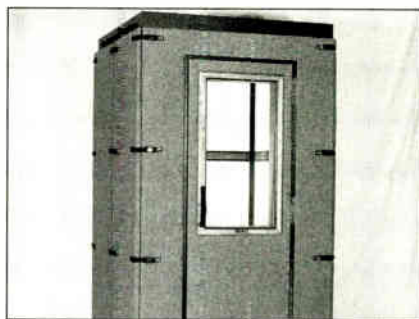
5744 Industry Ln., Ste. J; Frederick, MD 21701; (800) 221-8975. Product Name: A° Diffusor Model P. Contact: Bernard W. Chlop, pres. **Date Product Introduced:** 10/91. **Product Description & Applications:** The A° Diffusor Model P is a two dimensional acoustic diffuser effective from 125Hz to 16kHz. The squares can be arrayed where larger diffusers with less bandwidth can't go. The A° Diffusor family is free from the low frequency absorption of other products. Ready to paint, these units accept a variety of coatings, from texture paints to fire retardants. Applications include studio, control rooms, gobos & concert shells, theaters and conference rooms. **Basic Specifications & Suggested List Price:** List price: \$69.90. Nominal size: 14.875x14.625x9" (HWD). Material: rigid polyurethane. Bandwidth: 125Hz to 16kHz. Dispersion: horizontal and vertical. Weight:

—LISTING AND PHOTOLOGO TOP OF NEXT COLUMN



SYSTEMS DEVELOPMENT GROUP
A° Diffusor Model P

5.75lbs. Recommended mounting: attach to walls with paneling adhesive. Shipping method: UPS. Painting instructions: prime first with oil base paint then desired finish latex/oil base/acrylic.



WHISPERROOM INC.
WhisperRoom

WHISPERROOM INC.

166 S. Sugar Hollow Rd.; Morristown, TN 37813; (615) 585-5827; FAX: (615) 585-4831. Product Name: WhisperRoom. Contact: Sharon White, sales mgr. **Date Product Introduced:** 10/91. **Product Description & Applications:** The WhisperRoom is a portable, modular sound isolation room on wheels. It is completely self-contained, with electrical receptacle and ventilation system. It can be relocated even when it is assembled. Because of the unique gasketing system, it can be assembled or disassembled in minutes without technical personnel, tools or hardware. It is ideal for situations, both residential and commercial, where sound isolation is needed, and a permanent structure is not desired. **Basic Specifications & Suggested List Price:** Standard features include interior power receptacle, fan powered ventilation system and casters for mobility. Optional features are windows (door and wall), cable passage, interior acoustical tile package and studio ventilator system. Five sizes, ranging from 4'-square to 8'-square, are available. Prices range from \$2,150 to \$6,255. Endorsed and used by RCA/BMG Studios, NY.

AMPLIFIERS

ADA SIGNAL PROCESSORS INC.

420 Lesser St.; Oakland, CA 94601; (510) 532-1152. Product Name: Microtube 100. Contact: Chris Keller, marketing. **Date Product Introduced:** 6/92. **Product Description & Applications:** A single rackspace power amplifier for guitar. Stereo or bridge-mono operation delivers 100 watts of power. Features include presence control, level indicators, stand-by switch, circuit protectors, and courtesy A.C. outlet, all in a 9 lb. package. Breakthrough technology combines tube and solid-state circuitry to deliver all the benefits of tube power amplification without any of the drawbacks. **Basic Specifications & Suggested List Price:** \$439.95. 50 watts per channel stereo mode into 4 ohms. 100 watts mono mode into 8 ohms.

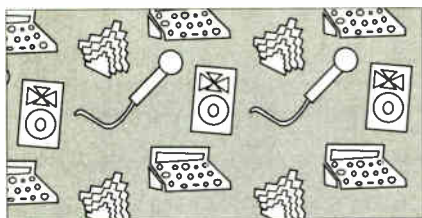
ADA SIGNAL PROCESSORS INC.

420 Lesser St.; Oakland, CA 94601; (510) 532-1152. Product Name: Microtube 200. Contact: Chris Keller, marketing. **Date Product Introduced:** 1/92. **Product Description & Applications:** A single rackspace power amplifier for guitar. Stereo or bridge-mono operation delivers 200 watts of power. Features include presence control, level indicators, cooling fan, stand-by switch and circuit protection all in an 8 lb. package. Breakthrough technology combines tube and solid-state circuitry to deliver all the benefits of tube power amplification without any of the drawbacks. **Basic Specifications & Suggested List Price:** \$699.95. 110 watts mono mode into 4 ohms. 200 watts mono mode into 8 ohms.

AUDIO CENTRON

1400 Ferguson Ave.; St. Louis, MO 63133; (314) 727-4512. Product Name: RMA-800. Contact: Tony Moscal, product mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Two rackspace, 200 watt per side power amplifier. 1/4" & XLR balanced inputs, 1/4" and binding post outputs, variable speed fan, optocoupler limiters, full protection circuitry, individual level controls. **Basic**

—LISTING CONTINUED ON NEXT PAGE



Amplifiers

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Specifications & Suggested List Price: \$650. 200 watts per side at 4 ohms, 400 watts mono-bridged at 8 ohms.

AUSTRALIAN MONITOR U.S.A.

PO Box 226; Malvern, PA 19355; (215) 380-1358. **Product Name:** Australian Monitor. **Contact:** Paul Sherwood, U.S. sales mgr. **Date Product Introduced:** 1992. **Product Description & Applications:** High powered MOSFET amplifiers AM 1600—2 channel, AM 1200—4 channel bridgeable, 2 rack height 1K2 and K7 Series, AM 2200 tri-amplifier—3 amps in one 3 rack height configuration. Plug-in limiter cards to fit our K Series amplifiers, band pass/x-over filters. **Basic Specifications & Suggested List Price:** The cost of these items is not yet known but will become available in 1992/93 at minimal cost.

BGW SYSTEMS INC.

13130 Yukon Ave.; Hawthorne, CA 90250; (310) 973-8090. **Product Name:** BGW GTC Compact Touring Amplifier. **Contact:** Joe DeMeo, sales. **Date Product Introduced:** 1/92. **Product Description & Applications:** The BFW GTC is the first compact and lightweight touring amplifier from BGW Systems. It offers the performance of the BGW GTA, but in a 45 lb. two-rack-space package with over 2 kW of dynamic power output. It features balanced looping XLR inputs, Neutrik speaker outputs, dual-channel & bridged mono modes, variable speed cooling, full modular construction, thermal protection and space for two internal crossover cards. **Basic Specifications & Suggested List Price:** \$2,099.

BGW SYSTEMS INC.

13130 Yukon Ave.; Hawthorne, CA 90250; (310) 973-8090. **Product Name:** Model GTC. **Contact:** Joe DeMeo, sales. **Date Product**

—LISTING CONTINUED TOP OF NEXT COLUMN

Introduced: 1/92. **Product Description & Applications:** The BGW Model GTC is our first two-rack-unit-high touring amplifier and doesn't compromise BGW engineering standards. New features include DC-servo controlled cooling fans that stay off when not needed and allow quiet operation in small clubs or studios. An efficient toroidal power transformer, combined with the GTA's massive heat sink modules, allows operation into 2 ohm loads. **Basic Specifications & Suggested List Price:** IHF power output: 1,100 watts/ch. into 2 ohm loads. Frequency response: 3Hz-85kHz ±0, -3 dB. Signal-to-noise ratio: 113 dB below rated 8 ohm output, A-weighted. Weight: 45 lbs., size: 19" w x 3.5" h x 15.5" d.

BOULDER AMPLIFIERS

4850 Sterling Dr.; Boulder, CO 80301; (303) 449-8220. **Product Name:** Boulder 102AE. **Contact:** Marv Farley, nat'l sales mgr. **Date Product Introduced:** Fall 1991. **Product Description & Applications:** Power amplifier, 100 watt/channel stereo. Dual stage BA990DC technology, DC coupled. Comparator method protection circuitry. Balanced inputs. **Basic Specifications & Suggested List Price:** 100 watt/channel at 8 ohm. 140 watts peak power. \$2,249 list.

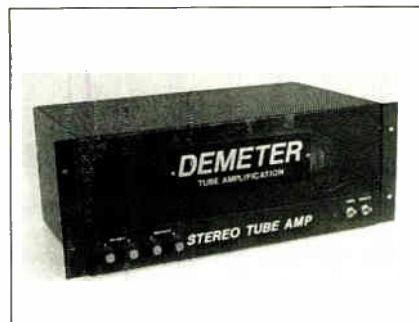
CROWN

PO Box 1000; Elkhart, IN 46515-1000; (219) 294-8000. **Product Name:** MA 5000 VZ. **Contact:** Verne Searer, prod. dev. mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** Macro-Tech 5000 VZ produces an incredible 5,000 watts of power using only three rackspaces. Expanded user control over the VZ power supply is available via a four-position switch that permits each power supply to be put into four different modes of operation. These include maximum voltage, maximum current and two modes of automatic VZ impedance. **Basic Specifications & Suggested List Price:** 1,300W-8 ohms, 2,000W-4 ohms, 2,500W-2 ohms, 5,000W-4 ohms (mono). 19"x5.25"x16", 75 lbs., grounded bridge circuitry, ODEP, P.I.P. compatible, IQ compatible, IOC, balanced XLR input connectors.

DEMETER AMPLIFICATION

2912 Colorado Ave. #204; Santa Monica, CA 90404; (818) 986-7103. **Product Name:** VT275 HF-75 watt reference amplifier. **Contact:** Michael Meltzer, mktg./sales dir. **Date Product Introduced:** 10/92. **Product Description & Applications:** Available for the first time to the professional market, a tube reference amplifier designed to withstand the demanding environment of the recording studio. Rigorously field tested, the VT275 HF provides unsurpassed accuracy and definition in the mid-range, unmatched spatial imaging, a well-defined tight bottom end, sparkling top end and overall tube warmth to leave ears un-fatigued after hours (or days) of intense listening. **Basic Specifications & Suggested List Price:** List price

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DEMETER AMPLIFICATION
VT275 HF-75 watt reference amplifier

\$1,695. 150 watts-75 watts per channel. Less than .1% THD. 1-12AX7, 2 12AF7, 4-KT88, 9C or 100 power tubes. Bandwidth 20-20k Hz S-4 >100 dB. Also available as a 150-watt monoblock.



DIGITAL PROCESS
DPH-4

DIGITAL PROCESS

PO Box 2979; Running Springs, CA 92382; (800) 835-1533. **Product Name:** DPH-4. **Contact:** David Harding, owner/mgr. **Date Product Introduced:** 7/91. **Product Description & Applications:** DPH-4

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4-channel powered stereo headphone amplifier (see Mix magazine August 1992). Direct drive ultra low noise audio circuitry, 4 independent stereo headphone outputs, home studio rehearsal and recording on headphones, hi-fi digital-ready audio at an ultra low price (excellent with CD, DAT and all digital electronics), rugged portable design and full warranty. **Basic Specifications & Suggested List Price:** Frequency response 15Hz-25kHz +/-0.5dB. Total harmonic distortion (THD) 0.01% or less. Channel separation 65 dB or more. Signal to noise ratio 93 dB or more. Power supply (UL listed) 18V DC.

ELECTRO FORCE CORPORATION

727 Dakstone Way; Anaheim, CA 92806-4638; (714) 774-3666; (800) 227-4445. **Product Name:** Portable digital power amp 800-SR-4. **Contact:** Phillip Lindberg, pres. **Date Product Introduced:** 9/92. **Product Description & Applications:** Specializing in light-weight digital power amps for Mobile DJ's and musicians who prefer small hand-carried equipment racks rather than heavy roll-around racks. Installations are also made easier for sound contractors because of the lightness and compact size. Inputs are balanced or unbalanced XLR's or phone jacks. Outputs are heavy-duty 5-way binding posts. Volume controls are mounted on front panel. Each channel has clip and signal lights and also built-in speaker protection. **Basic Specifications & Suggested List Price:** 800-SR-4 delivers 500 watts RMS/ch into 4 ohm speakers and 275 watts RMS into 8 ohm speakers. Weight is only 13 lbs., 3.5" high, 19" across and 7.5" deep. 4x higher operating efficiency equates to no noisy fan. Full frequency response from 20 to 20,000kHz. Economically priced at \$995.

ELECTRO-VOICE INC.

600 Cecil St.; Buchanan, MI 49107; (616) 695-6831. **Product Name:** 7200 stereo power amplifier. **Contact:** Mike Tortone, electronic product mgr. **Date Product Introduced:** 5/92. **Product Description & Applications:** The 7200 stereo power amplifier offers superb reliability with high performance characteristics and features a variable current limit circuit that allows the amp to deliver its rated current into rated loads. At the same time, the circuit limits current into low impedance or shorted loads. After a short is removed, the amp resumes normal operation. A large heatsink makes the amp convection cooled—performance is silent. **Basic Specifications & Suggested List Price:** 125 watts continuous into 8 ohms; 200 watts into 4 ohms; 400 watts into 8 ohms bridged. Octal accessory sockets; 31-position detented gain control; operates at 120V or 240V, 50/60Hz, special "protect" LED's. Price: \$720.

FM ACOUSTICS LTD. OF SWITZERLAND

Tiefenhofstr.17; CH-8820 Wädenswil, Switzerland; (41) 1 780-6444. **Product Name:** FM 801A Precision High-Power amplifier. **Contact:** Manuel Huber, dir./pres. **Date Product Introduced:** 11/91. **Product Description & Applications:** The FM 801A establishes an absolute reference standard for professional audio reproduction. Based on FM Acoustics' unique and proprietary enhanced Class A-input voltage gain circuitry, the new driver and output stages allow more analytic and detailed high-frequency reproduction and a reproduction of bass fundamentals which was never before possible. The FM 801A can drive any known load with unprecedented standards and without any form of limiting, compression or any other negative influences on the audio signal. **Basic Specifications & Suggested List Price:** List price: USD \$21,500. The FM 801A delivers 3000Wp, 3000 W RMS per channel into 1.5 ohms; it delivers 860 Wp, 430 W RMS per channel into 8 ohms. The maximum continuous output voltage is 180 Vpp, repetitive peak output currents are unlimited. Continuous output current capability of 40A RMS. The power supply has a capability of more than 3000 VA cont. and 9000 VA repetitive. Entirely damped and frozen transformer. No mechanical hum or plate vibration.

HAFLER DIV. OF ROCKFORD CORP.

641 S. Rockford Dr.; Tempe, AZ 85281; (800) 366-1619. **Product Name:** Trans-Nova 9500, 9300 amplifiers. **Contact:** Rick Gentry, sales mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Models 9300 and 9500 feature US patented Transnova circuitry that utilizes extremely short signal paths for outstanding linearity, speed and musical transparency, as well as unique low voltage, high current, wide bandwidth, front-end topology that delivers the ultimate combination of stability and linearity. The Model 9300 is rated at 150 watts per channel and employs 12 self-limiting lateral MOSFET output devices. The Model 9500 features 250 watts per channel and 16 MOSFET output devices. **Basic Specifications & Suggested List Price:** 9300: 450 watts bridged, 8 ohms. 9500: 750 watts bridged, 8 ohms. 7 year warranty. Available in both 17" black, 19" silver rack mountable. Model 9300 price: \$1,200. Model 9300S price: \$1,300. Model 9500 price: \$1,800. Model 9500S price: \$1,900. Slew 150V/microsecond. Full power bandwidth is 0.7 to 300k Hz.

HH ELECTRONICS LTD.

Newlyn Rd.; Cradley Heath, W. Midlands, B64 6BE England; 0384-633821. **Product Name:** HH. **Contact:** R.W. Thomas, dir. **Date Product Introduced:** 11/92. **Product Description & Applications:** MX Series—designed to deliver high power with full pro spec at a medium price. MX has many pro features including built in VCA control.

HOT HOUSE PROFESSIONAL AUDIO

275 Martin Ave.; Highland, NY 12528; (914) 691-6077; FAX: (914) 691-6822. **Product Name:** M500 HV Mono High Current/High Voltage Control Room Amplifier. **Contact:** Richard Rose, pres. **Date Product Introduced:** 10/92. **Product Description & Applications:** A direct descendent of the standard M500 audiophile unit, the new HV (high voltage) model shares the same front end, chassis and



HOT HOUSE PROFESSIONAL AUDIO
M500 HV Mono High Current/High Voltage Control Room Amplifier

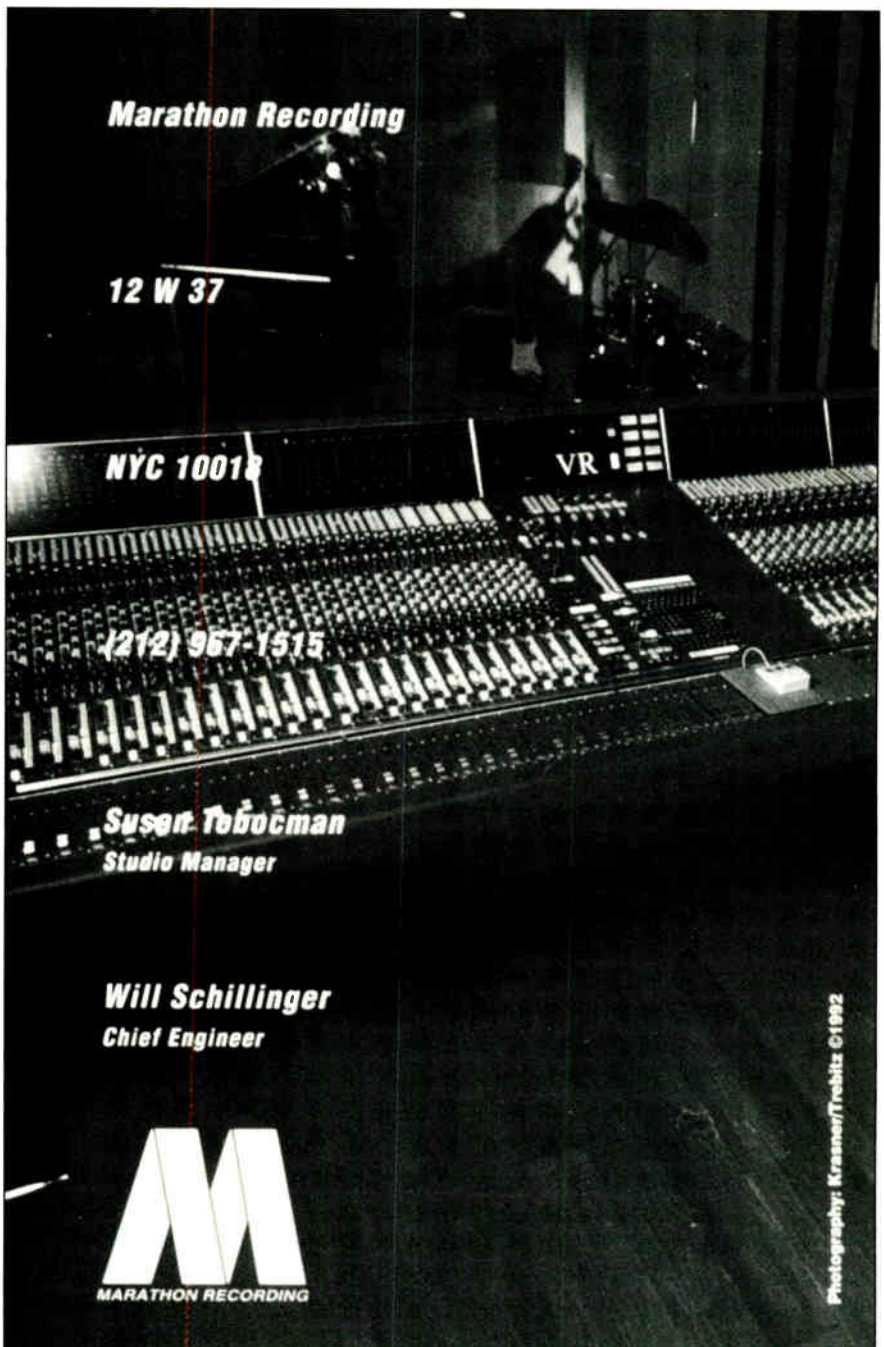
straight-wire design philosophy, but offers 2 1/2 times the output for powering larger primary monitors and subwoofers. Utilizing 16 of the largest MOSFETs, specially designed filter caps and an oversized custom-wound toroidal transformer, the M500 HV is capable of sup-

plying massive current reserves and exceptional bandwidth, speed and accuracy from a two-rack-space convection-cooled package. **Basic Specifications & Suggested List Price:** S/N 105 dB, frequency response: 5 Hz to 290k Hz, rise time 900 nanoseconds, slew rate 85 volts/microsecond, maximum peak current capability exceeds 100 amperes. RMS power output (not including 3 dB dynamic headroom), 8 ohms-375 watts, 4 ohms-600 watts. Professional user net price \$1,699.

HOT HOUSE PROFESSIONAL AUDIO

275 Martin Ave.; Highland, NY 12528; (914) 691-6077; FAX: (914) 691-6822. **Product Name:** M2250 Mono High Current/High Voltage Control Room Amplifier. **Contact:** Richard Rose, pres. **Date Product Introduced:** 12/92. **Product Description & Applications:** Simply stated, the M2250 mono bloc MOSFET amplifier was designed for maximum power, fidelity and reliability with no constraints on size or cost. Deriving its "Esoteric Tube Sound" from the same front end found in the renowned M500, the fan-cooled M2250, with its massive power supply and 36 output devices, is capable of delivering more current and voltage-swing per channel than any other amplifier ever built for the studio without sacrificing speed, resolution or smooth extended bandwidth. **Basic Specifications & Suggested List Price:** S/N: 105 dB, frequency response: 5 Hz to 290k Hz, rise time 900 nanoseconds, slew rate 85 volts/microsecond

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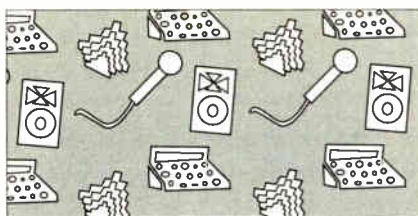
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Amplifiers

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(170 volts-series), peak current capability exceeds 200 amperes. RMS power output not including 3dB dynamic headroom (parallel mode/series mode) 16 ohms-290 watts, 8 ohms-575 watts, 4 ohms-1150/2250 watts, 2 ohms-2250 watts. Price to be announced.

MTX SOUNDCRAFTSMEN

555 W. Lamm Rd.; Freeport, IL 61032; (815) 232-2000. Product Name: A400. Contact: Corey Engel, customer service specialist. Date Product Introduced: 1/92. Product Description & Applications: The MTX Soundcraftsmen A400 power amplifier produces 205 watts into 8 ohms. The PCR (phase control regulation) design achieves greater stability, higher reliability and superior sonic performance. The A400 features MOSFET output transistors, zero phase shift/zero delay feedback loop, direct coupling, true clip indicators and is non-current limiting. Basic Specifications & Suggested List Price: Suggested retail \$799.95. 300 watts/4ohms, 205 watts/8 ohms, 450 watts/2 ohms. 1.25MV RMS input sensitivity, 30dB gain each channel, 50 volts per microsecond slew rate, less than .05% I.M. distortion, less than .05% THD.

MTX SOUNDCRAFTSMEN

555 W. Lamm Rd.; Freeport, IL 61032; (815) 232-2000. Product Name: MX500. Contact: Corey Engel, customer service specialist. Date Product Introduced: 7/92. Product Description & Applications: The MX500 features an inboard 16-bit, 96Hz digital effects section for full bandwidth. CD quality sampling, echo and delay. Four separate memory banks allow for one four-second sample to a continuous four-second sample to be produced. Also included: six-band graphic equalizer, Beat Blend circuitry and separate right/left channel monitoring. Basic Specifications & Suggested List Price: Suggested retail \$1,240. Inputs: (2) mic, (4) line, (3) phono. Max output, 8V RMS; rated output 7.75V, rated output THD 0.01%, mic signal/noise: -127dB EIN, phono S/N: -133dB, line S/N: -98dB. 19"W x 8 3/4"H x 4 3/4"D.



PEAVEY ELECTRONICS CORP.
DPC 750

PEAVEY ELECTRONICS CORP.

711 A St.; Meridian, MS 39301; (601) 483-5365. Product Name: DPC 750. Contact: Ernie Lansford, nat'l sales mgr. Date Product Introduced: 1/92. Product Description & Applications: The DPC 750 is the first of the next generation of digital power amplifiers from Peavey Electronics. The product features stereo or bridge-mode operation in a single-space, rack-mountable package weighing only 12 lbs. Ideal for situations requiring a small, lightweight package capable of delivering high power, the OPC 750 is the perfect amplifier for front PA systems, stage monitor systems, bass systems, keyboard systems, home recording studios as well as professional recording studios. Basic Specifications & Suggested List Price: 350 watts (continuous), 500 watts (program) RMS per channel, both channels driven into 4 ohms. 700 watts (continuous), 1,000 watts (program) RMS into 8 ohms in bridge mode. 90% power transfer efficiency. Digital DOTM™ Compression, thermal, short-circuit and speaker protection, automatic two-speed fan. Suggested list price \$999.99.

QSC AUDIO PRODUCTS INC.

1675 MacArthur Blvd.; Costa Mesa, CA 92626; (714) 754-6175. Product Name: USA Series. Contact: Randy Curlee, dir. mktg. Date Product Introduced: 1/92. Product Description & Applications: USA is a new series of professional power amplifiers offering 3 new models. All models feature fully complementary circuits clipping indicators, active balanced inputs, 1/4" RTS and barrier strip input connectors, patented output Averaging™ short circuit protection on each channel, mono-bridging switch and direct mounted power

—LISTING CONTINUED TOP OF NEXT COLUMN

transistors. Basic Specifications & Suggested List Price: USA 1&5: 3 rackspace, 185/side. USA 425: 3 rackspace, 425/side. USA 650: 3 rackspace, 650/side. All rated at 4 ohms, both channels driven.

STEWART ELECTRONICS

11460 Sunrise Gold Cir.; Rancho Cordova, CA 95742; (916) 635-3011; FAX: (916) 635-1787. Product Name: PA-1800. Contact: Christopher Dragon, sales & mktg. mgr. Date Product Introduced: 8/92. Product Description & Applications: Fully dual-monaural power amplifier which utilizes Stewart's "high frequency switch mode power supply," auto impedance. Optimization circuit provides maximum efficiency at all impedances, unique inrush current limiter minimizes current draw during power up (6 amps). XLR, 1/4" TRS and barrier strip inputs, 5-way large 6-gauge binding post outputs, fan cooled, just 17 lbs. and carries a 5 year warranty. Design'd and manufactured in the USA. Basic Specifications & Suggested List Price: \$1,599 retail. 400Wx2 into 8 ohms 20Hz-20kHz. 650Wx2 into 4 ohms 20Hz-20kHz. 900Wx2 into 2 ohm 20Hz-20kHz. >500 damping factor, .01% THD 20Hz-20kHz, 2 rackspace, 17" b.



TUBE WORKS
Mosvalve Power Amp

TUBE WORKS

8201 E. Pacific Pl. #606; Denver, CO 80231; (303) 750-3801. Product Name: Mosvalve Power Amp. Contact: Tom Wright, VP sales & mktg. Date Product Introduced: 10/91. Product Description & Applications: 2 space rack-mount power amplifiers which produce all of the favorable characteristics of tube amps but contain no tubes. Available in 160 and 500 watt stereo configurations. Patented MOSFET design prevents amplifier from producing square wave signals. Tube performance in a package that is half the weight and half the price of actual tubes. Basic Specifications & Suggested List Price: 942 retail \$900 w/250 watts per channel, 35 lbs., 2 rackspace. 962 retail \$600 w/80 watts per channel, 16 lbs., 2 rackspace.

WHIRLWIND MUSIC DIST. INC.

100 Boxart St., PO Box 12692; Rochester, NY 14612-2692; (716) 663-8820; FAX (716) 865-8930. Product Name: US Audio P45 A. Contact: Ray Bellizia, sales; Ron Long, sales. Date Product Introduced: 7/92. Product Description & Applications: Whirlwind's US Audio P45 A is a high quality, low cost, single rackspace stereo amplifier designed for applications that do not require large amounts of power. Suggested applications include reference monitoring and headphone distribution amplification. The P45 A's wide frequency response and low distortion make it perfect for critical listening in the production environment. Basic Specifications & Suggested List Price: Frequency response: -3dB at 10Hz and 80kHz at 50 watts, ±0.2dB 50Hz to 20kHz 50 watts. S/N ratio: 110dB at full power. THD: .02% at 50 watts. Equivalent input noise: -85dB. Input impedance: 20K ohms. Output power: 60 watts at 4 ohms, 45 watts at 8 ohms. Rise time: 2.5µs. AC mains: 110V 60Hz or 230V 50Hz. Pro net price: \$349.

AUTOMATION, SYNC AND CONTROL SYSTEMS

AD SYSTEMS

635 Weyburn Sq.; Pickering, Ontario, L1V 3V3 Canada; (416) 420-3946. Product Name: Optifile 3D version 3. Contact: Curt Smith, mktg. mgr. Date Product Introduced: 4/92. Product Description & Applications: SMPTE based retrofit console automation system. Easily installed in any console utilizing existing faders. Up to 64 channels of fader/mute automation. Basic Specifications & Suggested List Price: Complete machine control, cue list, track sheet, mix list, 9 groups, auto drop, auto record, auto null, offline merge and copy, VCA bypass option, dedicated keyboard, rehearse facility, local fader control option.

AD SYSTEMS

635 Weyburn Sq.; Pickering, Ontario, L1V 3V3 Canada; (416) 420-3946. Product Name: Optifile LC. Contact: Curt Smith, mktg. mgr. Date Product Introduced: 4/92. Product Description & Applications: Low cost version of the popular Optifile 3D Automation System. Easily installed in any console with Alps faders. Up to 40 channels of fader/mute automation. Basic Specifications & Suggested List Price: SMPTE based, dedicated computer and keyboard, macro command facility, drop key for instant comparison of mixes in real time; separate fader and mute writing.

ALESIS

3630 Holdrege Ave.; Los Angeles, CA 90016; (310) 558-4530. Product Name: BRC and RMB. Contact: Allen Wald, VP adv./prcm.

—SEE LISTING BOTTOM OF PREVIOUS COLUMN

Date Product Introduced: Announced 1/92. **Product Description & Applications:** For large ADAT systems from 16 to 128 tracks (up to 16 ADATs), the BRC Master Remote Control provides full autolocalization functions, reads and generates SMPTE time code, generates MIDI time code and MIDI clocks, provides control over timing, track offsets, machine offsets, track selection, automatic record/rehearse and punch in and allows for complex, cut-and-paste assembly editing. The optional RMB Remote Meter Bridge provides 32 channels of remote LED metering for a multiple ADAT system and mounts on the BRC or in a rack. **Basic Specifications & Suggested List Price:** \$1,995 for BRC; \$995 for RMB.

CIRCUIT RESEARCH LABS

2522 W. Geneva Dr., Tempe, AZ 85282; (800) 535-7648. **Product Name:** Real Time Event Sequencer. **Contact:** William L. Ammons, sales. **Date Product Introduced:** 4/92. **Product Description & Applications:** The Real Time Event Sequencer is a micro-processor controlled device that can control equipment via contact closures. It is a single rack high unit, with AC supply and battery backup. Up to 200 events per week can be programmed into the eight outputs. **Basic Specifications & Suggested List Price:** Events: up to 200 per week. Contact closures: 8—either latching or pulse. Timebase: high stability Crystal Osc; 1 ppm typical. Longlife battery backup for time-keeping functions.

CM AUTOMATION

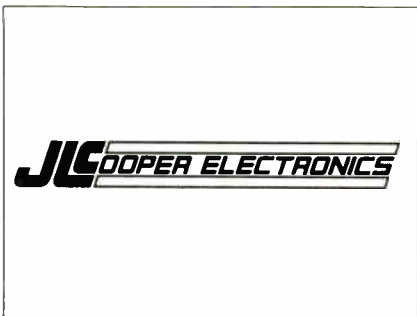
402 Museum Dr., Los Angeles, CA 90065; (714) 488-0024. **Product Name:** MX-816 (8 or 16 channel unit). **Contact:** Don Taylor, mkt. mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** The MX-816 is a MIDI controlled mixing automation device available in 8 or 16 channel configurations. The MX-816 is a rack-mount unit with built-in memory for fader recall, snapshots, scenes or fades. It uses proprietary technology that makes it compatible with MIDI sequencers, controllers or keyboards. **Basic Specifications & Suggested List Price:** Groups of 8 channels are summed out to produce mix/send out; 28 internal pre-programmed master autofades, up or down; gold plated audio jacks used thru out. 100 patch internal memory to store and recall snapshots and scene fade times. 8 channel \$489.95, 16 channel \$799.95.

CROWN

1718 Mishawaka Rd., Elkhart, IN 46517; (219) 294-8000. **Product Name:** SMX-6 Intelligent Multiplexer. **Contact:** Jim Semble, contractor liaison. **Date Product Introduced:** 4/92. **Product Description & Applications:** The SMX-6 can be likened to a 6x2 stereo mixer with computer-controlled input switching and routing capabilities. In addition, it offers the ability to monitor pre-attenuated levels coming into its inputs and summed output levels. The SMX-6 can reconfigure itself through downloadable software, termed "Algos." Algos provides an almost limitless number of functions, including auto-leveling, compression and limiting. Multiple SMX-6 units can be combined. **Basic Specifications & Suggested List Price:** For use with Crown IQ System 2000 software; eight level detectors on inputs and outputs; monitoring capabilities, full battery backup. Price: \$1,795.

EUPHONIX

10647B Riverside Dr., North Hollywood, CA 91602; (818) 766-1666. **Product Name:** The CSII Dynamics Package. **Contact:** Andy Wild, VP sales and marketing. **Date Product Introduced:** 3/92. **Product Description & Applications:** The CSII Dynamics package allows multiple digitally controlled Dynamics units to be added to any CSII system. Each unit comprises a compressor, expander, limiter and gate with S/C input. The parameters are controlled from the CSII console with a unique screen display. **Basic Specifications & Suggested List Price:** The audio processors are mounted in a 19" rack. For further information contact Euphonix.



JL COOPER ELECTRONICS
PR03700

JL COOPER ELECTRONICS

12500 Beatrice St., Los Angeles, CA 90066; (310) 306-4131. **Product Name:** PR03700. **Contact:** Chuck Thompson, mgr. **Date Product Introduced:** 10/91. **Product Description & Applications:** PR03700 automation enhancements for Tascam's M-3700 console expands the automation capabilities with moving fader graphics, SMPTE display and additional status information. The PR03700 expands capabilities with features such as off-line editing of fader, mute, monitor mute, aux mute, EQ on/off, MIDI events and up to 16 automated software subgroups. The system provides increased memory capacity. Disk operations are 25 times faster. Suggested list price on the JL Cooper PR03700 is \$995.

JL COOPER ELECTRONICS

12500 Beatrice St., Los Angeles, CA 90066; (310) 306-4131. **Product Name:** dataSYNC—Synchronizer for Alesis A-DAT. **Contact:** Chuck Thompson, mgr. **Date Product Introduced:** 10/91. **Product Description & Applications:** JL Cooper's new dataSYNC generates MIDI Time code directly from the 9 pin sync connector of Alesis' new A-DAT digital audio recorder. It allows A-DAT to provide master time code to drive MIDI sequencers, digital audio workstation and more. The bit accurate dataSYNC converts A-DAT's sample clock to MTC without wasting a valuable audio track for SMPTE. It also converts A-DAT's transport functions to MMC (MIDI machine control) commands. \$349.95 suggested retail.

MYTEK TECHNOLOGIES

PO Box 1023; New York, NY 10276; (212) 388-2677. **Product Name:** Digipot—digital motorised potentiometer. **Contact:** Michal Jurewicz. **Date Product Introduced:** 1993. **Product Description & Applications:** The Digipot is a patent pending advanced electro-mechanical device designed to perform functions of a motorized potentiometer in digitally controlled audio and video equipment. It uses a digitally controlled stepper motor and high resolution optical encoder. When used for automation this device can remember and repeat previous moves, perform computer generated functions and be used as precision multiturn knob or programmable rotary switch. **Basic Specifications & Suggested List Price:** Directly interfaces with TTL logic and microprocessor systems. Looks and feels like analog but it is all digital, programmable and it can turn itself. 8 bit or more resolution. Priced below the price of motorized potentiometers.

MYTEK TECHNOLOGIES

PO Box 1023; New York, NY 10276; (212) 388-2677. **Product Name:** Sony-SSL Interface, The Little Black Box. **Contact:** Michal Jurewicz. **Date Product Introduced:** 10/91. **Product Description & Applications:** This compact Sony-SSL transport interface connects Sony 3348/24 digital tape machines and SSL G/E console (Version +1, also Lynx synchronizer) into one system. The Little Black Box comes with all necessary cables, set up instruction and SSL parameters. It has an internal power supply and the circuitry is double buffered. **Basic Specifications & Suggested List Price:** Version+ for Sony and SSL—25 ft. of cables, \$395. Version+1 for Sony, SSL and Lynx—40 ft. of cables, \$790.

NEVE (SIEMENS AUDIO INC.)

7 Parklawn Dr., Bethel, CT 06801; (203) 744-6230. **Product Name:** Neve Flying Faders Junior. **Contact:** Charles Conte. **Date Product Introduced:** 4/92. **Product Description & Applications:** A new compact software version of the Flying Faders Automation system, engineered into a more affordable package by excluding some of the most sophisticated features of the full-blown Flying Faders system. Flying Faders Junior includes the following features: VCA-style grouping allowing the selection of a master channel and assigning slaves to that channel; a destructive, in-place solo independent of the console's solo; a trim feature allowing the operator to adjust the preset level of all or some of the faders; mute list allowing off-line editing of the channel mutes; merge channel data and copy channel data features. Compatible with almost any console, Flying Faders Junior retains all the accuracy, speed and ease of use of the original Flying Faders system. **Basic Specifications & Suggested List Price:** List price: \$53,570.

PEP INC.

25 W. 54th St., New York, NY 10019; (212) 246-2490. **Product Name:** Jog Box. **Contact:** James B. Tharpe, mgr. **Product Description & Applications:** The new Jog Box is now available to provide edit sessions with audio in search, jog and edit perroll. The Jog Box is simple to install and is transparent in the audio path. No modifications to the video recorder are required. This is one of the most requested improvements for the Sony DVR-10, DVR-18 or Betacam SP machines. **Basic Specifications & Suggested List Price:** For use with Sony DVR-10, DVR-18 and Betacam SP machines.

QSC AUDIO PRODUCTS INC.

1675 MacArthur Blvd., Costa Mesa, CA 92626-1468; (714) 764-6175; FAX (714) 754-6174. **Product Name:** EX Series computer remote control. **Contact:** Barry Ferrell, regional sales mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** QSC will introduce a computer remote control system based on the MediaLink™ Network protocol. The system will be an option for EX power amps, but all MediaLink™ devices may be operated on the same network. QSC will promote fiber optics as the preferred interconnect method. **Basic Specifications & Suggested List Price:** Pricing, specifications and availability to be announced by Oct. '92.

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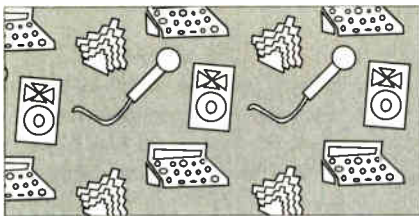
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Automation, Sync and Control Systems

RICHMOND SOUND DESIGN LTD.

1234 W. 6th Ave.; Vancouver, BC, V6H 1A5 Canada; (604) 732-1234; FAX: (604) 734-3901. **Product Name:** MMC-16. **Contact:** Ken Bell, P.E., general mgr. **Date Product Introduced:** 5/92. **Product Description & Applications:** The MMC-16 uses the set command of MIDI Show control to open or close any of 27 contact outputs. Another 16 input contacts are converted to any of 65,000 MSC messages, depending on the local card programming, which itself may be altered by MIDI. For advanced users, the card can be programmed as a custom dedicated controller, responding to high-level MIDI instructions. **Basic Specifications & Suggested List Price:** TTL/HCMDS compatible 5 volt inputs, open collector outputs rated 500 mA, 50 volts, 10% duty cycle, all outputs driven. Cards mounted in RSD CF-20W card frame, up to 16 MMC-16 cards in 3 units of rackspace.

RICHMOND SOUND DESIGN LTD.

1234 W. 6th Ave.; Vancouver, BC, V6H 1A5 Canada; (604) 732-1234; FAX: (604) 734-3901. **Product Name:** Stage Manager. **Contact:** Ken Bell, P.E., general mgr. **Date Product Introduced:** 8/92. **Product Description & Applications:** Amiga-based cue software for MIDI Show control and MIDI Machine control, oriented to live performance. Stage Manager 500 now features automatic transfer through multiple cue paths. Stage Manager 3000, in addition to 128 independent and simultaneous cue lists, now includes timed sequence capture, allowing a MIDI sequence to be clocked and stored inside each cue. **Basic Specifications & Suggested List Price:** Stage Manager 500 license \$400—requires Amiga 500 or better with 1M RAM; Stage Manager 3000 license \$1,080 requires Amiga 3000/25.



UPTOWN AUTOMATION SYSTEMS INC.
System 990

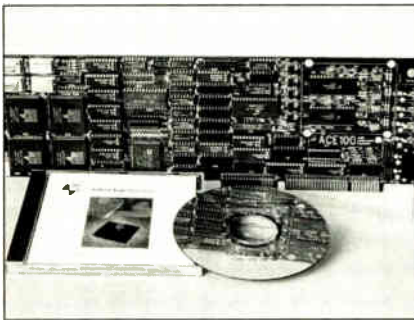
UPTOWN AUTOMATION SYSTEMS INC.

1320 Pearl #205; Boulder, CO 80302; (303) 443-1171. **Product Name:** System 990. **Contact:** Chris Fichera, (310) 306-8823. **Date Product Introduced:** 2/92. **Product Description & Applications:** The Uptown System 990 provides full-featured moving fader automation at a price competitive with VCA automation. The same MIX software that is used with the more expensive System 2000 is used with this system. By developing a new, thinner moving fader we are able to retrofit the System 990 into most audio consoles, even consoles without separate panels. **Basic Specifications & Suggested List Price:** 10 bit (1024 1/10th dB steps), 150ms end-to-end fader movement, 1 automated switch per channel, 64 faders mix. Frame-accurate, SMPTE-based, MIDI compatible.

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COMPUTER HARDWARE/SOFTWARE



AUDIO PROCESSING TECHNOLOGY LTD.
ACE100 Digital Audio Expansion Board

AUDIO PROCESSING TECHNOLOGY LTD.

21 Stranmillis Rd.; Belfast BT9 5AF, Northern Ireland; 44/232-662714; FAX: 44/232-382208. **Product Name:** ACE100 Digital Audio Expansion Board. **Contact:** Steve Cheung, sales/mktg dir. **Date Product Introduced:** 11/91. **Product Description & Applications:** The ACE100 Digital Audio Expansion Board plugs directly into the expansion slot of a PC/AT-compatible computer, and allows bit-reduced audio to be stored onto a conventional hard drive. Applications include digital recording and editing systems, plus workstation development. System utilizes proven apt-X 100 4:1 Sub-band ADPCM audio-compression techniques. **Basic Specifications & Suggested List Price:** Features stereo/mono analog I/Ds; AES/EBU or S/P DIF Digital I/Ds; 8-48 kHz sampling rates (software selectable); PC-compatible software drivers; low noise and crosstalk performance. Pro-user price is \$1,475.



BGW SYSTEMS INC.
Model U86 Computer System

BGW SYSTEMS INC.

13130 Yukon Ave.; Hawthorne, CA 90250; (310) 973-8090. **Product Name:** Model U86 Computer System. **Contact:** Brian Wachner, pres. **Date Product Introduced:** 6/92. **Product Description & Applications:** The BGW Model U86 upgradable rack-mount computer system is supplied with an 80386 40MHz processor as standard. The U86 can be upgraded to an 80486 50MHz or any future pin-compatible enhancement. A complete system includes 4 megs of RAM, 120 meg hard disk, Super VCA Graphic card and rack-mountable keyboard. **Basic Specifications & Suggested List Price:** IBM compatible PC, which requires only 5 1/4" of rackspace. Supplied standard with 5 1/4" and 3 1/2" high-density floppy drives. Only quality components are used. Including advanced U.S.-made motherboard and worldwide power supply. Complete system \$2,995, optional rack-mount keyboard drawer \$89.

CANNON RESEARCH

13338 Loma Rica; Grass Valley, CA 95945; (916) 272-8692; (800) 628-3394; FAX: (916) 272-8693. **Product Name:** Frontal Lobe-Version 3. **Contact:** Michael Cannon. **Date Product Introduced:** 1/92. **Product Description & Applications:** Frontal Lobe bridges the gap between hardware and software based devices. It is only 5"x7"x2" and 2 lbs., yet is a full-blown sequencer, sysex data filer, and performance system. It performs automatic song loading and chaining with programmable track mutes and programmable loops and pauses controllable from a footswitch. It has 16 multichannel tracks (256 virtual tracks), 96 PPO resolution, and 32-channel output. Up to 100,000 events in internal battery-backed memory and 500,000 events on a 3.5" HD disk. Real-time, variable speed forward and rewind that you can hear. Manual and auto punch in/out. Loop record with spot erase. Merge, unmerge, bounce, transpose, scale, compand by percentage, hard and soft clip, fade in/out, time shift, time calculation, and time fit. Non-destructive editing and recording with undo and real-time compared. MIDI files compatible. **Basic Specifications & Suggested List Price:** List price \$899.

COMDISCO SYSTEMS INC.

919 E. Hillside Blvd.; Foster City, CA 94404; (415) 574-5800. **Product Name:** Signal Processing Worksystem. **Contact:** Paul Titchener, VP technology. **Date Product Introduced:** 6/92. **Product Description & Applications:** Comdisco Systems introduces new audio-

oriented options for its SPW Framework. With these new options, the SPW allows digital audio products to be designed, prototyped and evaluated through listening tests without constructing any hardware or writing any software. Designs are entered as block diagrams, and the prototypes are automatically created using an integrated set of multiple DSP processors. SPW can dramatically accelerate the design of digital consoles, processing devices, synthesizers and any digital audio product. **Basic Specifications & Suggested List Price:** The SPW design tool runs on popular workstation computers. Available options include a special audio library, automatic code generation for the Motorola 56000 and other popular DSP processors and full ASIC design support. Prices start at \$25,000.

COVOX INC.

675 Conger St.; Eugene, OR 97402; (503) 342-1271. **Product Name:** Sound Master II. **Contact:** Leigh Brigham, mkg. **Date Product Introduced:** 1992. **Product Description & Applications:** Product is a 1/2 size plug in card for IBM PC and compatibles. Contains FM Music circuit, digital audio recording/playback and duplex MIDI port. Used by general consumers for entertainment and music composing/creation. Several multimedia applications for business exist with Windows multimedia extensions (included). **Basic Specifications & Suggested List Price:** 8-bit D/A digitalizer with sampling to 25Kbytes/sec. Yamaha II voice FM music synthesizer. UART MIDI interface. Music software, audio record/playback software included. List \$229.95.



DYNATEK AUTOMATION SYSTEMS INC.
DynaTek "Track" Series

DYNATEK AUTOMATION SYSTEMS INC.

15 Tangiers Rd.; Toronto, Ontario, M3J 2B1 Canada; (416) 636-3000. **Product Name:** DynaTek "Track" Series. **Contact:** Lorne Weiner, Simon Berry. **Date Product Introduced:** 10/91. **Product Description & Applications:** "Track" Series 19" rack-mountable SCSI data storage subsystems for professional digital audio and video recording. "Track" models are available with up to four data storage mechanisms in various combinations of fixed and removable disk, Magneto-optical (5.25" & 3.5"), CD-RDM and both 4mm and 8mm helical scan tape drives. All models feature steel construction, front-mounted SCSI ID selectors, individual ultra-quiet fans, universal power supplies, external termination, rack handles and 6' high-quality SCSI cables. **Basic Specifications & Suggested List Price:** The Track Series uses only high-quality mechanisms from Hewlett Packard, Fujitsu, SyQuest, Sony and ExaByte and is guaranteed to be compatible with sampling and digital recording systems from Akai, Avid, Digidesign, E-mu, Ensoniq, Hybrid Arts, Kurzweil, Roland, Sonic Solutions, Spectral Synthesis, SSL, Turtle Beach and Yamaha. Price range: \$700-\$10,000.

ENSONIQ CORP.

155 Great Valley Pkwy.; Malvern, PA 19355; (215) 647-3930. **Product Name:** KMX-8; KMX-16. **Contact:** Jerry Kovarsky, marketing director. **Date Product Introduced:** 8/92. **Product Description & Applications:** 8x8 and 15x16 MIDI programmable MIDI patch bays. Both units offer merging of inputs 1 and 2, and easy front-panel editing or MIDI System Exclusive capabilities. The KMX-8 has 30 memory locations in a single rackspace unit, and the KMX-16 offers 99 locations in a 2-space unit. Optional Mac or Atari editor/librarian software also available to integrate these patchers into your MIDI rig. **Basic Specifications & Suggested List Price:** KMX-8: 8 MIDI inputs and outputs, 30 memory locations, front panel buttons for editing, 1 rack space, external AC adapter, \$249 (US). KMX-16: 15 MIDI inputs and 16 outputs, 99 memory locations, front panel buttons for editing, 2 rackspaces, external AC adapter, \$579 (US).

ENTERTEC INC.

2522 Hermitage Rd.; Richmond, VA 23220; (804) 353-7133. **Product Name:** EnList. **Contact:** John Harlow. **Date Product Introduced:** 3/92. **Product Description & Applications:** EnList is a video edit list translator program for Windows® 3.X. EnList directly reads and writes 3 1/2" disks for use in CMX, Grass Valley and other editing systems. EnList also initializes disks for use in CMX editors. **Basic Specifications & Suggested List Price:** Priced: \$279.

ENTERTEC INC.

2522 Hermitage Rd.; Richmond, VA 23220; (804) 353-7133. **Product Name:** Serial Port Timecode Reader (STCR). **Contact:** John Harlow. **Date Product Introduced:** 3/92. **Product Description & Applications:** The STCR is a SMPTE LTC Reader designed to connect to the CDM1 or CDM2 serial port of IBM® PCs and compatibles. Applications include scene logging and offline list editing. Included with the STCR are large-digit display programs for DDS and Win-

dows® 3.X and application developers's sample source code. **Basic Specifications & Suggested List Price:** LTC speed range: 1/2 to 2 times play speed. Power requirements: none (powered by serial port). Price: \$174. OEM pricing available.

ENTERTEC INC.

2522 Hermitage Rd.; Richmond, VA 23220; (804) 353-7133. **Product Name:** Timecode Calculator for Windows® 3.X. **Contact:** John Harlow. **Date Product Introduced:** 3/92. **Product Description & Applications:** Simple timecode calculator, uses clipboard for memory. Converts timebases-24, 25, 30, 30DF. **Basic Specifications & Suggested List Price:** \$39.

FAST FORWARD VIDEO INC.

18200-C W. McDermott; Irvine, CA 92714; (714) 852-8404. **Product Name:** P2 "Time Traveller". **Contact:** Robert Riley Jr., public relations mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** Portable time code generator/reader/character inserter/SMPTE-to-MIDI converter. The P2 features built-in serial & MIDI ports for interface with other hardware, and can be controlled by a master "host" computer. The P2 carries an unconditional 30-day, money-back guarantee, and a complete 1 year warranty on parts and labor. **Basic Specifications & Suggested List Price:** Time code synced to video or free run, jam sync, regeneration, drop and non-drop frame, non-volatile memory, reads from 1/30-20X play speed, infinitely positionable window burn, LCD internal. Weight is 8 oz. Power is 50ma on 9V DC supply.

GREY MATTER RESPONSE

445 Sherman Ave., Ste. T, Palo Alto, CA 94306; (415) 327-4667. **Product Name:** ProArchive. **Contact:** Suz Howells, dir. of mktg. **Date Product Introduced:** 8/92. **Product Description & Applications:** ProArchive is a line of high-speed, high-capacity backup devices specialized for Macintosh-based digital audio applications, including Digidesign's Pro Tools and Sound Tools systems. Currently available in 8MM and DAT formats, both ProArchive models will backup and restore data in the background (using Digidesign's System Accelerator), leaving your Macintosh computer free for editing audio data or other applications. While the ProArchive software is optimized for digital media applications, the device can be used to backup any standard Macintosh data. **Basic Specifications & Suggested List Price:** ProArchive 8MM provides 5 gigabytes of storage (over 16 track-hours). Data transfer rate is 500 Kbytes per second. ProArchive 4MM provides 2 gigabytes of storage at a data transfer rate of 233 Kbytes/second. Neither device uses compression (pre-saves maximum audiolifely). Preliminary list prices: ProArchive 8MM: \$5,100; ProArchive 4mm: \$1,995.

GREYSOUNDS

8700 Reseda Blvd., Ste. 101; Northridge, CA 91324; (818) 773-7327; (800) 266-DISK; FAX: (818) 773-9203. **Product Name:** CD-ROM Sound Library. **Contact:** Bob Grey, sales. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Greysounds CD-ROM Sound Library contains sampled sounds of every kind, from percussion to sound effects, with particular emphasis on esoteric synthesizers and Fairlight. All sounds are digitally sampled and edited using Macintosh computers. **Basic Specifications & Suggested List Price:** CD-ROMs available in the following formats: Digidesign SampleCell, Akai S1000/1100 and E-mu Emax II. Suggested list \$299 each.



GREYSOUNDS
DD-1 Data Director

GREYSOUNDS

8700 Reseda Blvd., Ste. 101; Northridge, CA 91324; (818) 773-7327; (800) 266-DISK; FAX: (818) 773-9203. **Product Name:** DD-1 Data Director. **Contact:** Bob Grey, sales. **Date Product Introduced:** 1/92. **Product Description & Applications:** The DD-1 Data Director is a 1-space, rack-mount SCSI terminal hub. With 6 terminals (2 in front, 4 in back), the DD-1 allows connection of multiple SCSI devices to facilitate the linking of various SCSI-equipped electronics such as samplers, computer CD-ROM players and hard drives. **Basic Specifications & Suggested List Price:** 1-space, passive SCSI connector hub featuring 6 terminals. Suggested list \$299.

HARMONIC SYSTEMS INC.

PD Box 488; Fairfax, CA 94978-0488; (415) 485-5242. **Product Name:** StudioPal. **Contact:** Jim Wheaton. **Date Product Introduced:** 7/92. **Product Description & Applications:** StudioPal is a conversion/calculator program for the Macintosh computer designed for use with audio and video recording systems. StudioPal converts between all forms of SMPTE time code, sequencer timing (bars/beats/ticks), delay settings, notes, chords, frequencies, rhythms,

sample rates, megabytes, tape speed, and general units of time and distance (English and metric). Great for those late night sessions when you want the answer quickly and correctly without much work. **Basic Specifications & Suggested List Price:** StudioPal is a memory-resident program (150K), which requires a Mac SE or better, running system 6.0.X or newer. Mouse or keyboard interaction, plus shortcuts for SMPTE entry make it very quick to use. MIDI reference file included. The program is available for \$69.95 (plus CA tax, where applicable). Money-back guarantee.

IBM

4111 Northside Pkwy., HD4L1; Atlanta, GA 30327; (800) 426-9402. **Product Name:** PS/2 Ultimedia Computer. **Date Product Introduced:** 2/92. **Product Description & Applications:** The IBM PS/2 Ultimedia Model M57 SLC is the first PS/2 computer with integrated multimedia capability. Ultimedia computer systems go beyond text and graphics to include high-quality images, animation, full-motion video, brilliant stereo sound and touch-based interaction. All system software comes on a single CD-ROM optical disk allowing "plug and play" multimedia. **Basic Specifications & Suggested List Price:** New high-performance 386 SLC microprocessor, built-in CD-ROM drive and SCSI controller, 16-bit 44K stereo M-Audio adapter and stunning 640x480 64k color XGA graphics. Options include a Touch display, M-Motion full-motion video adapter, onscreen television image, ActionMedia digital video-compression adapter and a 127m rewritable optical drive.

JL COOPER ELECTRONICS

12500 Beatrice St.; Los Angeles, CA 90066; (310) 306-4131. **Product Name:** CSPM CS-10 Programming Module. **Contact:** Chuck Thompson, mgr. **Date Product Introduced:** 10/91. **Product Description & Applications:** CSPM (a hardware/software combination for the Macintosh) turns the CS-10 Control Station into a completely programmable universal controller, capable of sending ADB (Apple Desktop Bus), MIDI and GPI commands simultaneously. This allows the CS-10 to be programmed to control a wide variety of digital audio editing systems, digital video editors, MIDI sequencers, tape machines and more. The enhancement provides 8 complete setups with assignable buttons, knobs and faders. \$349.95 suggested retail.

THE RUSS JONES MARKETING GROUP

17700 Raymer St., Ste. 1001; Northridge, CA 91325; (818) 993-4091. **Product Name:** Cubase Windows. **Contact:** Russ Jones. **Date Product Introduced:** 1/92. **Product Description & Applications:** Steinberg/Jones offers Cubase Windows version 1.0. It's the state-of-the-art MIDI recording/editing software for IBM PC-compatibles running Windows 3.0 or higher. Cubase Windows has all the same real-time facilities as Cubase Atari 3.0. It has 4 editors, list edit, key edit, drum edit and logical edit and shows velocity by coloring the notes. Most importantly, Steinberg has implemented a cross-platform compatibility standard. We have implemented the standard MIDI-file format as well. The Tape Track Class allows you to use MMC (MIDI machine control) to control MIDI-compatible tape recorders. **Basic Specifications & Suggested List Price:** Requirements: 386SX/16 or better, VGA monitor, 2MB RAM, Microsoft Windows 3.0 or higher, MPU 401 or compatible MIDI interface. Specs: real-time program. Each song contains up to 16 arrangements with up to 64 tracks each simultaneous recording on up to 4 tracks resolution, 384 ppq.

KEY ELECTRONICS INC.

7515 Chapel Ave.; Ft. Worth, TX 76116; (817) 560-1912. **Product Name:** MIDiator MS-124. **Contact:** Carol Phelan, sales mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Serial-to-MIDI multi-port. Interface for all IBM compatibles. One MIDI in-port & four MIDI out-ports (allows up to 64 channels). The MS-124 provides the ultimate solution for musicians and users requiring portability, laptops, notebooks and all portable computers. Ideal for multimedia applications. Window drivers available in late summer 92. **Basic Specifications & Suggested List Price:** Fully hardware & software compatible with KEY MS-101 & MS-103 Serial MIDI interfaces. PC/XT-compatible Serial Port. Com I or II, 8250 or 16450 UART using a 1.843MHz clock & RS-232 C line drivers & receivers. Standard serial cable required. Line powered from the serial port. Size is 8 ounces, 1.4x2.9x4.6 inches. Sug. retail is \$179.95.

LARTEC SYSTEMS

4201 W. Burbank Blvd.; Burbank, CA 91505; (818) 972-1070. **Product Name:** ADR Control Pro. **Contact:** Bruce H. Larson, exec. VP. **Date Product Introduced:** Updated '92. **Product Description & Applications:** The ADR Control Pro is a PC-based software program designed to handle list management and machine control for the ADR stage. You can quickly pull loops from the list for recording and save them back to the list before another loop is accessed, while automatically logging take and track numbers. The ADR Control Pro operates in film footage or SMPTE and integrates with LarTec's line of editing and spotting systems. **Basic Specifications & Suggested List Price:** List price \$28,000, which includes LarTec Bias Control Interface, Audio Control Interface, Control Pro keyboard, computer and monitor, JSK Engineering MC211B Motion Controller, 8 hours of operator training and 90-day warranty.

LARTEC SYSTEMS

4201 W. Burbank Blvd.; Burbank, CA 91505; (818) 972-1070. **Product Name:** Cue Sheet Manager. **Contact:** Bruce H. Larson, exec. VP. **Date Product Introduced:** 3/92. **Product Description & Applications:** The Cue Sheet Manager is a PC-based software product that allows sound editors or mixers to print cue sheets in "mixing style" format on a variety of printers. The software provides the editor with extensive list checking that automatically catches errors

—LISTING CONTINUED ON NEXT PAGE

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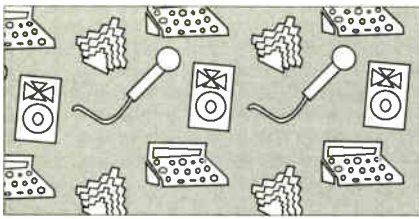
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Computer Software and Hardware

—LISTING CONTINUED FROM PREVIOUS PAGE

and "track collisions." The print preview feature allows you to view the entire cue sheet before printing. In addition, it allows direct entry of information and accepts LatEcd ADD Spotting Pro and Edit-Pro Spotter files. Suggested list price: \$695.

LIVEWIRE AUDIO

PD Box 561; Oceanport, NJ 07757; (908) 222-1227. Product Name: Livewire Sample Library. **Contact:** Mick Seeley, pres. **Date Product Introduced:** 2/92. **Product Description & Applications:** High-quality sampled sound disks for most popular sampling keyboards. All Livewire sample disks are digitally recorded and edited on Macintosh II computers for the ultimate sound clarity. Available for Ensoniq EPS, EPS-16 and Mirage, all Casio F2 samplers, Korg T1, T2 and T3 and Yamaha SY85 and SY99 keyboards. **Basic Specifications & Suggested List Price:** Disk prices range from \$6-\$15 per disk. A free disk list is available by sending a stamped, self-addressed envelope. A demo cassette (\$5) is also available.

MIDISOFT CORP.

PD Box 1000; Bellevue, WA 98009; (206) 881-7176. Product Name: Studio for Windows. **Contact:** Ronald Risdon, pres. **Date Product Introduced:** 12/91. **Product Description & Applications:** A notation-based sequencer for MIDI operating under Windows 3.0 or later. Features instantaneous "real-time" scoring of standard musical notation upon input (recording) of any MIDI musical performance. Can read standard MIDI files, for use with any MIDI music library. **Basic Specifications & Suggested List Price:** Requires minimum 286 PC with 2-meg RAM running Windows 3.0 or greater. \$249.95.

OPCODE SYSTEMS INC.

3950 Fabian Wy., Ste. 100; Palo Alto, CA 94303; (415) 856-3333. Product Name: Studio 4. **Contact:** Opcode customer service. **Date Product Introduced:** Fall '92. **Product Description & Applications:** The Studio 4 is Opcode's 128 channel, 8-in/8-out MIDI interface/SMPTE synchronizer. As an interface, the Studio 4 allows the Macintosh to independently communicate with each of the 8 MIDI in and outs. As a synchronizer, it reads and writes SMPTE in all formats including 29.97 non-drop. With the Studio 4 and a Mac present, the Opcode MIDI system (OMS) can add filtering, channelization, note range splitting, controller mapping, velocity and control value modification and other processing. **Basic Specifications & Suggested List Price:** 128 MIDI channels, 8 MIDI ins/outs, read & writes all formats of SMPTE, converts to MIDI time code or direct time lock, up to four Studio 4s can be used together for 512 MIDI channels. DMS+ Patches software including for powerful processing capabilities (when used with the Macintosh for live performance and studio integration). Battery back-up memory. MIDI activity LEDs for each MIDI in/out on front panel, full MIDI Time Piece emulation. Single rackspace. Full 1 year warranty. Requirements: Mac Plus and up. MIDI device(s). Retail price: \$495.

OPCODE SYSTEMS INC.

3950 Fabian Wy., Ste. 100; Palo Alto, CA 94303; (415) 856-3333. Product Name: Studio AV. **Contact:** Opcode customer service. **Date Product Introduced:** Fall '92. **Product Description & Applications:** The Studio AV is Opcode's single-rackspace video deck transport control for music scoring in post-production. The Studio AV provides master transport control for 1 video deck (dozens of models supported) while the Studio AVx Expander provides for control of additional decks. The Studio AV and AVx also support audio decks including Fostex, Otari and the Panasonic SV-3900 DAT deck, with more audio deck support to come in the future. **Basic Specifications & Suggested List Price:** Studio AV provides transport control for 1 video or audio deck. Each Studio AVx expander allows for control of 1 additional deck. Connects to Macintosh via MIDI interface. Reads and writes VITC (vertical interval time code). Stripes synchronous SMPTE locked to black-burst or video signal. SMPTE window dub. Black & white streamers and punches. Text display for markers or other uses. Single rackspace. OMS integration. Integration with Vision for transport control from the sequencer. Retail price: \$1,495.

OPTRONICS TECHNOLOGY

Box 3239; Ashland, DR 97520; (503) 488-5040. Product Name: Standard MIDI. **Contact:** Jim Chamberlain. **Date Product Introduced:** 1/92. **Product Description & Applications:** Standard MPU-401 compatible MIDI interface for the IBM computer. **Basic Specifications & Suggested List Price:** Single in and out with metronome output provided. Selectable address and interrupt lines, to avoid conflicts.

PERSONAL COMPOSER

3213 W. Wheeler St., Ste. #140; Seattle, WA 98199; (800) 446-8088. Product Name: Personal Composer for Windows. **Contact:** David Moore, marketing mgr. **Date Product Introduced:** 10/92.

Product Description & Applications: Personal Composer for Windows is a comprehensive, high-performance software package for creating musical scores and MIDI sequences. Publication-quality musical notation is automatically generated by simply playing any MIDI instrument. For those without keyboard skills, melodic phrases are created by clicking the mouse. Personal Composer for Windows reads standard MIDI files from other sequencers. It easily integrates into desktop publishing, MIDI studio and multimedia PC systems. **Basic Specifications & Suggested List Price:** Requires an IBM-PC compatible computer and Microsoft Windows. Retail price \$595. Please call (800) 446-8088 for information.

SOUND QUEST INC.

#2-131 W. 13th Ave.; Vancouver, BC, V5Y 1V8 Canada; (604) 874-9499; (800) 667-3998. Product Name: Quest Editor/Librarians. **Contact:** Michael Lambie. **Date Product Introduced:** 12/91. **Product Description & Applications:** Quest Editor/Librarian software is designed to simplify the storage and editing of sounds & setting for todays popular synthesizers & MIDI equipment. Each software package provides sophisticated sound storage, bank editing, sound auditioning and randomization along with a fully multitasking standard MIDI file player. Nine different software packages support the following instruments: Yamaha SY/TG 22/33/55/77, Korg Wavestation/ex/AD, Korg M1/R/ex/T1/T2/T3, Korg O1/W, Ensoniq VFX/SQ-1, Kawai K1/K4, Roland D-S10/20/70/VD/GR-50, Roland U-20/220 and Roland R-5/8/8. **Basic Specifications & Suggested List Price:** Quest Editor/Libs are available for MS Windows, MS DOS (PC/XT/AT/C1), Macintosh, Atari and Amiga computer systems. The list price is \$99 per package.

SPECTRAL SYNTHESIS INC.

19501 144th Ave. NE, Ste. #1000A; Woodinville, WA 98072; (206) 487-2931. Product Name: ADAX Series. **Contact:** Harold Drews, inside sales. **Date Product Introduced:** 10/92. **Product Description & Applications:** The ADAX series of AtoD/DtoA converters trims the cost even further on Spectral DAWs that offer multiple channels of converted I/O. The ADAX-8818 boasts 8 analog inputs, 8 analog outputs and stereo AES/EBU or S/PDIF digital I/O, all in one double-high rack unit. Switchable input or output metering is also included. The ADAX can be used in conjunction with or as a replacement for the MAX-880 digital audio expansion unit and separate stereo AtoD/DtoA converters. **Basic Specifications & Suggested List Price:** 16-bit linear PCM audio sampled at 32, 44.1 and 48 kHz. Frequency response=5Hz to 20 kHz at 44.1 kHz SR. S/N ratio<=-92 dB. Pricing to be announced.

SPECTRAL SYNTHESIS INC.

19501 144th Ave. NE, Ste. #1000A; Woodinville, WA 98072; (206) 487-2931. Product Name: StudioTracks Version 2.0. **Contact:** Harold Drews, inside sales. **Date Product Introduced:** 10/92. **Product Description & Applications:** StudioTracks Version 2.0 is a quantum leap forward for the Windows-based interface to Spectral's Digital Studio hard disk recording and editing system. Version 1.5 added disk-based multitrack multi-event scrubbing and J.L. Cooper CS-10 work-surface support. Version 2.0 now adds auto-mixing, same track punch in/out, and real-time support of magneto-optical drives. No more back-up with the MO-based system. Plus lots of shortcut features. **Basic Specifications & Suggested List Price:** Pricing set at \$1,295 as part of new DAW. Free update to all registered owners of Digital Studio and StudioTracks.



SPECTRAL SYNTHESIS INC.
Synclock

SPECTRAL SYNTHESIS INC.

19501 144th Ave. NE, Ste. #1000A; Woodinville, WA 98072; (206) 487-2931. Product Name: Synclock. **Contact:** Harold Drews, inside sales. **Date Product Introduced:** 10/92. **Product Description & Applications:** The Synclock 63 converts any one of 6 clock sources to 3 discrete digital audio clock outputs to enable the synchronizing of digital audio systems to the rest of your studio. Inputs accepted are SMPTE LTC, composite video or black burst, Word, Superclck (Spectral Sync), and AES/EBU. The clock outputs are Word, Superclck and AES/EBU. The single rack unit Synclock is MIDI or front panel controllable. **Basic Specifications & Suggested List Price:** Pricing to be announced.

SUNRIZE INDUSTRIES

2959 S. Winchester Blvd. #204; Campbell, CA 95008; (408) 374-4962. Product Name: Studio 16/AD1012. **Contact:** Anthony Wood, pres. **Date Product Introduced:** 3/92. **Product Description & Applications:** A 12 bit, 4-track studio with integrated digital signal processing. Provides advanced hard disk recording, extensive editing features and comprehensive SMPTE support. An affordable Amiga-

based audio system ideal for audio-for-video applications. **Basic Specifications & Suggested List Price:** Frequency response 20 Hz-20 kHz. LTC SMPTE time code reader (24, 25, 30 fps), signal-to-noise ratio -70 dB, THD+N <0.04%, adjustable sampling rate, VPP 100kHz (1,200 levels), unbalanced RCA audio in & out jacks, ADSP2105 sound processor (rated at 10mips, 100ns), VU meters, real-time effects, echo, delay, flange, chorus & FFTs, simultaneous playback and record.

SUNRIZE INDUSTRIES

2959 S. Winchester Blvd. #204; Campbell, CA 95008; (408) 374-4962. Product Name: Studio 16/AD516. **Contact:** Anthony Wood, pres. **Date Product Introduced:** 9/92. **Product Description & Applications:** A 16 bit, 8-track mono/16-track stereo studio with integrated digital signal processing. Provides advanced hard disk recording, extensive editing features and comprehensive SMPTE support. An Amiga-based audio system ideal for any high-fidelity audio application. **Basic Specifications & Suggested List Price:** Frequency response 20 Hz-20 kHz, LTC time code reader (24, 25, 30fps), adjustable sampling rate 12 levels including 44.1 kHz and 48 kHz, unbalanced RCA audio in and out jacks, ADSP 2105 sound processor (rated at 10mips, 10ns), VU meters, real-time effects: echo, delay, flange, chorus, FFTs; simultaneous playback and record.



TIME DESIGNS
The MIDINOME

TIME DESIGNS

2854 Baton Rouge Ct.; San Jose, CA 95133-2001; (408) 258-1460. Product Name: The MIDINOME. **Contact:** James DaLewis, pres. **Date Product Introduced:** 1/92. **Product Description & Applications:** The MIDINOME is a fully programmable Visual MIDI Metronome. It features a bright row of LEDs and a large green "flash" LED which transforms MIDI Beat Clocks and note on/off information into a visual timing display. This visual method enables the performer to play along with or without the aid of an audio reference, such as a "click." The MIDINOME is extremely useful for education, live performance and recording. **Basic Specifications & Suggested List Price:** Internal clock: 20-250 beats per minute. Dimensions: Height-2.5", width-8", depth-6.25". Shipping weight 3 lbs. Power supply: 9 volt DC/500ma. Microprocessor: Motorola 68HC11. Suggested retail price: \$249. Warranty: full 1-year guarantee.

TRUE IMAGE AUDIO

349 W. Felicita Ave., Ste. 122; Escondido, CA 92025; (619) 480-8961. Product Name: MacSpeakerz 2.5. **Contact:** Sharon Alsup, mktg. dir. **Date Product Introduced:** 1992. **Product Description & Applications:** MacSpeakerz V2.5 calculates and displays frequency, cone excursion, impedance, phase and group delay responses for any loudspeaker driver in any closed, vented or isobaric enclosure. The dB SPL mode lets you see how loud the system will play at any distance or input power. Further design tools are provided in the form of calculators for enclosure dimensions, vent dimensions, crossover component values and compensation networks. **Basic Specifications & Suggested List Price:** Any Macintosh with 1-meg memory. Suggested list price \$299.

TURTLE BEACH SYSTEMS

1600 Pennsylvania Ave., Unit #33; York, PA 17404; (717) 843-6916. Product Name: Multisound. **Contact:** Michael Hand, regional sales mgr. **Date Product Introduced:** 3/92. **Product Description & Applications:** Multisound is the first professional sound card for professional multimedia applications in the Windows 3.1 environment. Multisound plays and records 16-bit digital audio with CD quality. It also features an E-mu Proteus 1XR chip set onboard for CD quality MIDI instruments. This card is built with a future in mind. It also includes a Motorola 56001 DSP chip. **Basic Specifications & Suggested List Price:** MS DDS or PC DOS Version 3.1 or later, Windows Ver. 3.1, 386 compatible computer, 2MB memory, 30MB hard drive. List price \$995.

TURTLE BEACH SYSTEMS

1600 Pennsylvania Ave., Unit #33; York, PA 17404; (717) 843-6916. Product Name: Waves for Windows. **Contact:** Michael Hand, regional sales mgr. **Date Product Introduced:** 7/92. **Product Description & Applications:** Now the Windows 3.1 computing environment has a serious audio-editing package. Wave for Window offers cut/paste editing, a 3-D frequency analysis, 4 band parametric equalization, a gain adjustment function, 2 stereo soundfile mixer, time compression and many other professional editing tools. **Basic Specifications & Suggested List Price:** MS DOS or PC DOS 3.1 or later, Windows Ver. 3.1, 386 compatible computer, 2MB memory, 30MB hard drive, VGA display, Windows 3.1 compatible sound card. List price \$149.

DUPLICATION EQUIPMENT

ACCURATE SOUND CORPORATION

3475-A Edison Way; Menlo Park, CA 94025; (415) 365-2843. Product Name: AS-100 High Speed Cassette Duplicator Slave. Contact: Ronald M. Newdell, pres. Date Product Introduced: 10/92. Product Description & Applications: Tape transport, micro process controlled, for use as a high speed duplicator slave (300 ips) cassette pancake tape evaluator and 1/4"-1/2" tape recorder/master maker. Basic Specifications & Suggested List Price: Tape speeds: 15/32 to 480 ips, reel size 14". 0.150, 1/4" & 1/2" tape width packing arms on supply and take up. Bi-directional, search to que with 10 memory points. Price \$14,500 plus depending on options.

APEX MACHINE COMPANY

3000 NE 12th Terr.; Ft. Lauderdale, FL 33334; (305) 565-2739. Product Name: RS-1000 Rotoscreen DCC printer. Contact: Bob Coningsby, sales mgr. Date Product Introduced: 10/92. Product Description & Applications: The RS-1000 DCC printer can achieve high-quality opaque printing directly on this exciting new format cassette. The cassettes are manually fed into a feed chute and are automatically pushed into the chute and fed into pre-set guide rails. The pusher continues to push the cassette beneath the Rotoscreen section where it is imprinted in one color. The DCC is pushed under the UV dryer, curing the ink, and then is exited out of the system into a receiving container or onto a continuous conveyor belt. The RS-1000 can be implemented with a second and third Rotoscreen section, if multi colors are required. Or, if multi colors are required for a particular job, the cassettes can be run through either system a second or third time. Basic Specifications & Suggested List Price: The RS-1000 is complete with an automatic hopper feed, one color Rotoscreen print section, and Apex ultraviolet drying system and can print with production speeds of approximately 120 parts per minute. This wonderful new machine is priced at approximately US \$38,000. The actual price is dependent upon the options purchased.

BASF INFORMATION SYSTEMS

33 Crosby Dr.; Bedford, MA 01730; (800) 225-3326. Product Name: BASF DCC Audio Duplicating Tape. Contact: Terence D. O'Kelly, dir. sales. Date Product Introduced: 10/92. Product Description & Applications: BASF, the inventor and leader in magnetic tape, was the first to develop DCC tape. In conjunction with Philips, the inventor of the analog compact cassette and compact disc, BASF specifically engineered and manufactured backcoated DCC tape for thin-film head technology. Basic Specifications & Suggested List Price: Available in C90 10,800 pancakes.

BASF INFORMATION SYSTEMS

35 Crosby Dr.; Bedford, MA 01730; (800) 225-3326. Product Name: Chrome Plus Audio Duplicating Tape. Contact: Terence D. O'Kelly, dir. sales. Date Product Introduced: 7/92. Product Description & Applications: BASF's new Chrome Plus combines the unique low-noise properties of chrome with the lower distortion and higher output level of cobalt. The extremely low print through delivers clear, sharp, defined sound, a hallmark of BASF chrome-based tapes. Basic Specifications & Suggested List Price: C60 8,200', 12,300' pancakes. C90 10,800' & 17,300' pancakes.

CONCEPT DESIGN

1105-A Pomeroy St.; Graham, NC 27253; (919) 229-6500; FAX: (919) 229-0063. Product Name: DAAD R(2) for DCC. Contact: Kathleen Farrow, director of PR. Date Product Introduced: 3/92. Product Description & Applications: The digital audio analog duplication for CD quality cassettes is reconfigurable for DCC duplication. Its format flexibility allows simultaneous analog/DCC duplication. It loads at high speed and utilizes a VHS digital tape as the master source for security and reliability. Basic Specifications & Suggested List Price: True 16 bit digital format. Non-unitary memory for format flexibility. User friendly computer control. Double digital inputs and outputs. Double analog outputs. Level, duration and frequency adjustable/cutone internal to system adjustable from software.

CONCEPT DESIGN

1105-A Pomeroy St.; Graham, NC 27253; (919) 229-6500; FAX: (919) 229-0063. Product Name: DCC Adapters. Contact: Kathleen Farrow, director of PR. Date Product Introduced: 5/92. Product Description & Applications: The DCC adapter for existing analog cassette loaders makes new equipment purchases for loading DCC cassettes an unnecessary expense. The adapter is available for King 790 Winders and can be installed easily. DCC Loading adaptability is also designed into the CD 9000 single pancake and CD 9002 dual pancake loaders from Concept Design.

INFONICS INC.

2302 E. Michigan Blvd.; Michigan City, IN 46360; (219) 879-3381. Product Name: Infonics high speed cassette rewinder. Contact: Carol Lant, sales. Date Product Introduced: 1/92. Product Description & Applications: The Infonics high speed rewinder is designed to provide a fast, reliable, and easy way to quickly rewind or exercise cassettes. The unit features drop-in individual start and automatic shut off, as well as a direct drive system, eliminating belts, clutches and wear. A self-adjusting torque system automatically increases for tight cassettes or lessens for loose cassettes. The rewinders are constructed with modular positions for easy expansion and multi-configured in one through eight position units. Basic Specifications & Suggested List Price: Speed: C-60/19 sec., C-90/29 sec., C-120/40 sec. Size: 1-2 position 7"x5"x5"; 3-4 position 7"x10"x5"; 5-6 position 7"x15"x5"; 7-8 position 7"x20"x5". Price: 2 position: \$279; 3 position: \$341; 4 position: \$398; 5 position: \$507; 6 position: \$548; 7 position: \$679; 8 position: \$769.

JRF MAGNETIC SCIENCES

249 Kennedy Rd.; Greendell, NJ 07839; (201) 579-5773. Product Name: Head Assembly for Dtari DP1610. Contact: John French. Date Product Introduced: 1992. Product Description & Applications: The new fully adjustable head assembly for the Dtari DP1610 Cassette Quality Control tape machine. Provides complete control with precision accuracy of all mechanical head alignment requirements. With the new JRF Head assembly, the Dtari DP1610 will be elevated to a higher level of reliability and tape path control. Adjustments for Track Placement, Zenith, Wrap and Azimuth can now be performed very quickly with ease and smooth control. Head assembly has a location for an optional Dtari Scrape Flutter Idler. Basic Specifications & Suggested List Price: The new JRF Adjustable head assembly can be added to any vintage Dtari DP1610 machine. It can be purchased: a) as an individual assembly, \$395 or b) with Saki Premium Quality Extended Performance Ferrite heads, \$1,200 or c) with original Dtari Sendu heads, \$695. All assemblies are supplied assembled and optically aligned.

JRF MAGNETIC SCIENCES

249 Kennedy Rd.; Greendell, NJ 07839; (201) 579-5773. Product Name: T-Bar Head Mounts for High Speed Cassette Slaves. Contact: John French. Date Product Introduced: 1992. Product Description & Applications: JRF has expanded its T-Bar line (Adjustable head mount for High Speed Cassette Slave assembly) to include equipment manufactured by Electro-Sound (models 6000, 8000, 4800), Gauss (model 1200), Ampex, Liberty, and Select Custom Systems. The T-Bar two head mount is precision-machined from a solid block of aluminum to ensure hard-mount rigidity with accurate and repeatable alignment for Azimuth and Wrap. Initial installation of T-Bar on slave head base required some modification and should be performed at the JRF Lab facility. (May also be scheduled in conjunction with having the heads relapped). Basic Specifications & Suggested List Price: With the increasing demands for tighter tolerances on Azimuth and frequency response in high-speed cassette duplicating, the JRF T-Bar mount makes the adjustments achievable, easy and saves a substantial amount of time in the process. Pricing (including head relapping, installation, and digital/optical alignment) is \$250 to \$450.

KABA RESEARCH & DEVELOPMENT

24 Commercial Blvd.; Novato, CA 94949; (415) 883-5041; (800) 231-8273. Product Name: KABA 4-Track CD master system. Contact: Ken Bacon, pres; Jim Stern, VP operations. Date Product Introduced: 10/92 (AES). Product Description & Applications: New dual CD player/master allows use of CDs for master source with the KABA 4-track real-time and double-time audio cassette duplication system. Dual CD player/master eliminates the need to load programs to hard disk every time a program is re-run. It also provides safe, non-wearing, instantly accessible working masters for real-time duplicators working from digital masters. The unit allows duplication from CD to cassette at real- and double-time.

KABA RESEARCH & DEVELOPMENT

24 Commercial Blvd.; Novato, CA 94949; (415) 883-5041; (800) 231-8273. Product Name: KABA Low Cost System Controller. Contact: Ken Bacon, pres; Jim Stern, VP operations. Date Product Introduced: 10/92 (AES). Product Description & Applications: New distribution-amplifier/system-controller reduces system cost by replacing master deck for users who use only reel or digital masters. The unit provides all-system control functions including start/stop, auto or manual rewind, bias selection, short tape sensor, and real-time or doubletime duplication speed.



KABA RESEARCH & DEVELOPMENT
KABA Premium Heads 55RHA-LC

KABA RESEARCH & DEVELOPMENT

24 Commercial Blvd.; Novato, CA 94949; (415) 883-5041; (800) 231-8273. Product Name: KABA Premium Heads 55RHA-LC. Contact: Ken Bacon, pres; Jim Stern, VP operations. Date Product Introduced: 10/92 (AES). Product Description & Applications: New high-performance record heads can retrofit KABA 4-track real time and 2x duplication systems, dramatically extending head life, lowering maintenance requirements and improving cross-talk specifications by more than 15dB. Basic Specifications & Suggested List Price: Head life—7,500-10,000 hours. Cross talk—less than 60dB.

SPRAGUE MAGNETICS

15720 Stagg St.; Van Nuys, CA; (818) 994-6602. Product Name: Duplicator Heads. Contact: John M. Austin Jr., sales. Date Product Introduced: 10/91. Product Description & Applications: High speed duplicator heads for Cetec Gauss and Electro-Sound. Optical align-

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ROCKET LAB

MASTERING STUDIO

COMPLETE

DIGITAL MASTERING

MUSIC EDITING

& CD REFERENCES

ATLANTIC RECORDS

WARNER BROTHERS RECORDS

SHRAPNEL RECORDS

DIGITAL UNDERGROUND

MICKY HART

RYKODISC

RELATIVITY RECORDS

JOHN LEE HOOKER

TRAMAIN HAWKINS

MCA RECORDS

RCA RECORDS

JERRY GARCIA

TOMMY BOY RECORDS

THE RESIDENTS

2 PAC

POLYGRAM RECORDS/

MERCURY RECORDS

PRIORITY RECORDS

TNT PRODUCTIONS

CARGO RECORDS

DAVID GRISMAN

JEFF WATSON

HOLLYWOOD BASIC

NARADA RECORDS

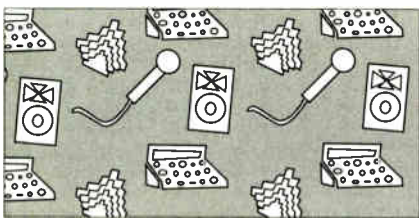
51 FEDERAL STREET #100

SAN FRANCISCO, CA 94107

FAX: 415-495-2684

PHONE: 415-495-2297

USE READER SERVICE CARD FOR MORE INFO



Duplication Equipment

—LISTING CONTINUED FROM PREVIOUS PAGE
ments available. **Basic Specifications & Suggested List Price:** Hot pressed Ferrite/glass bonded.

SUNKYONG MAGNETIC/AMERICA INC.

4041 Via Oro Avenue, Long Beach, CA 90810; (310) 830-6000. **Product Name:** HCX. **Contact:** Joseph Kempter, technical dir. **Date Product Introduced:** Summer '92. **Product Description & Applications:** HCX is a cobalt modified ferric oxide audio cassette duplicating tape featuring very low harmonic distortion and an unexcelled capacity for clean recording of high level, high frequency peaks. HCX tape improves the sound quality of any analog cassette, particularly when using a digital master bin. **Basic Specifications & Suggested List Price:** Specified lengths: C-60, 10,500FT, 12,500FT, C-90, 15,00FT, 17,300FT.

UNITED AD LABELS CO. INC.

650 Columbia St., Brea, CA 92621; (800) 423-4643; (714) 990-2700. **Product Name:** Audio cassette face labels for laser printers. **Contact:** Leslie Geller. **Date Product Introduced:** 1/92. **Product Description & Applications:** Audio cassette face labels are now available in sheets for desktop laser printers. These high-quality labels are designed specifically for laser printers and will not jam, melt or fall apart in high temperatures. **Basic Specifications & Suggested List Price:** 12 labels per sheet, each 3-1/2"x1-13/16". Packaged 100 sheets per box, white only. \$49.95 per box for 1-3 boxes, discounts on larger quantities.

UNITED AD LABELS CO. INC.

650 Columbia St., Brea, CA 92621; (800) 423-4643; (714) 990-2700. **Product Name:** Audio cassette labels in small quantity pack. **Contact:** Leslie Geller. **Date Product Introduced:** 1/92. **Product Description & Applications:** Audio cassette face labels for pin-fed printers are now available in 200 labels/pack, for audio professionals who use cassette labels in limited quantities. Great for quick handwritten or typewritten labeling needs, too. **Basic Specifications & Suggested List Price:** Matte or high gloss white material, permanent adhesive. \$10.95 per pack for up to 5 packs, discounts on larger quantities.

MICROPHONES



AKG ACUSTICS INC.
The AKG Blue Line

AKG ACOUSTICS INC.

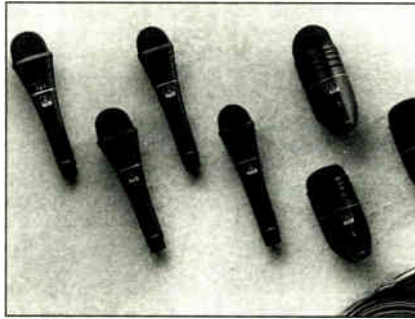
1525 Alvarado St., San Leandro, CA 94577; (510) 351-3500. **Product Name:** The AKG Blue Line. **Date Product Introduced:** 1992. **Product Description & Applications:** The AKG Blue Line is a complete family of modular components permitting the rapid custom assembly of the exact high-quality condenser microphone system needed for a particular application. The series features a patented bayonet quick-lock interlocking system and visually coded components to permit rapid, accurate conversions under difficult field conditions.

AKG ACOUSTICS INC.

1525 Alvarado St., San Leandro, CA 94577; (510) 351-3500. **Product Name:** Tri Power. **Date Product Introduced:** 10/91. **Product Description & Applications:** The Tri-Power series of microphones utilizes proprietary transducer and suspension systems to deliver the signature AKG sound under the toughest live performance conditions. Exceptionally high gain-before-feedback and low handling noise allow artists to cut through to their audience and cause the mics to combine smoothly so that mixing and equalization are easier for the sound engineer.

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—SEE LISTING BOTTOM OF PREVIOUS COLUMN



AKG ACOUSTICS INC.
Tri Power

AMS INDUSTRIES (SIEMENS AUDIO INC.)

7 Parklawn Dr., Bethel, CT 06801; (203) 744-6230. **Product Name:** AMS SoundField MkV Microphone. **Date Product Introduced:** 1/92. **Product Description & Applications:** New version of a unique, single-point microphone system capable of capturing all the sounds in a 3-dimensional environment. New on the MKV: upgraded electronics, improved systems diagnostics, improved ergonomic design, 40Hz high-pass filter, easy standard 4x4 B-format interfacing capability, able to engage M/S equivalent for broadcast and post-production applications. Based on a patented design of 4 separate capsules in a tetrahedral array, the SoundField MKV gives you the ability to produce a truly coincident, phase-coherent stereo image, plus the ability to "datalog" all the sonic information in a specific sound field for later manipulation in post-production. **Basic Specifications & Suggested List Price:** List price: \$5,850.

AUDIO-TECHNICA U.S. INC.

1221 Commerce Dr., Stow, OH 44224; (216) 686-2600. **Product Name:** AT933 (R, PM)/ML Engineered Sound™ MicroLine™ Shotgun Microphone. **Contact:** Gary Elliott, national sales manager. **Date Product Introduced:** 10/92. **Product Description & Applications:** Its small size and excellent response make the AT933/ML ideal for suspension over choirs, instrumental groups or theatre stages. So light it can be hung by its own cable. Despite its tiny size, the significantly narrower acceptance angle solves your most difficult sound pickup problems. The power module features either a standard electrical wall plate or is remote with an XLR-type output connector. Available in black or white. Excellent sound quality is maintained in this miniature microphone. **Basic Specifications & Suggested List Price:** Frequency response of AT933R/ML is 30-20,000 Hz and AT933PM/ML is 40-20,000 Hz. Open circuit sensitivity (re 1V at 1Pa) for AT933R/ML is -35 dB (17.7 mV) and AT933PM/ML is -26 dB (50.1 mV). For both versions impedance is 200 ohms, phantom power requirements are 9-52V DC, and power module is remote XLR output wall-plate. Suggested list price for AT933R/ML is \$249 and AT933PM/ML is \$285.

AUDIO-TECHNICA U.S. INC.

1221 Commerce Dr., Stow, OH 44224; (216) 686-2600. **Product Name:** AT935QMR Engineered Sound™ MicroLine™ Shotgun Microphone. **Contact:** Gary Elliott, national sales manager. **Date Product Introduced:** 10/92. **Product Description & Applications:** Its small profile and excellent response make the AT935QMR/ML ideal for podium applications. Despite its tiny size, the significantly narrower acceptance angle solves the most difficult sound problems. Featuring a self-contained power module and XLR-type connector in the base. The small-diameter gooseneck design permits highly flexible positioning while maintaining a smooth, well contoured appearance. Excellent sound quality is maintained in this miniature microphone. **Basic Specifications & Suggested List Price:** Frequency response is 30-20,000Hz. Open circuit sensitivity (re 1V at 1 Pa) is -35 dB (17.7 mV). Impedance is 200 ohms. Phantom power requirements are 9-52V DC. Suggested list price is \$280.

BEYERDYNAMIC INC.

56 Central Ave., Farmingdale, NY 11735; (516) 293-3200. **Product Name:** MC 833. **Contact:** Mike Solomon. **Date Product Introduced:** 10/92. **Product Description & Applications:** Stereo condenser microphone with built-in X-Y and MX capability without the need of an external matrix device! The 833 contains 3 discrete transducers and is intended for critical applications in live recording, studio recording, sound reinforcement, EFP Sports production and film sound special effects. This microphone processes very high sensitivity and smooth, wide range frequency response. **Basic Specifications & Suggested List Price:** List price \$2,799. Frequency response=30-20,000 kHz. Sensitivity= -32 dBV ±2 dB, maximum SPL 132 dB. Each MC 833 stereo microphone is supplied with carrying case and shock isolation mount.

BEYERDYNAMIC INC.

56 Central Ave., Farmingdale, NY 11735; (516) 293-3200. **Product Name:** U-700 Series UHF Microphone Systems. **Contact:** Mike Solomon. **Date Product Introduced:** 10/92. **Product Description & Applications:** U-700 Series UHF wireless hand-held, body-pack and headworn mic systems. Modular receiver design for maximum space savings. True diversity reception—up to 12 wireless systems can operate within an 8MHz bandwidth. Hand-held transmitter available with TGX 280, 480 or 580 heads. Body-packs available with MCO 5 omni or MCO 10 cardioid lavaliers. Custom lavaliers and headset interfaces are easily made. **Basic Specifications & Suggested List Price:** Contact Beyer for custom price quotations.

BRÜEL & KJAER

300 Gage Ave., Unit 1, Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158. **Product Name:** APE (Acoustic Pressure Equalizer). **Contact:** Bill Calma. **Date Product Introduced:** 10/92. **Product Description & Applications:** B&K will introduce a full line of APE (Acoustic Pressure Equalizers) at the '92 AES. These innovative products offer varied frequency response and pattern control for the famous B&K 4000 series of microphones.

CROWN

1718 Mishawaka Rd., Elkhart, IN 46517; (219) 294-8000. **Product Name:** PCC-170. **Contact:** Bob Herrold, PDM, mics. **Date Product Introduced:** Introduced: 5/92. **Product Description & Applications:** PCC-170 is a supercardioid boundary microphone designed for boardroom table or lectern for telecommunications and conference applications. **Basic Specifications & Suggested List Price:** Frequency response 50 Hz to 20,000 Hz at 30°. Max SPL: 120dB SPL. Impedance: 150 ohms, balanced.

ELECTRO-VOICE INC.

600 Cecil St., Buchanan, MI 49107; (616) 695-6831. **Product Name:** MS-2000A Wireless Microphone System. **Contact:** Gary Parks, wireless prod. mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Each system includes the MR-2000A wireless receiver and MT-2000A handheld transmitter. The receiver is true diversity and features silent operation due to precisely engineered audio and RF circuitry combined with EV's DNX companding circuitry. The transmitter features an N/D757B microphone element, providing full, rich vocal sound with the lowest handling noise of any premium microphone available. Guitar and bodypack transmitters available. **Basic Specifications & Suggested List Price:** Signal to noise ratio: 105dB (108dB A-weighted); internal power supply switchable between 115V and 235V; detachable AC power cable; 1/4 inch and balanced XLR outputs with 30dB level adjustment. Price: \$798.

LECTROSONICS INC.

581 Laser Rd. NE, Rio Rancho, NM 87124; (505) 892-4501. **Product Name:** 195 Series Wireless Microphone. **Contact:** Bruce C. Jones. **Date Product Introduced:** Spring '92. **Product Description & Applications:** Lectrosonics Inc. introduces a new wide band wireless microphone system in VHF and UHF. For maximum reliability and audio performance, the 195 series wireless microphones offer several new features. These include 75kHz deviation, dual band companding, no pre-emphasis/de-emphasis, modular front end for frequency changes, pilot tone squelch control, calibrated VU and LED metering for all audio and RF levels, headphone monitor with variable output, Opti-blend diversity design and locking phase reversal switch. **Basic Specifications & Suggested List Price:** Call for specifications and mfg. suggest list.

C.F. MARTIN & COMPANY INC.

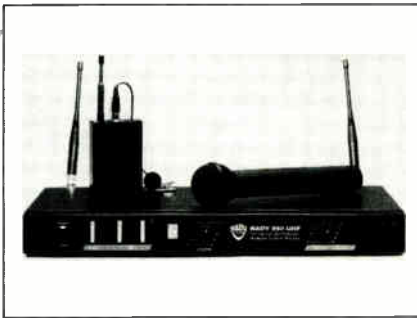
PO Box 329; Nazareth, PA 18064; (800) 345-3103. **Product Name:** Thinline 332 Gold Plus. **Contact:** Martin telemarketing. **Date Product Introduced:** 2/92. **Product Description & Applications:** At the heart of the low impedance system is a revolutionary, proprietary vibration sensing device that senses the motion of the entire saddle and virtually eliminates balance problems. In the end it provides a natural acoustic sound and overall tonal flexibility that cannot be matched by any other existing pick-up system. It's also easily installed. It comes equipped with a miniature electronic package to eliminate the need for costly installation or any alterations to the instrument. **Basic Specifications & Suggested List Price:** The Thinline's three terminal stereo jack capability enables the delivery of two separate signals when used in conjunction with other acoustic pick-ups or internally mounted microphones, or it can be used to provide turn on/shut off capability with active circuitry. Retail price is \$164.50.

MILLENNIA MEDIA

PO Box 277611; Sacramento, CA 95827; (916) 363-1096. **Product Name:** Model HV-2. **Contact:** John La Grou, eng. **Date Product Introduced:** 7/92. **Product Description & Applications:** A stereo high voltage power supply and line driver for use with Bruel & Kjaer +130V DC (4000 Series) microphones. An affordable alternative to the B&K 2812, the HV-2 features selectable balanced or unbalanced operation, adjustable +130V DC outputs, Gold Neutrik XLRs, Mogami internal wiring, toroidal power supply, RF line filters and short circuit protection in a 16 gauge, laser-etched, 1U rack. **Basic Specifications & Suggested List Price:** The HV-2 employs 50V DC-coupled balanced output drivers with less than .0008% THD from 20Hz to 20 kHz better than .1 degree stereo phase tracking, 500kHz bandwidth, +32dBu maximum output, +17dBu maximum input and can accept an optional high performance plug-in A/D converter. Price: \$795.

NADY SYSTEMS INC.

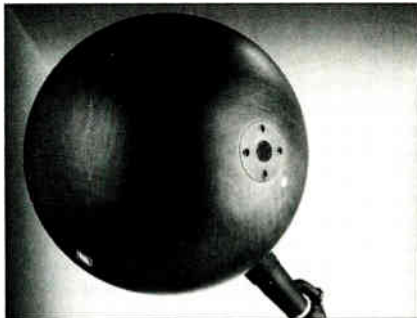
6701 Bay St., Emeryville, CA 94608; (510) 652-2411. **Product Name:** Nady 551 VR Two Channel Wireless Video Microphone System. **Contact:** Joe Territo, PR manager. **Date Product Introduced:** Early '92. **Product Description & Applications:** Nady's finest professional system for EFP and ENG. The all-metal receiver and lavalier bodypack transmitter use Surface Mount Technology (SMT) which makes them ultra-compact. Both feature two user-switchable UHF highband operating channels. The Nady HT10 handheld transmitter (single channel) is also available. The system features Nady's patented companding noise reduction for an unsurpassed dynamic range of 120dB. Operates on batteries or AC. **Basic Specifications & Suggested List Price:** Suggested list prices for the Nady 551VR system (receiver and transmitter) start around \$500.



NADY SYSTEMS INC.
Nady 950 UHF Ten Selectable
Channel Wireless System

NADY SYSTEMS INC.

6701 Bay St., Emeryville, CA 94608; (510) 652-2411. **Product Name:** Nady 950 UHF Ten Selectable Channel Wireless System. **Contact:** Joe Territo, PR manager. **Date Product Introduced:** Late '91. **Product Description & Applications:** A rack-mount, true diversity wireless microphone or instrument system with ten user-switchable, frequency synthesized UHF operating channels. Features Nady's patented companding noise reduction for 120dB dynamic range, the best in wireless today. Available with handheld mic, lavalier and instrument transmitters. **Basic Specifications & Suggested List Price:** Suggested list prices for Nady 950 UHF receiver and transmitter systems start at \$2,495.



NEUMANN USA
KFM 100

NEUMANN USA

6 Vista Dr., PO Box 987; Old Lyme, CT 06371; (203) 434-5220. **Product Name:** KFM 100. **Contact:** Jeff Alexander, product mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** The KFM 100 is a new stereo microphone containing two flush mounted pressure transducers in a wooden sphere. The sphere is 20cm in diameter and presents an acoustically hard surface. This microphone reproduces the acoustic depth of the environment especially well and has extended low frequency response down to 10Hz. Arrangement and spacing of the capsules result in nearly constant directivity factor and a smooth diffraction of the sound waves around the sphere. **Basic Specifications & Suggested List Price:** Transformerless circuitry, includes aluminum carry case and accessories. Retail price: \$5,595.



NEUMANN USA
KU 100 Dummy Head microphone

NEUMANN USA

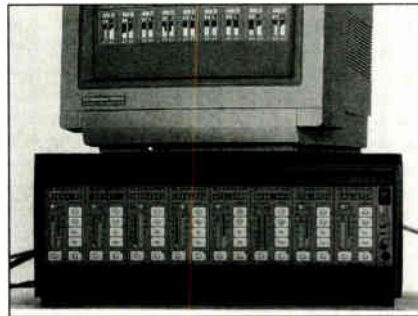
6 Vista Dr; Old Lyme, CT 06371; (203) 434-5220. **Product Name:** KU 100 Dummy Head microphone. **Contact:** Jeff Alexander, product mgr. **Date Product Introduced:** 1992. **Product Description & Applications:** The KU100 is Neumann's third generation binaural, artificial head microphone system. The mic features wide-range condenser capsules, transformerless FET 100 electronics and XLR and BNC outputs. Powering is via internal batteries or a 48V DC phantom source.

PASO SOUND PRODUCTS

14 1st St.; Pelham, NY 10803; (914) 738-4800. **Product Name:** Handlers Microphones. **Contact:** Ken O'Brien, product mgr. **Date Product Introduced:** 1992. **Product Description & Applications:** Complete line of handheld, dynamic, low impedance, directional microphones. Black satin finish, shock mount cartridge. **Basic Specifications & Suggested List Price:** Low impedance, dynamic, cardioid, shockmounted cartridge.

SANKEN MICROPHONES

1155 N. LaBrea; W. Hollywood, CA 90038; (213) 845-1155. **Product Name:** CQ-1 4-channel "Shotgun-Surround" Microphone. **Contact:** Jim Pace. **Date Product Introduced:** 4/92. **Product Description & Applications:** The CQ-1 was designed as a highly accurate, 4-channel directional microphone for use in HDTV and film production. The compact, shotgun-style design incorporates a new rectangular, vertically placed diaphragm similar to the one developed for the Sanken COS-11 lavalier. The unique vertical placement provides absolute coincident registration of the left-center-right response and the greatest sensitivity in a compact housing. **Basic Specifications & Suggested List Price:** Measuring only 22.5mm in diameter, the microphone is available in two lengths, 363mm and 513mm. Revolutionary "shotgun-surround" pickup. 4-channels, left-center-right surround. Mounts easily on camcorder or film camera. 19 Capsules w/unique vertical diaphragms. Sound balanced for 360 degree "point-and-shoot" production. List price TBA at AES.



SENNHEISER
EM 1046/SK50

SENNHEISER

PO Box 987, 6 Vista Dr.; Old Lyme, CT 06371; (203) 434-9190. **Product Name:** EM 1046/SK50. **Contact:** Joe Ciandelli, applications engineer. **Date Product Introduced:** 10/92. **Product Description & Applications:** Highly tunable UHF wireless microphone system. Modular receiver design. Miniature bodypack transmitters with switchable battery supplies. System signal-to-noise ratio of 108dBa. Optional remote computer display monitoring. For theatre, concerts, broadcast and studio applications. **Basic Specifications & Suggested List Price:** 8 channel system starts at \$92,000.



SHURE
EC Wireless Series

SHURE

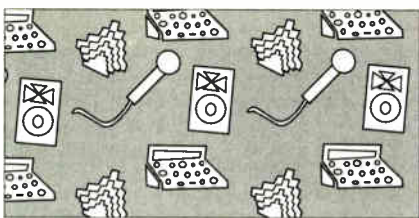
222 Hartrey Ave.; Evanston, IL 60202; (708) 866-2200. **Product Name:** EC Wireless Series. **Contact:** Davida Rochman. **Date Product Introduced:** 10/92. **Product Description & Applications:** The EC Wireless line consists of six systems featuring bodypack and handheld transmitters. Shure's EC Wireless incorporates a new digitally controlled, frequency-synthesized design which sets a new standard for reliability and system performance. This design meets the toughest RF standards, resulting in greater freedom from RF interference, significantly improved multiple-system performance, and virtually "bulletproof" signal reliability. The EC Series also allows for field serviceable frequency modification. Handheld transmitters feature a new antenna design for 10dB more effective RF power. The EC line features a new Beta87 handheld transmitter providing concert-level sound quality and outstanding gain-before-feedback.

SHURE

222 Hartrey Ave.; Evanston, IL 60202; (708) 866-2200. **Product Name:** L5 Receiver. **Contact:** Davida Rochman. **Date Product Introduced:** 10/92. **Product Description & Applications:** The new Shure L5 receiver is a small, battery operated, single antenna re-

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USE READER SERVICE CARD FOR MORE INFO



Microphones

—LISTING CONTINUED FROM PREVIOUS PAGE

ceiver for mounting directly on video cameras. The L5 is an extension of Shure's L Series Wireless Line, and is compatible with existing L Series transmitters and microphones. This new portable wireless system for video production will offer a total of six system combinations in 12 different frequencies, with 5 compatible in any geographic area. Additional product features include optimized circuitry for minimal current drain, interchangeable heads for handheld systems, pivotal antenna and external power capability.



SONY BUSINESS & PROFESSIONAL GROUP
C-800 Series Studio
Condenser Microphones

SONY BUSINESS & PROFESSIONAL GROUP

3 Paragon Dr., Montvale, NJ 07645; (201) 358-4197. **Product Name:** C-800 Series Studio Condenser Microphones. **Contact:** Art Gonzales, product manager. **Date Product Introduced:** 7/92. **Product Description & Applications:** The C-800 Series consists of the C-800 and C-800G large diaphragm condenser vacuum tube electronics microphones intended for the most critical recording applications. The C-800 is designed for musical instrument recording, and the C-800G is designed for vocal recording and incorporates a Peltier cooling device to ensure low noise and high sound quality. **Basic Specifications & Suggested List Price:** List price: C-800 \$4,400, C-800G \$5,600.

VEGA

9900 Baldwin Pl., El Monte, CA 91731; (818) 442-0782; (800) 777-1771. **Product Name:** AX-20 Wireless Microphone System. **Contact:** Robert Bell, nat'l sales mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** The AX-20 features a new receiver design that virtually eliminates "false squelch burst." For live sound, stage and other wireless applications, it incorporates Vega's DYNEX III audio processing for superb sound quality and very high signal-to-noise ratio. Available with bodypack transmitter or 2 hand-held models, all providing 50mW of RF power. **Basic Specifications & Suggested List Price:** Receiver takes up one rackspace; dual-mode squelch circuits; front panel headphone monitor output; external squelch adjustment; dual audio level and RF level bargraph displays. Price: \$1,349.

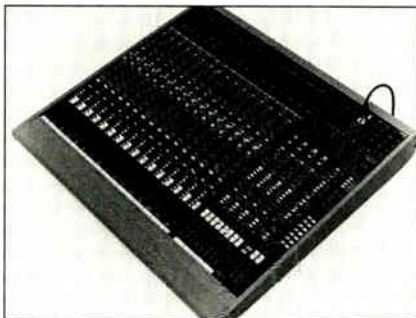
MIXING CONSOLES

ALESIS

3630 Holdrege Ave., Los Angeles, CA 90016; (310) 558-4530. **Product Name:** X-2 Recording Console. **Contact:** Allen Wald, VP adv/promo. **Date Product Introduced:** 1/92. **Product Description & Applications:** The X-2 recording console is a 24-channel, 24 tape monitor, 8 bus, in-line professional recording mixer, perfectly suited to multitrack recording and mixing. All tape and line inputs can be used simultaneously for a total of 64 inputs (including the 16 returns) during mixdown. As a complement to the ADAT digital audio recording system, the X-2 provides full channel busing and tape return facilities for up to 3 ADATs via +4 balanced 56-pin ELCD connectors. Each channel can simultaneously route inputs from the line/mic inputs and the tape returns and includes MIDI muting. **Basic Specifications & Suggested List Price:** Projected list price \$5,995. 24-channels, 16 returns, 24 in-line tape returns, 4 band EQ: hi, low 8 bus, EQ is splittable between channel input and tape, 6 auxiliary sends, 2 cues, 16 returns, 100mm faders, aux feedback for cue, stereo in-place solo three +4dBu balanced ins/outs on 56 pin ELCD connectors, -10dBV ins/outs on 1/4" jacks.

ALLEN AND HEATH

5639 S. Riley Ln., Salt Lake City, UT 84107; (801) 268-8400. **Product Name:** GL3. **Date Product Introduced:** 9/92. **Product Description & Applications:** 16, 24 and 32x4x2x1 sound reinforcement consoles. Feature 6 aux sends, all with individual controls. Auxes 1-4 selectable pre/post. Auxes 5-6 selectable pre-post. "Monitor Mode" switches provide aux master routing through subs. 1-4 and L&R to convert the consoles to full function monitor desk at the touch of a button (actually 6). **Basic Specifications & Suggested List Price:** Consoles feature balanced mic and line inputs. 4 band EQ with fixed high and low bands with 2 swept mids, full function metering, inserts and XLR balanced outputs on sub 1-4, L & R, and mono outputs (mixes 1-6, wedge mix, in monitor mode). Price TBA.



ALLEN AND HEATH
GS3

ALLEN AND HEATH

5639 S. Riley Ln., Salt Lake City, UT 84107; (800) 777-1363. **Product Name:** GS3. **Contact:** Lynr Martin, sales mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** In-line recording console featuring dedicated EQ on monitor section as well as stereo returns. Also features MIDI mute automation of all channel, monitor and auxiliary mutes via an onboard sequencer as well as programmable function keys for sending MIDI information, recalling patches and MIDI machine control (MMC). **Basic Specifications & Suggested List Price:** Main channel's feature 3 band EQs with wide frequency sweepable mid- and low's and high frequency shelving. The monitor and return sections use a two band EQ with high and low frequency shelving. Available in 16' & 24x8 configurations expandable to 32 input channels. 16 channel begins at \$4,995.

AMEK TECHNOLOGY GROUP PLC

AMEK/TAC US Operations: 10815 Burbank Blvd., North Hollywood, CA 91601; (818) 508-9788; FAX: (818) 508-8619. **Product Name:** 9098 by Rupert Neve (the designer). **Contact:** Steve Harvey, national sales mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** The 9098 console has been created by Mr. Rupert Neve in response to the extraordinary demand throughout the industry for the consoles he designed in the 1970s. 9098 is intended to implement the best aspects of his classic masterpieces of circuit design within the framework of a contemporary system architecture. The designer has sought to combine the best of the old features with the sort of performance that will convince the most exacting engineers that the contemporary enhancements are all worthwhile. **Basic Specifications & Suggested List Price:** The 9098 system spans the widest possible budget range from entry-level, modestly priced tracking consoles to full specification systems with comprehensive automation. This is accomplished by the use of a number of different modules with varying levels of sophistication in facilities and various levels of automation options.

AMEK TECHNOLOGY GROUP PLC

AMEK/TAC US Operations: 10815 Burbank Blvd., North Hollywood, CA 91601; (818) 508-9788; FAX: (818) 508-8619. **Product Name:** Big by Langley. **Contact:** Steve Harvey, national sales mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** Big, the affordable superconsole system, combines a professional automation system with an incredibly powerful recall system and in-line flexibility to give a standard package that rewrites the book on console design. Minitrue automation gives fast, accurate SMPTE time code-based control of faders and mute information, as well as 16 VCA groups. A recall system provides accurate recall of channel and return switch & pot settings. AMEK Virtual Dynamics is offered as an upgrade option which fully integrates with Minitrue. **Basic Specifications & Suggested List Price:** Two compact, steel chassis and motherboard frame works house either 28 or 44 in-line input modules, 4 stereo effects returns and an additional 4 routable stereo line inputs which double as fader-controlled subgroups. A sophisticated four-band semi-parametric EQ can be used in either mixdown or channel paths, or split between the two. Available as either 44 input for approx. \$40,000 or as 23 input for approx. \$28,000.

APPLIED RESEARCH & TECHNOLOGY (ART)

215 Tremont St., Rochester, NY 14608; (716) 436-2720. **Product Name:** Phantom Professional Series Consoles. **Contact:** Angelo Biasi, advertising & media relations. **Date Product Introduced:** 1/92. **Product Description & Applications:** Designed to work perfectly as a professional recording console or high-headroom live console. The Phantom series consoles come in 16, 24 and 32 input configurations. They feature multifunction metering, solo and muting per channel, 4 monitor sends, 4 post fader auxiliary sends, 4 master subgroups, comprehensive 4 band equalization, high isolation circuitry and phantom powering

AUDIOARTS ENGINEERING

6720 V.I.P. Pkwy., Syracuse, NY 13211; (315) 455-7740. **Product Name:** Audioarts Engineering. **Contact:** Mark Kaltman, dir. of sales. **Date Product Introduced:** 1991. **Product Description & Applications:** Audioarts® Engineering manufactures "Digital Quality" audio consoles, studio furniture, and processing equipment. The MTX series consoles fill a need where the "music store mixers" won't cut it. All MTX consoles are configured per client specifications. The MR-40 and R series audio production consoles provide audio specifications. The MR-40 and R series audio production consoles provide audio performance equal to that of digital sources. Rack-mounted processing equipment is the highest spec. performance in the industry. Audioarts® pre-engineered studio furniture will add elegance to any production facility. **Basic Specifications & Suggested List Price:** Typical console performance: Dynamic range of 113dB, frequency response of ±1/4dB (20Hz-20kHz), THD of .002%! The 4200C parametric EQ with 4 bands per channel; 10x range extender. Filters are reciprocal curve design. 2700B 1/3 octave graphic EQ; precision control and non-interactive filters. Many more models...call for product information and pricing.

BIAMP SYSTEMS

14270 NW Science Park Dr., Portland, OR 97229; (800) 826-1457; (503) 641-7287. **Product Name:** Integrity TriPower(3). **Contact:** Ron Camden, sales mgr. **Date Product Introduced:** 5/92. **Product Description & Applications:** The Biamp Integrity TriPower(3) is a powered mixing console, which provides a 12-channel mixer, two 9-band graphic equalizers and three power amplifiers in one easy-to-use package. The individual components may be assigned to various system configurations, including combined power. Discrete transistor mic/line preamps and MOSFET power amplifiers deliver excellent sonic performance. The Integrity TriPower(3) is a complete sound system in a compact unit, covered by a 5 year warranty. **Basic Specifications & Suggested List Price:** Amplifier output: 150 watts at 4 ohms (per amplifier) x3 (mono-bridged). Suggested retail \$2,499.

BIAMP SYSTEMS

14270 NW Science Park Dr., Portland, OR 97229; (800) 826-1457; (503) 641-7287. **Product Name:** SCM 7600. **Contact:** Ron Camden, sales mgr. **Product Description & Applications:** The Biamp SCM 7600 is a stereo "club" mixer, with 2 stereo phono inputs, 8 stereo line inputs and 2 mono microphone inputs. The SCM 7600 has 6 independent stereo outputs, plus subwoofer and light send outputs, to provide maximum flexibility of mixing, monitoring and recording. The SCM 7600 is designed for applications such as discos, resorts and professional DJ use. It provides control of audio signals from turntables, audio tape, video tape, laser disc and compact disc, as well as from microphones and auxiliary equipment. **Basic Specifications & Suggested List Price:** Frequency response +0/-3dB, THD <.0%, hum & noise -85dBu at 20Hz to 30kHz. \$1,499 suggested retail.

CREST CONSOLES

A DIVISION OF CREST AUDIO. 100 Eisenhower Dr., Paramus, NJ 07652; (201) 909-8700. **Product Name:** Express Series. **Contact:** Chuck Augustowski, sales mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** Crest Consoles introduces its first console series including 4 bus, 8 bus, and monitor consoles ranging from 16-input to 52-input. Advance series consoles feature 4-band sweep EQ with switchable peak/shelving characteristics on the high and low-frequency bands. All versions of the 4 and 8 bus formats include 8 aux buses. Mute scene groups and matrix systems are available on advanced series versions. **Basic Specifications & Suggested List Price:** All Crest Consoles make use of analog devices and Burr Brown active circuitry on all audio circuitry for outstanding signal performance. 27 versions of the console are available, from \$4,600 for a 16x4x2x1 standard configuration to \$30,000 for a 52x12 stereo monitor mixer.



D&R ELECTRONICS USA INC.
Axion

D&R ELECTRONICS USA INC.

Rte. 3, Box 184-A, Montgomery, TX 77356; (409) 588-3411. **Product Name:** Axion. **Contact:** Paul Westbrook, pres. **Date Product Introduced:** Summer '92. **Product Description & Applications:** The D&R Axion sound reinforcement mixing console was designed with the sound quality and mechanical construction of high-end recording consoles. Such features as 12 aux sends, full four band parametric EQ, 8 discrete buses, 8 VCAs, an extensive microprocessor-controlled mute system (SMPTE or MIDI), high resolution meters and much more. **Basic Specifications & Suggested List Price:** Elec-

—SEE LISTING TOP OF NEXT COLUMN

Iron spec are available on request. Like all D&R Consoles, the Axion has the best specs available with current technology. The Axion starts at \$60,000.

DDA

200 Sea Lane; Farmingdale, NY 11735; (516) 249-3660. Product Name: "QMR" console. Contact: Allan Nichols, sales mgr. Date Product Introduced: 6/92. Product Description & Applications: 24-track monitoring, 4 band EQ, 12 buses, 6 aux buses, aux 1 & 2 provide second input with FX return, EQ splittable to second channel input, aux 4 has direct out MIDI mute system, PFL solo or solo-in-place. Basic Specifications & Suggested List Price: \$24,900.

EUPHONIX

106478 Riverside Dr.; North Hollywood, CA 91602; (818) 766-1666. Product Name: The Cube. Contact: Andy Wild, VP sales and marketing. Date Product Introduced: AES show 1992. Product Description & Applications: The Cube is the first of a line of system expansion options for the CSII. It is a digitally controlled routing system. It can be configured to add extra aux buses, multitrack buses, mix buses and extra inputs to the CSII. It can also be configured to operate as a computer-controlled audio routing system. Basic Specifications & Suggested List Price: Prices start at \$15,000 and go up to \$100,000 for a large Routing Matrix with level control. A single Cube may accept up to 48 inputs with 48 outputs. Larger systems may be linked together to the CSII's internal buses.

FOSTEX CORPORATION

15431 Blackburn Ave.; Norwalk, CA 90650; (310) 921-1112. Product Name: DCM 100 & MIXTAB. Contact: Dave Oren, VP marketing. Date Product Introduced: 4/92. Product Description & Applications: The DCM 100 is a digitally controlled mixer with 8 stereo/mono inputs, 2 effects sends, a stereo effects return and a master output. MIXTAB is a controller that offers conventional knobs and faders, yet controls other devices that receive MIDI data. MIXTAB can control up to 3 DCM 100 mixers.



GRAHAM-PATTEN SYSTEMS INC.
D/ESAM 400 Digital Edit Suite Audio Mixer

GRAHAM-PATTEN SYSTEMS INC.

PO Box 1960; Grass Valley, CA 95945; (916) 273-8412; FAX: (916) 273-7458. Product Name: D/ESAM 400 Digital Edit Suite Audio Mixer. Contact: Tim Prouty, VP sales and marketing. Date Product Introduced: 5/92. Product Description & Applications: The D/ESAM 400 provides flexible edit-system control of audio mixing functions in a manner similar to conventional video switchers. A modular input architecture, together with powerful digital signal processing, enables full integration of digital/analogue ATRs and VTRs in a single editing suite. All channel level settings, channel/machine assignments and audio crossfades can be stored as snapshots and instantly recalled. System components comprise an assignable control surface, display module and electronics rack. Basic Specifications & Suggested List Price: D/ESAM 400 handles up to 32 analog and digital inputs, routing via a flexible virtual matrix to four analog program, four digital program and four monitor outputs. Control surface contains 12 channel faders, an I/O assignment matrix, virtual machine and logical machine functions. Options include parametric equalizer. Pro-user price is between \$18,500 (base unit) and \$21,500 (typical configuration).

GRAHAM-PATTEN SYSTEMS INC.

PO Box 1960; Grass Valley, CA 95945; (916) 273-8412; FAX: (916) 273-7458. Product Name: D/ESAM 800 Enhancements/Upgrades. Contact: Tim Prouty, VP sales and marketing. Date Product Introduced: 5/92 (NAB). Product Description & Applications: D/ESAM 800 Plus for the D/ESAM Digital Edit Suite Audio mixers includes memory management and storage enhancements, including additional RAM capacity for 900 internal registers, register management for configuring virtual machines, and a DOS-compatible disk drive for offloading register settings. Version 2.0 Operational Software is an EPROM upgrade that provides manual crossfades, auto recall of registers in sequence, auto to/from machines for enhanced auto-assembly and extended GPI control functions. Basic Specifications & Suggested List Price: D/ESAM 800 handles up to 56 analog and digital inputs, routing via a flexible Virtual Matrix to 4 analog program, 4 digital program and 4 monitor outputs. Control surface contains 12 channel faders, an I/O matrix, Virtual machine and logical machine functions. Options include parametric equalizer. Pro-user process: D/ESAM 800 \$37,200; D/MEN Plus \$3,500; V 2.0 software is free.

HARRISON BY GLW

437 Atlas Dr.; Nashville, TN 37211; (615) 331-8800. Product Name: MPC. Contact: Tom Irby, VP sales and mktg. Date Product

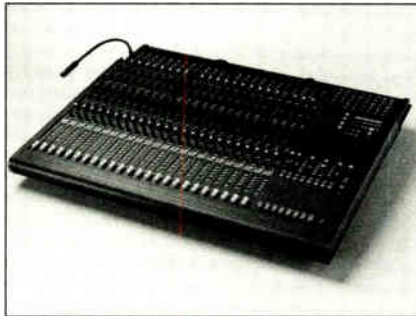
Introduced: 3/92 Product Description & Applications: The Harrison MPC is designed specifically for motion picture sound post-production mixing. The MPC is unique in that it can be totally automated and be configured in numerous physical formats to allow the system to be customized to the exact requirements of a facility. All audio processing is contained in separate racks, which may be located over 100 feet away from the control surface. The console will be shown with both analog and digital electronics. Basic Specifications & Suggested List Price: Systems may be configured from 16 to 256 input channels. Control surfaces may be configured for single, 2, or 3 mixer operation. Because of the system architecture and total automation capabilities, the MPC can handle many more input channels in the processing rack with fewer channels in the control surface. With minimal hardware and software changes, the MPC can be configured for other applications, such as television, recording and theater.

LAFONT AUDIO LABS

635 Weyburn Sq.; Pickering, ON L1V 3V3; (416) 420-3946. Product Name: Privilege film mixing console. Contact: Curt Smith, mktg. mgr. Date Product Introduced: 1/92. Product Description & Applications: Modular design film mixing console. Basic Specifications & Suggested List Price: 2 selectable line inputs per channel; stereo, front/surround and LCR pan pots, divergence control, 12 aux buses, assignable routing to 3-8 track group, 12 dual output modules for 32 or 48 track operations.

MACKIE DESIGNS

16130 Woodinville-Redmond Road NE #2; Woodinville, WA 98072; (206) 487-4333. Product Name: 16.8. Contact: Ron Koliha, advertising mgr. Date Product Introduced: 11/92. Product Description & Applications: 16x8 mixing console optimized for both studio recording and PA applications. 32 inputs, discrete low noise, high headroom mic preamps w/phantom power on all chs., 4-band EQ with parametric sweep on midrange and EQ split. In-line monitoring (effectively doubling inputs). Two assignable headphone sections. Multitrack tape outs, inserts on all channels, 6 stereo, assignable aux returns, comprehensive talkback system and much more. Basic Specifications & Suggested List Price: Suggested retail \$2999. Channel strip: noise mic E.I.N. (20Hz-20kHz)-129.0dBm; 150 ohm source; distortion 0.005% 20Hz-20kHz; gain range +6dB to +48dB; max input +14dBu; line in max input +22dBu; equalization: hi shelving, 12kHz \pm 15dB; hi mid sweep, 500Hz-18kHz \pm 15dB w/bandwidth adjustable from .05 to 3 octaves; lo mid sweep, 40Hz-2kHz \pm 15dB; lo shelving 80Hz \pm 15dB; lo cut (HPF) 75Hz 18dB/oct; tape out noise -94dBu; main section: working S/N ratio: 90dBu (ref. +4dBu), all chs assigned, ch faders at Unity Gain, max output +28dBu balanced XLR, +22dBu unbalanced 1/4-inch; frequency response 20Hz-40kHz \pm 1dB any input to any output.



MACKIE DESIGNS
24-8

MACKIE DESIGNS

16130 Woodinville-Redmond Road NE #2; Woodinville, WA 98072; (206) 487-4333. Product Name: 24.8. Contact: Ron Koliha, advertising mgr. Date Product Introduced: 11/92. Product Description & Applications: 24x8 mixing console optimized for both studio recording and P.A. applications. 48 inputs, discrete low noise, high headroom mic preamps w/phantom power on all chs., 4-band EQ with parametric sweep on midrange and EQ split. In-line monitoring (effectively doubling inputs). 2 assignable aux returns, inserts on subs, control room/studio function controls. Ultra comprehensive talkback system and much more. Basic Specifications & Suggested List Price: Suggested retail \$3599. Channel strip: noise mic E.I.N. (20Hz-20kHz)-129.0dBm; 150 ohm source; distortion 0.005% 20Hz-20kHz; gain range +6dB to +48dB; max input +14dBu; line in max input +22dBu; equalization: hi shelving, 12kHz \pm 15dB; hi mid sweep, 400Hz-18kHz \pm 15dB w/bandwidth adjustable from .05 to 3 octaves; lo mid sweep, 40Hz-2kHz \pm 15dB; lo shelving 80Hz \pm 15dB; lo cut (HPF) 75Hz 18dB/oct; tape out noise -94dBu; main section: working S/N ratio: 90dBu (ref. +4dBu), all chs assigned, ch faders at Unity Gain, max output +28dBu balanced XLR, +22dBu unbalanced 1/4-inch; frequency response 20Hz-40kHz \pm 1dB any input to any output.

MACKIE DESIGNS

16130 Woodinville-Redmond Road NE #2; Woodinville, WA 98072; (206) 487-4333. Product Name: 32.8. Contact: Ron Koliha, advertising mgr. Date Product Introduced: 11/92. Product Description & Applications: 32x8 mixing console optimized for both studio recording and P.A. applications, 64 inputs, discrete low noise, highheadroom mic preamps w/phantom power on all chs., 4-band EQ

—LISTING CONTINUED ON NEXT PAGE



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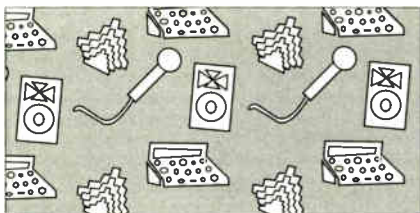
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Mixing Consoles

—LISTING CONTINUED FROM PREVIOUS PAGE

with parametric sweep on midrange and EQ split. In-line monitoring (effectively doubling inputs). Two assignable headphone sections. Multitrack tape outs, inserts on all channels, 6 stereo, assignable aux returns, inserts on subs, control room/studio function controls. Ultra-comprehensive talkback system and much more. **Basic Specifications & Suggested List Price:** Suggested retail \$4299. Channel strip: noise mic E.I.N. (20Hz-20kHz)-129.0dBm; 150 ohm source; distortion 0.005% 20Hz-20kHz; gain range +6dB to +48dB; max input +14dBu; line-in max input +22dBu; equalization: hi shelving, 12kHz ±15dB; hi mid sweep, 500Hz-18kHz ±15dB w/bandwidth adjustable from .05 to 3 octaves; lo mid sweep, 40Hz-2kHz ±15dB; lo shelving 80Hz ±15dB; lo cut (HPF) 75Hz 18dB/oct; tape out noise -94dBu; main section: working S/N ratio: 90dBu (ref: +4dBu), all chs assigned, ch faders at Unity Gain, max output +28dBu balanced XLR, +22dBu unbalanced 1/4-inch; frequency response 20Hz-40kHz ±1dB any input to any output.

MACKIE DESIGNS

16130 Woodinville-Redmond Road NE #2; Woodinville, WA 98072; (206) 487-4333. **Product Name:** Mackie CR-1604 Add-on MIDI Automation Board. **Contact:** Ron Koliha, advertising mgr. **Date Product Introduced:** 11/92. **Product Description & Applications:** Add-on MIDI automation package for Mackie CR-1604 mic/line mixer. Features include: full fader automation and muting for all 16 channels, master outputs all 4 stereo aux returns of CR-1604. Mounts internally via ribbon cables in any existing CR-1604. Exclusive "7-times MIDI speed" design provides lightning-fast response and unsurpassed resolution. Purely resistive circuitry doesn't degrade sound quality or add "zipper noise." Use alone or with Mackie assignable controllers and faders. **Basic Specifications & Suggested List Price:** Suggested retail: \$799. Frequency response: 2Hz-20kHz ±1dB; distortion: less than 0.025%, 20Hz-20kHz; dynamic range 108dB; maximum output +28dBu balanced, +22dBu unbalanced 1/4-inch.

MIDAS

200 Sea Lane; Farmingdale, NY 11735; (516) 249-3660. **Product Name:** XL316. **Contact:** Allan Nichols, sales mgr. **Date Product Introduced:** 1992. **Product Description & Applications:** All the features of the XL340 (40) input console in a 16-input frame. 18 sends per channel. **Basic Specifications & Suggested List Price:** Size: 1 meter wide. 18 sends per channel, 8 mute groups, VU meter bridge.

NEOTEK CORPORATION

1154 W. Belmont Ave.; Chicago, IL 60657; (312) 929-6699. **Product Name:** The Elan. **Contact:** Tom Lay, mktg. dir. **Date Product Introduced:** 10/92. **Product Description & Applications:** The name is the same. The console is all new. The Elan is a professional multitrack recording console designed for budget conscious facilities which demand sonic excellence. The Elan features the same rock-solid alloy frame as our other consoles, split EQ, 8 aux buses, up to 24 aux sends, comprehensive communication and central facilities. Stereo modules are available. Built-in patchbays are standard. **Basic Specifications & Suggested List Price:** Two basic frame sizes are available as standard 32 inputs and 40 inputs. Other sizes and configurations are available as options. Prices start at \$36,700 for 32 inputs, includes a patchbay.

NEOTEK CORPORATION

1154 W. Belmont Ave.; Chicago, IL 60657; (312) 929-6699. **Product Name:** The Esprit. **Contact:** Tom Lay, mktg. dir. **Date Product Introduced:** 4/92. **Product Description & Applications:** The Esprit is designed for broadcast use and features an all input design. Direct outs on each channel, extensive talkback facilities, mix A and mix B and mix minus on each channel. Input modules may double as group modules, making the Esprit a space-efficient design. Stereo modules are available. **Basic Specifications & Suggested List Price:** Neotek products are all built to order. The Esprit is available in a wide variety of frame sizes and module configurations. Prices start at \$23,900.

NEVE (SIEMENS AUDIO INC.)

7 Parklawn Dr.; Bethel, CT 06801; (203) 744-6230. **Product Name:** Neve Capricorn. **Date Product Introduced:** 4/92. **Product Description & Applications:** Capricorn is an all-digital console, providing digital audio processing throughout and total dynamic automation with real-time automation for all switches, control and faders. Capricorn system highlights include: total reset (all console controls can be reset within seconds, with set-up transferable to another console); stereo pairing (any channel may be configured for mono or stereo using the same channel strip); absolute processing parameters (all values applied to processing parameters are accurate and repeatable from channel to channel and console to console); automatic user set-up (user-defined operational set-ups may be stored for subsequent use); assignability (very rapid access total signal

processing functions with one or two keystrokes). Capricorn provides the basis for the "all-digital" studio, allowing audio signal to remain in digital form during the entire production process.

PEAVEY ELECTRONICS CORP.

711 A St.; Meridian, MS 39301; (601) 483-5365. **Product Name:** Peavey AMR Production Series 2400PB console. **Contact:** John Roberts. **Date Product Introduced:** 10/91. **Product Description & Applications:** Peavey Electronics introduces the Audio Media Research Production Series 2400PB recording console. This state-of-the-art console is available in a 32x24 standard "split" configuration with built-in 240 point "miniature TT" type patchbay. Inputs, masters and subs feature Peavey's patented Delta VU simultaneous peak and VU responding LED metering. **Basic Specifications & Suggested List Price:** 240 point miniature TT type patchbay, Delta VU simultaneous peak/VU metering, totally modular, low noise, discrete input preamps, 4-band sweepable EQ, 8 aux/Efx sends, 8 Efx returns, dual monitors, (48 channel w/2 band shelving), monochoque chassis design, gold-plated interconnects, electronically balanced input/output, fader upgradability (automation capable), external power supply.



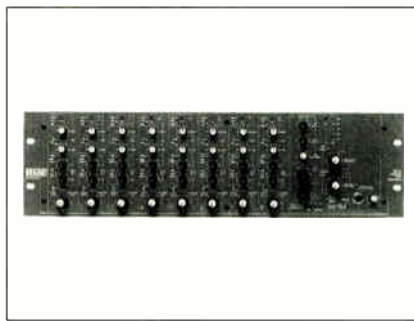
PROFESSIONAL SOUND CORPORATION
PSC M4 Audio Mixer

PROFESSIONAL SOUND CORPORATION

10643 Riverside Dr.; North Hollywood, CA 91602; (818) 760-6544. **Product Name:** PSC M4 Audio Mixer. **Contact:** Chris Palmer, sales mgr. **Date Product Introduced:** 7/92. **Product Description & Applications:** The PCS M4 stereo audio mixer provides all the features necessary to produce studio-quality recordings in the field. Its true sonic excellence and rugged design make it the perfect choice for electronic news gathering (ENG), electronic field production (EFP) and feature film productions. Additionally, the PSC M4 has the dynamic range and low noise floor required for classical music recording. **Basic Specifications & Suggested List Price:** 4 balanced transformerless inputs, 2 balanced outputs, mid side decoding, reference oscillator, high pass filters, 8 AA battery operation 20Hz-20kHz ±0.5dB, THD<0.06%, SN>131dB. Weight: 3.5 lbs. \$1,995 w/case.

RAINDIRK AUDIO

635 Weyburn Sq.; Pickering, Ontario, L1V 3V3 Canada; (416) 420-3946. **Product Name:** Raindirk recording console. **Contact:** Curt Smith, marketing mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** Symphony® Model console features full parametric EQ, 32 group in-line, in 28-to 72-channel configurations. **Basic Specifications & Suggested List Price:** 32 track routing, 8 aux outputs, 2 separate stereo outputs, group level trims.



RANE CORPORATION
CM 86 Compact Mixer

RANE CORPORATION

10802 47th Ave. W.; Mukilteo, WA 98275; (206) 355-6000. **Product Name:** CM 86 Compact Mixer. **Contact:** Ellen Allhands, sales & mktg. coord. **Date Product Introduced:** 8/92. **Product Description & Applications:** The CM86 is an 8-input, 16-output rack-mount mixer. Each input channel provides switchable mic/line 2-band EQ, 2 assignable aux sends, insert loop, phantom power and assignable master send. The output section provides master 1, master 2 and aux A/B levels, plus aux return and tape/CD input; headphone amp also included. **Basic Specifications & Suggested List Price:** 8 mic/line inputs with transformer option, XLR and barrier strip inputs and outputs, flex bus in/out, rear panel trim controls, master insert loops, 19"W x 5.25"H x 5.25"D. Assignable headphone monitor and meter. Suggested list price: \$1,299.

ROSS SYSTEMS

1316 E. Lancaster; Ft. Worth, TX 76102; (817) 336-5114. **Product Name:** RCS2402. **Contact:** Ramon West, product specialist. **Date Product Introduced:** 1/92. **Product Description & Applications:** 24 channel mixing console featuring 24 mic/line inputs, 3 band EQ, 3 aux sends, two stereo returns, PFL and channel inserts. Also provides +48VDC phantom power, output bar graph displays, (sum, monitor and tape outputs) balanced and unbalanced main outputs, headphone circuit. **Basic Specifications & Suggested List Price:** \$1,250. Mic In -130 dB, res. noise -85 dBu, freq. response 20Hz-20kHz/0 dB, crosstalk -85 dB, +48VDC phantom, gain 60 dB, THD 20Hz-20kHz .01%, max output +21dBu, nominal output +4dBm.

ROSS SYSTEMS

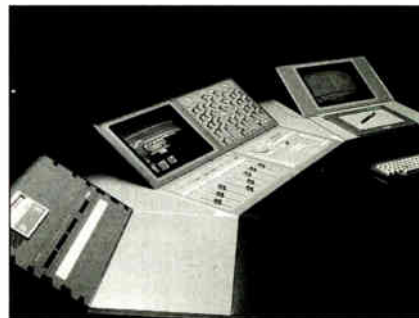
1316 E. Lancaster; Ft. Worth, TX 76102; (817) 336-5114. **Product Name:** Ross Systems MINIMIX. **Contact:** Ramon West, product specialist. **Date Product Introduced:** 7/92. **Product Description & Applications:** 19" rack-mountable mixing console provides 16 mic and line inputs, 2 band EQ, 4 aux sends, phantom power, channel mute, peak +10dB headroom indicator, PFL and 100mm faders. Output section features bar graph displays, mute switch, PFC aux master controls and headphone circuit. Perfect for live applications, recording and permanent installations. **Basic Specifications & Suggested List Price:** \$995 retail price. 16 mic/line inputs, residual noise -85dBu, THD 20Hz-20kHz .01%, freq. response 20Hz-20kHz/0dB, +48VDC phantom, crosstalk 85dB, gain 60 dB, +23dBu max output, +4dBm nominal output.



SOLID STATE LOGIC
SL 8000 G Series Multi-Format Production System

SOLID STATE LOGIC

320 W. 46th St.; New York, NY 10036; (212) 315-1111. **Product Name:** SL 8000 G Series Multi-Format Production System. **Contact:** Piers Plaskitt, CEO (N. America). **Date Product Introduced:** 10/91. **Product Description & Applications:** The SL 8000 provides the capability to mix in any release format—from stereo music to the 5/6 channel discrete mixes proposed for HDTV. These formats include: TV post-production with up to 4 stereo stripes; Dolby surround TV post-production, film post-production, from 4-stripe LCRs to multiple DMEF dubs, Dolby SR D, "3-D" sound processing systems. **Basic Specifications & Suggested List Price:** A variety of frame sizes, with optional L or U-shaped "wings." Programmable joystick panning. Additional recorder panel for 4/8-track and multitracks. Ultimition™ moving fader system. Oxygen-free cable. Total Recall.



SOLID STATE LOGIC
Scenaria

SOLID STATE LOGIC

320 W. 46th St.; New York, NY 10036; (212) 315-1111. **Product Name:** Scenaria. **Contact:** Piers Plaskitt, CEO (N. America). **Date Product Introduced:** 4/92. **Product Description & Applications:** Scenaria integrates a fully automated, 38-channel digital mixing console, 24-track random access audio recorders and random access video into a single system. Designed to simplify the recording, editing and mixing of large-scale audio post-production projects to picture, Scenaria uses random access technology to achieve this with a speed and flexibility never before imagined. **Basic Specifications & Suggested List Price:** 38-channel digital mixing console with 4-band parametric EQ, dynamics and 8 aux sends per channel. Moving fader system, 24-track random access audio recorder/editor. Random access video system. Computer controlled routing of analog/digital audio and serial control. Comprehensive machine control capabilities.

SOUNDCRAFT

8500 Balboa Blvd.; Northridge, CA 91329; (818) 893-4351. **Product Name:** Venue Theatre. **Contact:** Gary Lynn, product development mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** The Venue Theatre has been designed for the specific requirements of theatre sound with a new sophisticated input module compatible with the updated and restyled 8-bus Venue II. Features include illuminated switches for clear status control, four mute groups, individual routing and an input bar graph meter. An unlimited number of theatre input modules may be specified within 16-, 24-, 32- and 40-input frame sizes, with or without an LED meter bridge.

SOUNDCRAFT

8500 Balboa Blvd.; Northridge, CA 91329; (818) 893-4351. **Product Name:** Vienna Console. **Contact:** Gary Lynn, product development mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** The Vienna is an 8-bus console with 8 auxiliary sends, 8 VCA subgroups, 9 mute groups and 8 stereo effect returns. Each input has a four band sweepable EQ with two position Q and PEAK/Shelf switches on selected bands. A 16-segment input meter is located in the meter bridge. Each of the stereo effects returns can be routed to any pair of the 8 audio subgroups along with the main left/right and mono buses. The VCA Grouping system allows several channels to be placed under the control of one VCA group fader. The Vienna has options for an 11 by 8 matrix and console linking.

SOUNDRACCS PLC

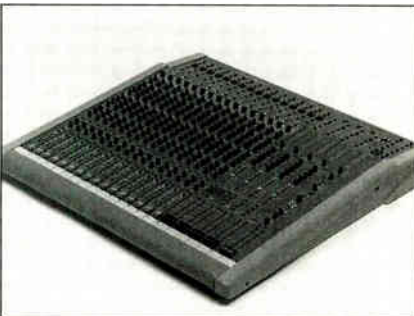
91 Ewell Rd.; Surbiton, Surrey, KT6 6AH, England; (44) 081-399-3392. **Product Name:** Jade. **Contact:** Peter Jostins, technical sales mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Jade Production console combines the finest audio quality with the speed and precision of DSP and microprocessor technology. Features fader automation on both channels and monitors, mute automation on all inputs plus dynamic gate processors on every channel. Also features the unique FAB™ parametric EQ on all channels. Available for a multiplicity of applications including music production, video post-production, broadcast and TV. **Basic Specifications & Suggested List Price:** Available in a number of permutations and frame sizes from 24 channels without patchbay automation or gates (provisional cost: £17,995) to 48 channels complete with automation, gates and patchbay (provisional cost £33,500).

SOUNDRACCS PLC

91 Ewell Rd.; Surbiton, Surrey, KT6 6AH, England; (44) 081-399-3392. **Product Name:** Solo Logic. **Contact:** Peter Jostins, technical sales mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** The Solo Logic forms part of the remarkable new Solo range of consoles. This 8 bus recording console features full built-in fader automation which is frame accurate for faders, half frame accurate for mutes and uses a 12-bit fader system. Utilizing an in-line monitoring format on each channel, the number of inputs are doubled on mixdown. Both the input and the monitor have access to the precise Soundtracs 4-band EQ, plus the 6 auxiliary sends. **Basic Specifications & Suggested List Price:** Available with 16, 24 or 32 inputs. Prices unavailable as yet. However, Solo MIDI (same features as Solo Logic without the automation) prices are as follows: 16x8x16 £2,550; 24x8x24 £3,220; 32x8x32 £3,826 (provisional).

SPECK ELECTRONICS

925 S. Main St.; Fallbrook, CA 92028; (619) 723-4281. **Product Name:** XTRAMIX. **Date Product Introduced:** 1/92. **Product Description & Applications:** A rack-mount, ultra-compact synth and sampler mixer with 40 inputs, 8 subgroup outputs, 8 effect sends and returns and complete master section, all in 4 rackspaces. Each stereo input channel has 8 subgroup assign, 8 effect sends, stereo level, pan, stereo/mono select, high/low level select, in-place solo, and presence of signal indicator. The XTRAMIX includes 8 stereo effects returns, an 8x2 monitor mix section, 8 subgroup master controls, stereo program master, monitor and headphone master, and cue and aux returns. **Basic Specifications & Suggested List Price:** Price \$3,295.



STUDIOMASTER
P7

STUDIOMASTER

3941 Miraloma Ave.; Anaheim, CA 92807; (714) 524-2227. **Product Name:** P7. **Contact:** Jim Giordano. **Date Product Introduced:** 10/92. **Product Description & Applications:** 16x8x16x2 recording console featuring 4 band EQ with dual mid sweeps, EQ defeat, in-line monitoring, direct outs, EQ splits, input swap switch, 6 aux sends,

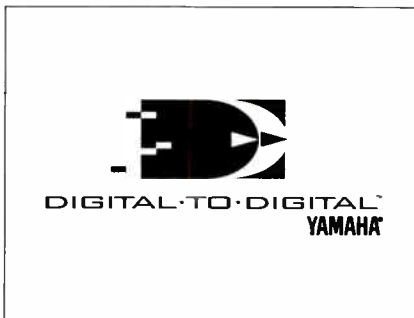
4 stereo returns, dual control room monitor sends, 4 mute groups. Onboard MIDI controls muting of all input channels, tape monitors, 4 aux sends and can store up to 99 scenes which can be recalled manually or via MIDI program change. Expandable to 40 inputs via 3x8 channel expanders providing up to 88 equalized inputs and 40-track capability. **Basic Specifications & Suggested List Price:** THD: -86dB, EIN: -128dB, frequency response 30Hz-20kHz, signal to noise: -89dB (avg.). List price: 16x8x16—\$4,195; 24x8x16—\$5,820; 32x8x16—\$7,445; 40x8x16—\$9,070. All configurations include EP-6 external power supply (rack-mount).

TRIDENT AUDIO USA

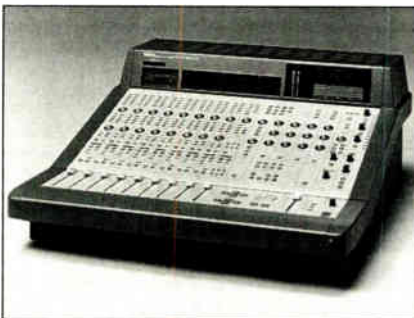
2720 Monterey St., Ste. 403; Torrance, CA 90503; (310) 533-8900. **Product Name:** Trident Ninety. **Contact:** Phil Wagner, sales mgr. **Date Product Introduced:** 10/92. **Product Description & Applications:** The Trident Ninety series was unveiled for the first time at the June APRS show in London. This 40- and 56-input, 24 bus, in-line console features three inputs per module, each with EQ and 12 aux sends. The Series Ninety is standard with VCA automation for main and monitor fader with optional moving faders on main. Twelve automated switches per module and machine control are also included. Please call for updated information. Price: \$95,000 to \$179,000. Includes bargraph meters.

TWECOMM

107 Rydal Ln.; Pittsburgh, PA 15237; (412) 363-8770. **Product Name:** Twecomm Redundant Power Supply Adaptor. **Contact:** Terry Kulchar, pres. **Date Product Introduced:** 9/91. **Product Description & Applications:** Redundant power supply adaptor allows popular mixing consoles to operate from 2 power supplies simultaneously. Supply changeover is seamless, noise free and fully automatic. Front panel LED status indicators and test jacks provided allow convenient metering of all supply parameters under "actual load" conditions. Units provided with all necessary interconnect cables. All connectors are pin for pin compatible for specified console. Models are specifically designed for the console they serve. **Basic Specifications & Suggested List Price:** All models rack-mount 1, 3/4" high. Models available for Yamaha PM3000, PM1800, PM2800, PM1200, all Ramra WR and C-900 series consoles. Soon available for Yamaha PM4000, Soundcraft Europa, Venice & Venue. Suggested list prices start at \$680.



YAMAHA CORP OF AMERICA



YAMAHA CORP OF AMERICA
DMC1000 Digital Mixing Console

YAMAHA CORP OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. **Product Name:** DMC1000 Digital Mixing Console. **Contact:** Peter Chaikin, sales & mktg. mgr., prof. digital products. **Date Product Introduced:** 8/91, upgraded for 92/93. **Product Description & Applications:** 22-input digital audio production console for recording, audio-for-picture, and CD mastering applications. Permits all-digital production when interfaced with professional digital multitracks, disk recorders, digital VTRs and Yamaha DRU8 20-bit digital recorder. Features: on-board interface to professional digital I/O formats, dynamic automation and "snap-shot" reset of all console parameters, RS422 editor interface, 100mm touch-sensitive motorized faders, 2 on-board digital effect units, 4 aux sends (2 mono, 1 stereo, digital and 20 bit analog). Multiple units may be cascaded to provide more inputs. New for '93: Project Manager software provides Macintosh control and display of all console parameters. FMC9 format converter converts eight DMC1000 monitor inputs to

—LISTING CONTINUED ON NEXT PAGE

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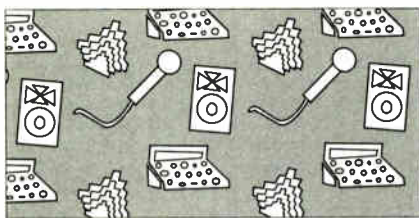
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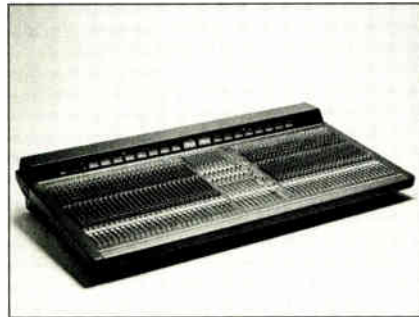
Mixing Consoles

—LISTING CONTINUED FROM PREVIOUS PAGE

AES/EBU format. Version 2.0 software extends console capabilities. **Basic Specifications & Suggested List Price:** 22 inputs, 10 buses, 4 aux, 4 band EQ (each band 20Hz-20kHz) up to 32-bit internal resolution, 1 frequency response 20Hz-20kHz, external optional A/D converter (AD8X 19-bit delta-sigma encoding), external D/A converter (DA8X 20-bit), suggested retail price: \$34,000.

YAMAHA CORP OF AMERICA

6600 Orangethorpe Ave., Buena Park, CA 90620; (714) 522-9011. **Product Name:** MC Series Mixing Consoles. **Contact:** Peter Chaikin, sales & mktg. mgr., prof. digital products. **Date Product Introduced:** 1/92. **Product Description & Applications:** The second generation of the MC04 series mixing consoles from Yamaha. Features include 4 subgroups plus stereo, with direct stereo assign and channel on/off, 4 auxiliary sends, 4-band EQ with 80Hz HPF, 2 mix matrices, 2 stereo auxiliary returns, 2 stereo tape auxiliaries 1 and 2 and stereo outputs are balanced +4dB, inserts are 0dB. Full metering of inputs, subgroups, matrices, auxiliary returns and stereo outputs. **Basic Specifications & Suggested List Price:** The MC1204II is \$3,100; MC1604II is \$3,600; MC2404II is \$4,300 and the MC3204II is \$5,800. The monitor versions (MC2410M and MC3210M)TBA.



YAMAHA CORP OF AMERICA
PM4000 Mixing Console

YAMAHA CORP OF AMERICA

6600 Orangethorpe Ave., Buena Park, CA 90620; (714) 522-9011. **Product Name:** PM4000 Mixing Console. **Contact:** Don Bowles, mktg. support manager. **Date Product Introduced:** 11/91. **Product Description & Applications:** Yamaha's fourth generation of PM mixing consoles. Features include 8 VCA subgroups, VCA mutes, program mutes and mix matrices, 4 full function stereo input modules, 2 stereo monitor outputs, 4-band parametric equalization with variable HPF. Balanced inputs/outputs (transformer optional); all output levels are +4dB. Direct outputs on all mono input channels, 12 mono (or 8 mono/2 stereo) aux sends with on/off and pre/post assignments. Full metering of all inputs/outputs. **Basic Specifications & Suggested List Price:** Additional stereo input modules may be added by removing mono input modules, maximum of 28 total stereo modules per mainframe. The PM4000-24 (special order only) is \$46,000, PM4000-32 is \$51,000, PM4000-40 is \$57,000 and the PM4000-48 is \$65,000. The monitor versions (PM4000M-44 and the PM4000M-52) TBA.

YORKVILLE SOUND

4600 Wilmer Industrial Estate, Unit #1; Niagara Falls, NY 14305; (716) 297-2920. **Product Name:** AudioPro 1216. **Contact:** Bud Mayer. **Date Product Introduced:** 6/92. **Product Description & Applications:** The AP-1216 is a compact, full featured 16 channel powered mixing console. It uses the same high-efficiency design as the Yorkville AP-1200 power amp, enabling it to deliver up to 1200 watts stereo. Other features include: 16-bit Alesis digital effects processor, speaker processor with 2 EQ curves and self-correcting hum reduction for automatic unbalanced/balanced line output compatibility. **Basic Specifications & Suggested List Price:** 16x2x1, 2 fx sends (1 internal, 1 ext. w/stereo returns), 2 monitor sends, fully buffered channel inserts, freq. resp. 20Hz-25kHz, THD -0.05%, S/N 124dB, main EQ 9 band stereo graphic, mon. EQ 9 band graphic, 48V phantom power, 600W/ch. cont. avg. at 2 ohms, 2 year unlimited transferable warranty. List price \$2,699.

Pro Audio dictionaries and technical reference guides are available through the Mix Bookshelf catalog. Call toll-free (800) 233-9604 for your free copy.

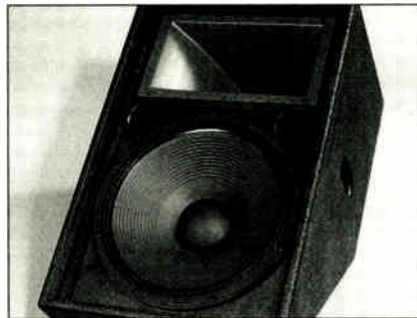
MONITORS AND LOUSPEAKERS

APOGEE SOUND INC.

1150 Industrial Dr., Petaluma, CA 94952; (707) 778-8887. **Product Name:** AE-1 Series 2. **Contact:** Barry Ray Luz, director of marketing. **Date Product Introduced:** 1/92. **Product Description & Applications:** The AE-1S2 is a compact loudspeaker of two-way design, single-amped, wide-range system suitable for near-field monitoring, boardroom-type installations and delay fill in theaters or churches. **Basic Specifications & Suggested List Price:** Suggested list: \$645. Frequency response: 63Hz to 19kHz ±3dB. Dispersion: 90° horizontal, 90° vertical. Maximum output: 110dB continuous. Maximum power handling: 60 watts continuous. One 8" woofer, one 1" titanium dome tweeter.

APOGEE SOUND INC.

1150 Industrial Dr., Petaluma, CA 94952; (707) 778-8887. **Product Name:** AE-2 Series 2. **Contact:** Barry Ray Luz, director of marketing. **Date Product Introduced:** 1/92. **Product Description & Applications:** The AE-2S2 wide-angle loudspeaker is a two-way, single-amped system utilizing electronic control for improved performance. Its low-profile, wide-angle design is particularly suited for under-balcony and over-balcony fill, low-ceilinged meeting rooms and fan-shaped churches. **Basic Specifications & Suggested List Price:** Suggested list: \$1,205. Frequency response: 63Hz to 19kHz ±3dB. Dispersion: 165° horizontal, 45° vertical. Maximum output: 114dB continuous. Maximum power handling 120W continuous. Two 8" woofers, two 1" spheroid-ellipsoidal horns.



ARX SYSTEMS
PowerMax4 Monitor

ARX SYSTEMS

PO Box 842; Silverado, CA 92676; (714) 649-2346. **Product Name:** PowerMax4 Monitor. **Contact:** Algis Renkus. **Date Product Introduced:** 1992. **Product Description & Applications:** The new PowerMax 4 full-range monitor loudspeaker features the new ARX HPB15 high-excursion, low-frequency driver and the EXF16 high-frequency compression driver. The PowerMax 4 utilizes an all-new Linkwitz-Riley 24dB passive crossover to ensure phase coherence through the crossover region. The PowerMax 4 is a concert profile monitor with an operating angle of 45° and, like the rest of the PowerMax range is finished in ARX's new non-skid Duratex finish. The PowerMax 4 is designed to be used with the PowerPro Loudspeaker System Processor, which offers ARX's innovative ISC system protection, phase and frequency correction, plus balanced XLR inputs and XLR outputs.

AUDIENCE

1848 W. First St., San Pedro, CA 90732; (310) 521-0033; FAX: (310) 521-0485. **Product Name:** The Mikro Loudspeaker System. **Contact:** Richard A. Smith, pres. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Mikro loudspeaker system is one of the smallest loudspeaker systems able to reproduce the full range of audio frequencies. The accurate tonal balance provided by the Mikro System allows the most natural reproduction of your musical sources possible in such a small, low-cost loudspeaker system. The finest inductors and capacitors available are used in the filter network (SideralKaps, PLW inductors). May be used as near- or far-field monitor. This diminutive loudspeaker is the finest close-field monitor available. **Basic Specifications & Suggested List Price:** Mikro loudspeakers: 8 ohm impedance nominal, 5 ohms minimum. Heavy duty 5-way binding post connectors. Heavily braced, die-cast aluminum cabinet. 6 lbs. each. 7"H x 4 1/2"W x 4"D. Optional Mikro Bass module: 8 ohms nominal, 3 ohms minimum. Heavy duty 5-way binding post, 33 lbs. each. Mikro loudspeaker system may be console-mounted, or optional stands available.

AUDIX CORPORATION

19439 SW 90th Ct., Tualatin, OR 97062; (503) 692-4426. **Product Name:** PM-5. **Contact:** Clifford Castle. **Date Product Introduced:** 7/92. **Product Description & Applications:** Self-powered studio monitors for digital workstations, keyboards, studio and broadcast. Operates on 12-16VDC which enables remote use as well as fixed. Made in U.S.A. **Basic Specifications & Suggested List Price:** Type: near-field reference monitor-pair. Power: 25W per side. Size: 9"x6"x9". Response: 50-18K. Imp: 4 ohm. Sensitivity: 88dB. Price: \$429/pr.

BAG END LOUSPEAKER SYSTEMS

PO Box 488; Barrington, IL 60011; (708) 382-4550. **Product Name:** ELF® (Extended Low Frequency) Loudspeaker System. **Contact:** Jim Wischmeyer, pres. **Date Product Introduced:** 5/91, re-intro-

duced 1/92. **Product Description & Applications:** Extended low frequency system. First significant breakthrough in low-frequency sound reproduction in 40 years. Single or double transducers and two-channel, state-of-the-art, microprocessor-driven loudspeaker controller. ELF incorporates dual integrators, active equalization, frequency dividing, and system protection limiters. Great sounding, musical sounding bass in small enclosures. Applications: sound reinforcement, DJ systems, bass guitar, synthesizer, electronic drums, nightclubs, theater, studios. **Basic Specifications & Suggested List Price:** Price: ELF-1 Integrator: \$2,388. S18E cabinet: \$598 each. D18 E-R cabinet: \$1,490. D18-E cabinet: \$1,232. Output 10V RMS; input 10V RMS; input common mode rejection >70dB; MOOE: stereo/oval; signal present threshold: above -20dB RS-232dB-25; frequency limit 8-80Hz, highpass filter frequency: 50-250Hz; high-pass filter slopes: 0, 12, 24dB/octave.

BAG END LOUSPEAKER SYSTEMS

PO Box 488; Barrington, IL 60011; (708) 382-4550. **Product Name:** TA15-I. **Contact:** Jim Wischmeyer, pres. **Date Product Introduced:** 1/92. **Product Description & Applications:** High-fidelity, high-efficiency loudspeaker system adaptable to diverse professional applications. Offers remarkable acoustic integrity with unparalleled performance and reliability. Bag End utilizes the time-alignment system to create lifelike sound and unsurpassed transient response while minimizing listener fatigue. Features: constant directivity coverage, uniform frequency response, minimum EQ required, superb construction. Applications: churches, theater, studios, nightclubs, auditoriums, bass guitar, electronic drums, DJ systems, synthesizers. **Basic Specifications & Suggested List Price:** Prices: TA15-I \$916, TA15-C \$916, TA15-CF \$916, TA15-B \$1,026, TA15-BF \$1,026. Frequency response: ±3dB 50Hz to 19kHz. Dispersion: ±3dB 90° horizontal x 40° vertical. Sensitivity: 1 watt for 103dB SPL at 1 meter. Enclosure tuning: 40Hz. Power recommended: 400W max. Power handling: 200 watts continuous sine wave, 800 watts instantaneous peak. Impedance: 8 ohms full range.

BARBETTA INC.

5301 Commerce Ave. #4; Moorpark, CA 93021; (805) 529-3607. **Product Name:** HA-1. **Contact:** Victor Deanglelis, sales. **Date Product Introduced:** 8/92. **Product Description & Applications:** Two-way bi-amplified active speaker system. High acoustic accuracy for studio monitor applications. Accepts line level inputs to built-in amplifiers. 10" woofer and 1" dome tweeter. **Basic Specifications & Suggested List Price:** 200 watts total power. MOSFET power amps and precision low-level crossover system. ±2dB from 41Hz to 20kHz.



CADPRO CHICAGO INCORPORATED
Audigo

CADPRO CHICAGO INCORPORATED

2525 E. Oakton, Ste. C33; Arlington Heights, IL 60005; (708) 640-1853. **Product Name:** Audigo. **Contact:** Paul F. Bergetz, prod. mgr. **Date Product Introduced:** 2/92. **Product Description & Applications:** Near-field reference monitors designed to complement workstations used for hard disk recording and digital media productions. The enclosure is constructed of MDF and cast epoxy using a dual-tapered transmission line. The drivers are set in a closely coupled, linear-phase, mirror-image group radiating forward. Low-frequency resonance is tunable from 34-44Hz. Driver array integrates a Morel MDT33 tweeter crossed at 4,000Hz with a DynAudio D52AF midrange crossed at 1,000Hz to the low frequency driver, an Audigo LFM8. **Basic Specifications & Suggested List Price:** FR: 50Hz to 15kHz ±2.5dB at 100dB. Maximum SPL 110dB, 1 meter on axis. THD >1%. Impedance >4 ohms. Power: 100 watts minimum, 500 watts maximum. Dimensions 14.8"H x 10.8"W x 14"D. Weight 40lbs. Bi-amps terminals included. Optional passive magnetic radiation shields to inhibit video monitor distortion. Priced from \$4,000 a pair. (Model A-i-nms until 12/31/92).

CALIBRATION STANDARD INSTRUMENTS

PO Box 2727; Oakland, CA 94602; (510) 531-8725. **Product Name:** B18. **Contact:** Edward M. Long. **Date Product Introduced:** 6/92. **Product Description & Applications:** The B18 subwoofer system consists of an E.M. Long LF460 18" driver in a very small enclosure. It is designed to be used with the HLE2 ELF™ Electronics. The B18 is unusual because it produces flat acoustical output and high SPL down to 30Hz with an enclosure of only 2 cubic feet. This is possible because of the ELF™ technology and the large excursion and power handling capability of the LF460.

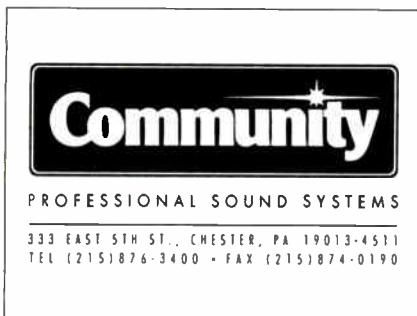
CIRCUITS MAXIMUS COMPANY INC.

214 N. Park Dr.; Arlington, VA 22203; (703) 276-0125; FAX: (703) 522-0864. **Product Name:** C:MAX Wired Monitor System. **Contact:**

Larry D. Droppa, pres. **Date Product Introduced:** 7/92. **Product Description & Applications:** The C:MAX wired monitor system has been developed to provide high-quality audio monitoring through the use of in-the-ear transducers. By providing several parameters under the wearer's control, the monitoring environment can be maintained day after day. Feedback with this system is nearly impossible! Visually, the system is hard to detect by an observer. Yet the wearer can hear with an accuracy previously unobtainable on a performance stage. **Basic Specifications & Suggested List Price:** Frequency response: 40-20kHz ± 2 dB (XLR to output). Maximum input +20dB. THD 0.1% maximum at full load. Suggested list \$1,049.

CIRCUITS MAXIMUS COMPANY INC.

214 N. Park Dr.; Arlington, VA 22203; (703) 276-0125; FAX: (703) 522-0864. **Product Name:** ITE-20 Wearable Monitors. **Contact:** Larry D. Droppa, pres. **Date Product Introduced:** 1992. **Product Description & Applications:** ITE-20s are high-quality monitors in a small wearable package. Designed by leading research audiologists, they create a listening chamber within the ear canal with a response of 80-15,000Hz. When the devices are in place they are unobtrusive, comfortable and virtually invisible. ITE-20s are available in either brown or beige. Single earpiece models are also available for broadcast IFB use. **Basic Specifications & Suggested List Price:** Constructed of injection-molded plastic and non-allergenic silicone. Frequency response 80-15,000 Hz. Nominal impedance 22 ohms. Suggested list \$738.



COMMUNITY PROFESSIONAL SOUND SYSTEMS
N-Series FB

COMMUNITY PROFESSIONAL SOUND

333 E. Fifth St.; Chester, PA 19013-4511; (215) 876-3400. **Product Name:** N-Series FB. **Contact:** Doug Wilkens, director of sales. **Date Product Introduced:** 1992. **Product Description & Applications:** Community N-Series FB, a near-field system capable of delivering exceptional bass performance, utilizes a 3-way Wavefront Coherent™ design incorporating a true long-exursion subwoofer unit. Built for A/V contractors, nightclub entertainment systems, and any other applications specifying strong bass response. **Basic Specifications & Suggested List Price:** LF 1-12", MF 2-6 1/2", HF cabinet size: 26-1/2"x18-1/4"x14-1/4". Weight: 75 lbs. Imped.: 8 ohms, power rating: 200W continuous. Pink noise: 500W program, freq. range: 45Hz to 18kHz, ± 3 dB, sensitivity 101dB SPL 1W/1M. Cabinet complete with rigging. List price: \$1,340.

COMMUNITY PROFESSIONAL SOUND

333 E. Fifth St.; Chester, PA 19013-4511; (215) 876-3400. **Product Name:** RS Jr. Microarray™. **Contact:** Doug Wilkens, director of sales. **Date Product Introduced:** 1992. **Product Description & Applications:** Community's new RS Jr. MicroArray™ is a 2-way fully horn-loaded trapezoidal loudspeaker system. Ideally suited for providing natural-sounding and intelligible voice reinforcement in flying arrays, the enclosure is the perfect complement for churches, nightclubs and under-balcony downfill. **Basic Specifications & Suggested List Price:** LF 2-6 1/2", HF 1-1"; cabinet complete with rigging. Cabinet size: 21"x11-1/4"x11-1/4"; weight: 38 lbs. Imped.: 8 ohms; power rating: 120W continuous, 300W program; sensitivity: 101dB between 100Hz and 18kHz. Freq. Range: 100Hz to 18kHz ± 3 dB. List price: \$745.

CURTIS AUDIO SYSTEMS

28-30 N. Main St.; Three Rivers, MI 49093; (616) 273-2205. **Product Name:** Curtis Audio Systems Loudspeakers. **Contact:** Jim Curtis, owner and designer. **Date Product Introduced:** 12/91. **Product Description & Applications:** Curtis Audio Systems produces a line of loudspeakers for live sound reinforcement. Included are full range systems, floor monitors and low frequency units. **Basic Specifications & Suggested List Price:** Full range enclosures are available with 12" or 15" low frequency drivers in 2- and 3-way configurations, starting at \$229. Floor monitors also start at \$229.

DIGITAL DESIGNS

100 N. Quapah, Ste. K; Oklahoma City, OK 73107-6631; (405) 946-4500. **Product Name:** Digital Designs Club Series. **Contact:** Alice Sandhu, sales and marketing. **Date Product Introduced:** 6/92. **Product Description & Applications:** The CS monitors offer high definition and smooth response normally associated with studio monitors. The design uses a wide bandwidth, 10" polypropylene cone, mid-bass driver, crossed over to a slot-loaded, 1.5" aluminum dome compression tweeter without the harshness of midrange horns. These monitors play at loud levels while remaining smooth, clear and undistorted. Ideal for situations where studio-quality sound is needed at high volume levels. Vocal reproduction is un-

surpassed, bass is tight and clear. **Basic Specifications & Suggested List Price:** DDCS-110C: \$407/each; freq. response: ± 3 dB, 42-18kHz; efficiency: 95dB (1W/1M); dispersion: -6dB, 120°H x 40°V; 150W RMS max; single 10" woofer. DDCS-210C: \$531/each; freq. response: ± 3 dB 38-18k Hz, dispersion: -6dB, 120°H x 40° V; 250W RMS max.; dual 10" woofers.

DIGITAL DESIGNS

100 N. Quapah, Ste. K; Oklahoma City, OK 73107-6631; (405) 946-4500. **Product Name:** Digital Designs Vocal Monitors, Models DDVM 4.5, DDVM24.5, DDVM26.5C. **Contact:** Alice Sandhu, sales and marketing. **Date Product Introduced:** 8/92. **Product Description & Applications:** The VM Series are miniature wedge monitors designed to reproduce detailed speech and vocals. The small size makes the VM Series truly unobtrusive, ideal for applications when monitors need to be heard but not seen. These monitors utilize cast-frame, low-moving mass components to achieve high volume levels, wide bandwidths and high intelligibility. These wedges have been designed with durability in mind because of their exposure to accidental misuse on the job. **Basic Specifications & Suggested List Price:** DDVM 4.5 (2) 4.5" drivers w/13 oz. magnets and 1.2" Kapton edge-wound voice coils; freq. response, ± 3 dB, 100-16 kHz; efficiency: 95dB 1W/1M; power handling 100W continuous. DDVM26.5C: (2) 6.5" drivers w/30 oz. magnets and 1.2" Kapton edge-wound voice coils; 1.5" compression driver; freq. response ± 3 dB 80-18 kHz; efficiency 95dB 1W/1M; power handling 200W continuous.

EASTERN ACOUSTIC WORKS INC.

One Main St.; Whitinsville, MA 01588; (508) 234-6158; FAX: (508) 234-8251. **Product Name:** MH Series Mid-High Installation Systems. **Contact:** Beverly Brignolo-Seidler, director of sales operations. **Product Description & Applications:** For the first time, acoustical consultants can bring the proven solutions of EAW's Virtual Array™ technology to bear on the problems of large and/or difficult venues. Horn-loaded MH Series mid/high-frequency systems employ large vertical mouth sizes for precisely defined vertical dispersion, along with the consistent horizontal coverage for which VA™ systems are known worldwide. The results are excellent intelligibility and high-definition music reproduction. The MH662 and MH660 provide nominal (-6dB) 60° horizontal coverage with 40° vertical dispersion. The MH690 provide 90° horizontal and 40° vertical coverage. All are designed to be used with EAW's SB and BH Series subwoofers and MX Series integrated crossover/controllers.

EASTERN ACOUSTIC WORKS INC.

One Main St.; Whitinsville, MA 01588; (508) 234-6158; FAX: (508) 234-8251. **Product Name:** MS103 and MS63 Ultimate Fidelity Near-Field System. **Contact:** Beverly Brignolo-Seidler, director of sales operations. **Product Description & Applications:** These advanced designs are true three-way systems incorporating a 12" (MS63) or 15" (MS103) woofer, a 6" carbon fiber midrange cone driver, and a waveguide-coupled soft-dome tweeter, chosen for high internal damping and low distortion. To maintain dispersion at a constant 120° from 500Hz up, the MX Series tweeter is coupled to the air using a specially designed WGP™ waveguide. Spectral balance is maintained throughout the entire soundfield, producing stunningly natural reproduction. A carbon fiber midrange cone, minimum diffraction baffle, asymmetrical crossover filters and other innovations are added evidence of the MS Series' uncompromising quest for ultimate fidelity at high SPLs. Durability hasn't been ignored either. Enclosure construction lives up to EAW's exacting standards.

ECLIPSE RESEARCH CORPORATION

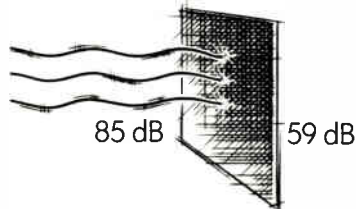
PO Box 8299; Incline Village, NV 89452; (702) 832-0666. **Product Name:** Eclipse OS. **Contact:** Jim Walters, nat'l sales. **Date Product Introduced:** 4/92. **Product Description & Applications:** High-output, omni-directional speaker systems which are weatherproof, vandal and theft resistant. Systems utilize large-format coaxial transducers in a high pressure, 360° waveguide manifold. Dual laminate composite, parabolic cabinet structure. "Durastone" add-on architectural protective shells. Applications include: theme parks, water parks and marine applications, theaters, arenas, hotels, airports, etc. Standard models come with 12" coaxial and 1" compression driver. HP Models use 15" coax and 2" driver. **Basic Specifications & Suggested List Price:** Model 2000: 40-15 kHz response, 360/180° pattern, 125 dB, 250 watt/RMS, \$1,899. Model 2000-C: 40-15 kHz response, 360/125° pattern, 125 dB, 250 watt/RMS, \$2,289. Model 2000-S: 40-15 kHz response, 360/360° pattern, 128 dB, 500 watt/RMS, \$3,948. "HP" indicates 15" coaxial transducer w/2" compression driver, high-power upgrade for all above models. 2000HP: \$2,349. 2000CHP: \$2,739. 2000SHP: \$4,848.

ELECTROMAN

PD Box 24474; New Orleans, LA 70184; (504) 488-7021. **Product Name:** Flame Speaker. **Date Product Introduced:** 1/92. **Product Description & Applications:** Finally, a speaker with no moving parts! Omnidirectional sound, with higher frequency response than conventional loudspeakers. No diaphragm or voice coil. **Basic Specifications & Suggested List Price:** Plans, \$10.

FRAZIER

Rte. 3, Box 319; Morrilton, AR 72110-9532; (501) 727-5543. **Product Name:** CAT 60 Family Subwoofer. **Contact:** James R. Truelsen, VP sales and marketing. **Date Product Introduced:** 4/92. **Product Description & Applications:** Open doors to more venues using full-bandwidth CAT 70/subwoofer systems. High-powered arrays featuring subs offer clean low-end performance below 30 Hz. As with other large venue systems, secure mounting is simplified when optional D-ringing hardware is used. **Basic Specifications & Suggested List Price:** 18" Biampable systems subwoofer. Suggested retail \$975.



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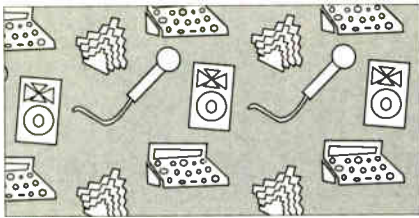
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Monitors and Loudspeakers

FRAZIER

Rte. 3, Box 319; Morrilton, AR 72110-9532; (501) 727-5543. Product Name: CAT 76. Contact: James R. Truelsen, VP sales and marketing. Date Product Introduced: 4/92. Product Description & Applications: The CAT 70 family design philosophy: unique among the large format coaxials, each CAT 70 Series loudspeaker is a fully engineered coincident system with nearly two decades of uniform pattern control. Each model is virtually identical in physical size, time center geometry, and rigging configuration. Thus, venue ensembles can be readily formed with unprecedented alignment accuracy with no requirement for electronic delay units and no custom rigging adapters. Basic Specifications & Suggested List Price: CAT 76: 60" x 40"; 104 dB SPL 1W/1M; 125 Hz-15 kHz (± 3 dB); 200 watts (AES); 95 lbs.; suggested retail \$2,416.

FUTURE SONICS INC.

655 Danbury Ct.; Newtown, PA 18940; (215) 579-4414. Product Name: Ear Monitors™. Date Product Introduced: late 1991. Product Description & Applications: Following ten years of development, studio-quality live monitoring is now available with Ear Monitors by Future Sonics Inc. Designed to help reduce the industry-related risks of hearing and vocal fatigue, Ear Monitors can help reduce excessive stage volume levels and the ear-damaging feedback frequencies associated with traditional monitor systems. The individually fitted custom earpieces are cosmetically designed to be virtually invisible from just a few feet away, and the high-fidelity mix is consistent in any performing environment. Major artists and engineers around the world have come to rely on the superior audio quality and artistic freedom made possible by this reliable and compact system.

GALAXY AUDIO

625 E. Pawnee; Wichita, KS 67211; (316) 263-2852; (800) 369-7768; FAX: (316) 263-0642. Product Name: Hot Spot PM. Contact: G.L. Graves, prod. coord. Date Product Introduced: 4/92. Product Description & Applications: Hot Spot, compact loudspeaker, for permanent installation paging, P.A. and music systems, features two 5" speakers housed in a high-impact ABS plastic case with durable metal grill. Available options include: 70- or 100-volt transformer with rotary switch selectable taps from 3 to 50 watts, a wall/ceiling swivel bracket, a choice of black, white, or easily painted primer grey finish and weather-resistant speaker treatment. Basic Specifications & Suggested List Price: Frequency response: 150 Hz-15 kHz, power handling: 120 W, sensitivity: 96 dB, max SPL: (120 W @ 5 meter) 117 dB. Input connection: binding posts. Dimensions: 6.75"x10.94"x6". Suggested retail (basic model PM): \$159, brackets \$39 each. Transformer option: \$79/cabinet, finish option \$29/cabinet, weather-resistant treatment: \$5.89/cabinet.

GALAXY AUDIO

625 E. Pawnee; Wichita, KS 67211; (316) 263-2852; (800) 369-7768; FAX: (316) 263-0642. Product Name: Pro Spot 2H. Contact: G.L. Graves, prod. coord. Date Product Introduced: 4/92. Product Description & Applications: Two-way cabinet for use as main speaker or wedge-type monitor. Built-in hardware for rigging in permanent installations, or optional stand mount for portable applications. 15" woofer and 1" driver on 90°x40° CD horn. Can be ordered with the horn positioned so that the 90° dispersion angle is directed vertically or horizontally. Available in simulated oak or walnut, black and white with matching cloth grill. Basic Specifications & Suggested List Price: Specifications to be announced. Projected list price: \$809 grey; \$859 black, white, walnut or oak.

GENELEC/QMI

15 Strathmore Rd; Natick, MA 01760; (508) 650-9444. Product Name: 1031A Active Monitoring System. Contact: Scott Berdell, pres. Date Product Introduced: 2/92. Product Description & Applications: A high-definition, compact near-field reference monitor with extended bass response and high SPL. The first Genelec near-field to employ Genelec's exclusive DCW design. The directivity control waveguide (DCW) delivers even frequency response across entire console. DCW design guarantees translation from Genelec's large Soffit systems to the near-field model. Basic Specifications & Suggested List Price: Full active system: 2-way 8" x 1" dome, 2 power amps 120W each. Fully protected. Frequency response 42 Hz to 21 kHz ± 2.5 dB, 122 dB SPL @ 1.7 meter from a pair of 1031A's. Sugg. pro net \$1,498 each. A 1992 TEC Award Nominee!

GENELEC/QMI

15 Strathmore Rd; Natick, MA 01760; (508) 650-9444. Product Name: 1032A. Contact: Scott Berdell, pres. Date Product Introduced: 10/92. Product Description & Applications: New 2-way 10" active monitor system. Designed for near-field listening situations where extended bass response and very high SPL levels are needed. Full active system with two power amplifiers, crossover, protection circuits and drivers are included in each enclosure. Low dis-

ortion and superb imaging are major aspects of the 1032A design. Basic Specifications & Suggested List Price: 2 way system: 10" LF driver and 1" dome H.F. driver. 2 power amplifiers: 160W and 120W. Full protection circuitry. Freq. resp. 42 Hz-21 kHz ± 2.5 dB. SPL level 124dB @ 1 meter, per pair on axis. Sugg. pro net less than \$2,199 each.

GENELEC/QMI

15 Strathmore Rd; Natick, MA 01760; (508) 650-9444. Product Name: 1037A. Contact: Scott Berdell, pres. Date Product Introduced: 8/92. Product Description & Applications: New 3-way 12" active monitor system. Designed for monitoring in project studios, post-production, workstations, CD mastering, studio control rooms. Advanced DCW Technology is employed in design. The 1037A features complete active design: line level crossover, three amplifiers and protection circuits to deliver high SPL and wide frequency response in a minimal size cabinet. Basic Specifications & Suggested List Price: 3 way system; 12" and 5" cone drivers and 1" dome H.F. driver. Three amplifiers: 160W l.f., 160W mid, 120W h.f. Full-protection circuitry. Freq. resp. 39 Hz-21 kHz ± 2.5 dB SPL 125 dB @ 1.7 m per pair, on axis. Sugg. pro net \$3,499 each.

GENELEC/QMI

15 Strathmore Rd; Natick, MA 01760; (508) 650-9444. Product Name: 1038A Active Monitor System. Contact: Scott Berdell, pres. Date Product Introduced: 10/92. Product Description & Applications: New 15" 3-way active monitoring system. Designed for monitoring in medium-sized control rooms. Project studios, post-production, workstations, etc. Employs advanced DCW Technology in design. The 1038A will be the top model in Genelec's line of DCW monitors for near-field and Soffit use. Basic Specifications & Suggested List Price: 3 way system featuring 15" bass, 5" midrange cone drivers, with a 1" HF Dome Driver. 3 amplifiers: 240W for bass, 160W for mid and h.f. Full protection circuitry. Freq. resp. 32 Hz-21 kHz ± 3 dB SPL 129 dB @ 1.7 m per pair, on-axis. Sugg. price: \$4,999 each.

JBL PROFESSIONAL

8500 Balboa Blvd.; Northridge, CA 91329; Product Name: Array Series. Contact: Bill Threikeld, mktg. comm. mgr. Date Product Introduced: 10/92. Product Description & Applications: New Array Series Model 4893 and 4894. Model 4893 is a high-power compact subwoofer system, and model 4894 is a high-power 2-way loudspeaker system. Both models feature 14-inch ultra-low distortion neodymium woofer with Vented Gap Cooling™ technology. Both systems easily array with Model 4892, and accept S.A.F.E.™ flying hardware and modules. Basic Specifications & Suggested List Price: Model 4893 frequency response: 38 Hz-1,400 Hz; sensitivity: 98 dB. Model 4894 frequency response: 46 Hz-18 kHz; sensitivity: 100 dB.

KLIPSCH & ASSOCIATES INC.

PO Box 688; Hope, AR 71801; (501) 777-6751. Product Name: K-1132. Contact: Tom Gallagher, mktg. Date Product Introduced: 8/92. Product Description & Applications: The K-1132 is a revolutionary new compression driver that is made almost entirely of high-density, glass-filled polycarbonate (Lexan 500). Because of this "bullet-proof" material, the K-1132 is lighter, more powerful and better protected from the elements. A one-piece, pure titanium diaphragm with tangential surround is used in combination with a 4-slit phase plug to provide extended high frequency response. This design also significantly reduces distortion at high output levels. Basic Specifications & Suggested List Price: \$417 list price. 500-20k Hz, nominal 8 ohm (optional 16 ohm). Nominal efficiency 25%. Power handling: 75 watts AES 300W peaks, Min. crossover frequency 500 Hz 12 dB/octave sensitivity 118 dB SPL, one meter with 2.83V input on a K-4020.5 horn, 15 lbs., 12 oz. K-1132: 2" throat, K-1132A: 1.4" throat.

KLIPSCH & ASSOCIATES INC.

PO Box 688; Hope, AR 71801; (501) 777-6751. Product Name: Traxtrix Technology™ Horns. Contact: Tom Gallagher, mktg. Date Product Introduced: 8/92. Product Description & Applications: The horns are based on a hybridized Traxtrix equation. The throat of the horns resemble exponential horns for better loading. The midsection of the horns resembles conical horns for better pattern control and the mouths of the horns have a hyperbolic flare, allowing the sound waves to expand more naturally. The horns maintain constant coverage with excellent frequency response. The horns themselves are made from a composite material that is more rigid than fiberglass. Basic Specifications & Suggested List Price: K-9040.5: Coverage 90° horizontal, 40° vertical, 29-5/8" x 46-3/4" x 30". K-6040.5: Coverage: 60°, horizontal, 40° vertical, 36-1/2" x 46-3/4" x 37-7/16". K-4020.5: Coverage: 40° horizontal, 40° vertical, 35-1/8" x 46-3/4" x 52" Construction: Polyester resin and glass fiber laminate with balsa core. Bolt-on 2" throat.

KRK MONITORING SYSTEMS

16462 Gothard St., Unit D; Huntington Beach, CA 92647; (714) 841-1600. Product Name: KRK Model 13000. Contact: Keith Klawitter, designer. Date Product Introduced: 1/92. Product Description & Applications: The 13000 is offered in three-way passive, bi-amp or tri-amp configurations. The unit's 13" composite woofer and powerful magnet combine low distortion with maximum low end and transient response. The 5" midrange is an all-Kevlar cone driver. It maintains high power handling capacity while avoiding the distortion and phase anomalies common to horn midranges. The 13000's 1-1/2" Kevlar tweeter produces the lowest possible distortion and excellent off-axis response. Basic Specifications & Suggested List Price: The KRK Model 13000 is a high-performance, 13" 3-way system capable of generating SPL's above 115 dB and efficiency of 91 dB with exacting three-way time arrayed crossover design. KRK Model 13000 is H 28.25" x W 16" x D 17". Weight 95 lbs.

KRK MONITORING SYSTEMS

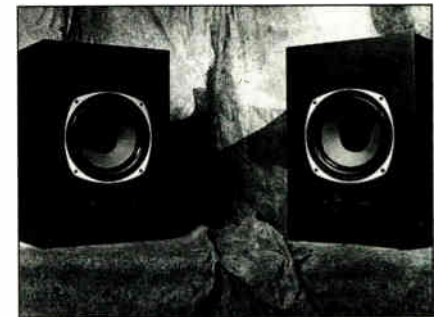
16462 Gothard St., Unit D; Huntington Beach, CA 92647; (714) 841-1600. Product Name: KRK Model 7000. Contact: Keith Klawitter, designer. Date Product Introduced: 1/92. Product Description & Applications: KRK Model 7000 is a new, higher-powered version of KRK's proven 703. Kevlar tweeters utilize KRK's custom inverted dome design, for very low distortion and excellent off-axis response. An optimum combination of strength-versus-weight. The 7" woofer uses a copper wire edge-wound voice coil for increased power-handling, while its long-excitation maximizes transient response and minimizes distortion. KRK's high manufacturing tolerances ensure perfect balanced stereo imaging and an incredible feeling of depth. Basic Specifications & Suggested List Price: The KRK model 7000 is a high performance, 7" 2-way system capable of generating SPL's above 108 dB and efficiency of 91 dB with impeccable two-way time arrayed crossover design. KRK Model 7000 is H 12" x W 11" x D 10". Weight 30 lbs.

KRK MONITORING SYSTEMS

16462 Gothard St., Unit D; Huntington Beach, CA 92647; (714) 841-1600. Product Name: New KRK Model 9000. Contact: Keith Klawitter, designer. Date Product Introduced: 1/92. Product Description & Applications: The 9000's 9" composite woofer and massive magnet structure maximize transient and low-end frequency response while minimizing distortion. The 9000's all Kevlar inverted cone tweeter combines pure highs with the lowest possible distortion. In addition, the driver's excellent off-axis response widens the 9000's "sweet spot," filling the listening field with transparent, uncolored sound. The drivers are built to the highest tolerances, providing perfectly matched stereo imaging and a remarkable depth of field. Basic Specifications & Suggested List Price: The KRK Model 9000 is a high performance 9" 2-way system capable of generating SPL's above 115 dB and efficiency of 92 dB with exacting two-way time arrayed crossover design. KRK Model 9000 is H 16.25" x W 14" x D 13.25". They weigh 45 lbs.

E.M. LONG ASSOCIATES

4107 Oakmore Rd.; Oakland, CA 94602; (510) 531-8725. Product Name: CRM-B18L. Contact: Ed Long. Date Product Introduced: 6/92. Product Description & Applications: The CRM-B18L subwoofer system consists of an E.M. Long LF460 18" driver in a very small enclosure. It is designed to be used with HLE2 ELF™ Electronics. The B18 is unusual because it produces flat acoustical output and high SPL up to 30 Hz with an enclosure of only 2 cubic feet. This is possible because of the ELF™ Technology and the large excursion and power handling capabilities of the LF460 driver.



THE MASTERING LAB STUDIO PRODUCTS
The Mastering Lab 10 Reference Monitors

THE MASTERING LAB STUDIO PRODUCTS

6031 Hollywood Blvd.; Los Angeles, CA 90028; (213) 466-3528; FAX: (213) 465-7570. Product Name: The Mastering Lab 10 Reference Monitors. Contact: Phyllis Sax, mgr. Date Product Introduced: 1/92. Product Description & Applications: The Mastering Lab 10 is a high-resolution loudspeaker designed for professional control room monitoring. Utilizing a 10" coaxial Tannoy driver, it offers point source localization coupled with low distortion and high output. Dense, nonresonant cabinetry, continuously variable high frequency controls, flush mounting for better imaging, and bi-wire capability. Basic Specifications & Suggested List Price: Technical specifications: 21.5x14.5x10. Price \$2,095. 49 lbs.

MEYER SOUND LABORATORIES INC.

2832 San Pablo Ave.; Berkeley, CA 94702; (510) 486-1166; FAX: (510) 486-8356. Product Name: HD-2. Contact: Mark Johnson. Date Product Introduced: 10/92. Product Description & Applications: Building upon the technology of HD-1 High Definition Audio Monitor, the new HD-2 offers similar sonic accuracy and point-source alignment in a larger, more powerful unit designed for mid-field monitor applications. The HD-2 comprises a driver and a one-inch (diaphragm) high-frequency driver on a symmetrical 60-degree horn in a vented enclosure. An active crossover, optimized pole-zero response correction filters, and dual power amplifiers are built into the enclosure. Basic Specifications & Suggested List Price: Applications include mid-field monitoring for music recording and audio post-production for video and film, and main monitors for project studios.

MEYER SOUND LABORATORIES INC.

2832 San Pablo Ave.; Berkeley, CA 94702; (510) 486-1166; FAX: (510) 486-8356. Product Name: UPM-2/P-2 Compact Reinforcement Loudspeaker. Contact: Mark Johnson. Date Product Introduced: 10/92. Product Description & Applications: Designed for sound re-

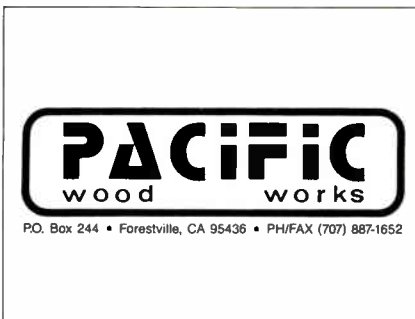
reinforcement applications requiring minimum enclosure size and weight, the UPM-2 is modeled upon Meyer Sound's UPM-1. The UPM-2 comprises two five-inch cone drivers and a two-by-five-inch horn-loaded piezoelectric high-frequency driver with passive crossover. The cost-effective UPM-2 enclosure is optimized for applications that do not require the roadworthy ruggedness of the UPM-1. Further cost savings are effected by the two-channel P-2 Control Electronics Unit. **Basic Specifications & Suggested List Price:** The UPM-2's ultra-flat frequency response simplifies equalization requirements and maximizes gain-before-feedback. Applications include music playback in small clubs, multichannel AV playback, paging and announcing in moderate-sized meeting rooms and conference rooms, under-balcony fill in installed systems, and multichannel home theater systems.

OPTIM AUDIO

733 Canal St., Stamford, CT 06902; (203) 324-2224. **Product Name:** Wharfedale Force 9. **Contact:** Irv Joel. **Date Product Introduced:** 12/92. **Product Description & Applications:** Wharfedale's Force 9 loudspeakers incorporate high efficiency in a portable arrayable enclosure offering excellent punch and clarity. The trapezoidal cabinet and optional mounting brackets allow arrangement of multiple loudspeakers. Designed to withstand the demands of live performance, the Force 9 is suited for nightclub, mobile DJ, theater, and church use. The Force 9 loudspeaker uses the new SMS coaxial driver, featuring a 12-inch silicon-impregnated paper cone and an 1-inch titanium compression driver, sharing common magnet. **Basic Specifications & Suggested List Price:** Sensitivity 98 dB-SPL/M/W. Maximum SPL 122 dB. Power Handling 500W music power. Frequency Response 70 Hz-20 kHz, -6 dB. Coverage 60 cone. Rated impedance 8 ohm Weight 37.8 lbs. Dimensions HxWxD 21.7x15.1x15.1 in crossover 2-pole low pass, 3-pole highpass, @ 2.5 kHz. Protection drivers attenuated during overload. Enclosure Sealed. MDF list price \$999.

OPTIM AUDIO

733 Canal St., Stamford, CT 06902; (203) 324-2224. **Product Name:** Wharfedale Programme 20. **Contact:** Irv Joel. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Programme 20 is a sensitive broad-bandwidth loudspeaker designed for music and voice. It provides first-rate bass performance, making it ideal for foreground and background music. The Programme 20 provides high acoustical performance with a rugged compact enclosure. It features an efficient 7-inch bass/midrange driver with tuned port and a 3/4-inch dome tweeter. Internal crossovers contain a thermally acting device to protect the tweeter from overload damage. **Basic Specifications & Suggested List Price:** Sensitivity: 88 dB SPL/M/W maximum SPL 105 dB @ 1 meter. Power handling: 120-watts music power. Frequency response: 70 Hz-20 kHz, -6 dB. Rated impedance 8 ohms. Weight 8.6 lbs. Dimensions 13.8H x 7W x 6.3D in drivers bass/midrange: 7 in., paper cone high frequency: 3/4-inch dome tweeter.



PACIFIC WOOD WORKS
GM 112

PACIFIC WOOD WORKS

PD Box 244; Forestville, CA 95436; (707) 887-1652. **Product Name:** GM 112. **Contact:** Michael Kane, designer. **Date Product Introduced:** 6/92. **Product Description & Applications:** GM112 comprises 2 models of guitar monitors w/ 30° slant capability: one is open back, the other bass reflex. PRT systems comprises Pacific's line of trapezoidal P.A. cabinets-R way 12" x 60 x 90 horn - 3-way 15", 12" mid + 60 x 90 horn.



PDLK AUDIO
M3

POLK AUDIO

5601 Metro Drive; Baltimore, MD 21215; (410) 358-3600. **Product Name:** M3. **Contact:** Al Baron, mktg. mgr. **Date Product Introduced:** 9/91. **Product Description & Applications:** Particular attention has been paid in the M3 to application, ease of use and sound quality. The angled back of this speaker provides many installation options. The M3 is offered with a unique stand which doubles as a bracket. The angled back and bracket/stand allows the user to mount the speaker on a wall either horizontally or vertically. Additionally the speaker can be placed horizontally or vertically on a bookshelf or on the floor. **Basic Specifications & Suggested List Price:** The two-way vented design includes a 5.25" long throw woofer and a 1/2" dome tweeter. Power handling is 100 watts and the speaker is compatible with 8 ohm outputs. 5.5 lbs each. MSRP \$99.95 each.

PROFESSIONAL TECHNOLOGIES

Box 282A Rd. 1; Rome, NY 13440; (315) 337-4156. **Product Name:** PT 652D-PRD. **Contact:** John A. Puleo Jr., owner. **Date Product Introduced:** 6/92. **Product Description & Applications:** The PT652D-PRD is an exceptionally accurate performance speaker system consisting of two mid-bass drivers and a horn-loaded 1-1/4-inch dome midtweeter arranged in a symmetrical configuration to maintain the soundfield's polar integrity. The crossover utilizes high-quality plastic film capacitors and heavy-gauge air core coils to eliminate saturation distortion. The tweeter has a self-reset protective device to protect against destruction. Applications include live performance, recording/monitoring, broadcast. **Basic Specifications & Suggested List Price:** Drivers: two 6-1/2 inch mid-woofers, one horn-loaded upper mid tweeter, freq. resp. 40 Hz-20 kHz ±13 dB, pwr. handling 350 watts, sensitivity at 1 watt/meter 93 dB, nominal impedance 4 ohms, carpet or epoxy cover veneer, protective metal corners and grills, tripod/stand mount. Price: \$1,099 per pair.

PROSYSTEMS - THE AWS GROUP INC.

4601 EDF St.; Wheeling, WV 26003; (800) 258-8550; (304) 233-2223. **Product Name:** FP Series II. **Contact:** Adolph Santorine, pres. **Date Product Introduced:** 2/92. **Product Description & Applications:** New and improved version of the lightweight and durable FP-Series. Includes redesigned crossover networks for better phase response and mechanical integrity. All models now have titanium dome tweeters and edge-wound, copper-clad aluminum voice coils. **Basic Specifications & Suggested List Price:** FP-121 Monitor: 80-16 kHz/125 watts, list \$225 each; FP-151M Monitor: 40-20 kHz/200 watts, list \$320 each; FP-151M: full range 40-20 kHz/200 watts, list \$320 each; FP-251: full range 35-16 kHz/200 watts, list \$398 each; FP-181 Subwoofer: 25-500 Hz/300 watts, list \$398 each.

RAMSDELL AUDIO

PD Box 76186; St. Petersburg, FL 33713; (813) 823-8037. **Product Name:** SW 2711. **Contact:** Richard Ramsdell. **Date Product Introduced:** 4/92. **Product Description & Applications:** Long throw higher x-max version of existing SW 2710 27" subwoofer. Ideal for applications requiring high output in 20-50 Hz range. Theme park, pipe organ, permanent install application in nightclubs and theaters. SW2711 has a waterproof cone and surround. **Basic Specifications & Suggested List Price:** 100 dB 1 watt/1 meter, 1,000 watt program capabilities. 6.3" edge-wound copper voice coil. List price \$1,250.



RENKUS-HEINZ INC.
C-3

RENKUS-HEINZ INC.

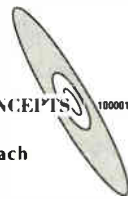
17191 Armstrong; Irvine, CA 92714; (714) 250-0166. **Product Name:** C-3. **Contact:** Carl Dorwaldt, national sales mgr. **Date Product Introduced:** 2/92. **Product Description & Applications:** The C-3 is a compact, 3-way medium throw loudspeaker system with unprecedented power handling and output capabilities for a cabinet of its small size. Its 3-way design features dual 1" drivers coupled to a 2" horn for the highs, a 10" cone driven mid frequency horn and dual 12" woofers in a highly efficient horn-loaded bandpass arrangement. The compact C-3's outstanding performance and high output level make it ideally suited for a wide variety of live entertainment applications. **Basic Specifications & Suggested List Price:** The trapezoidal C-3 is only 32.5" tall, 21" wide and 23.75" deep and weighs only 160 lbs., yet it handles over 1 kilowatt of power and delivers an output SPL of 131 dB from 70 to 20 kHz; provides 80°x50° coverage. Pro net price is \$3,330.

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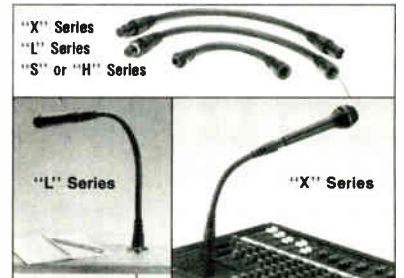
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"X" Series - Wired male to female XLR connectors.



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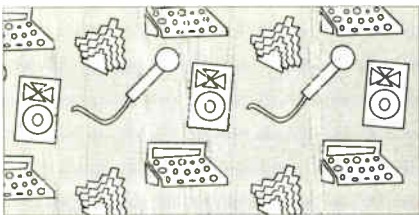
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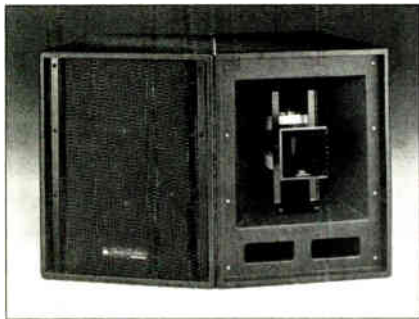
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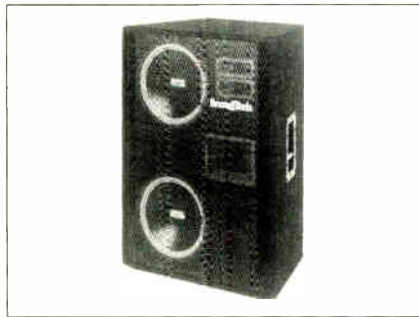
Monitors and Loudspeakers



RENKUS-HEINZ INC.
SR-4

RENKUS-HEINZ INC.

17191 Armstrong; Irvine, CA 92714; (714) 250-0166. **Product Name:** SR-4. **Contact:** Carl Donawaldt, national sales mgr. **Date Product Introduced:** 2/92. **Product Description & Applications:** The SR-4 is an extremely compact, high-power 2-way loudspeaker system featuring an innovative coaxial design that enables it to outperform many cabinets twice its size. Its unique design incorporates dual 1" drivers coupled to a 2" horn for highs and a 12" cone driven low/mid frequency horn. The SR-4's small size, high output level and excellent directional control make it ideally suited for both portable use and a wide variety of fixed installations. **Basic Specifications & Suggested List Price:** The trapezoidal SR-4 is only 24.5" tall, 19" wide and 17.75" deep; weighs only 76 lbs.; delivers an output SPL of 130 dB from 80 to 20 kHz; provides 30 x 50° coverage. Pro net price is \$2,025.



SOUND TECH
Titan Series T-215

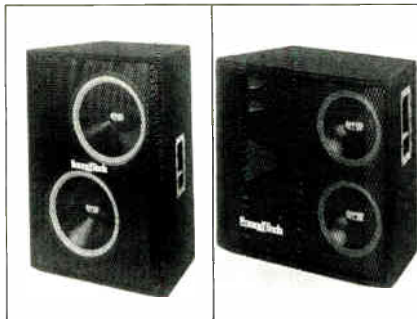
SOUND TECH

255 Corporate Woods Pkwy.; Vernon Hills, IL 60061; (708) 913-5511. **Product Name:** Titan Series T-215. **Contact:** Sound Tech sales dept. **Date Product Introduced:** 1/92. **Product Description & Applications:** Full range, high level concert sound reinforcement or playback cabinet. Woofers feature extra long excursion capabilities and mids are reproduced by our STS140 titanium-diaphragm compression driver mated to a true CD horn. Sizzling highs are delivered by two solid state tweeters. Both mid and high frequency devices are protected by Sound Tech's exclusive Dynamic Analog Compression Network. **Basic Specifications & Suggested List Price:** Power handling: 660 W RMS sensitivity, 105 dB, frequency response: 35 Hz to 24 kHz 1" rotatable horn standard, 2" rotatable horn with Radian driver: \$799.99 optional. 3 point flying hardware: \$149.90 optional. Foam grill: \$59.90 optional. 8 conductor Neutrik Speakon standard, passive crossover: \$149.90 optional. TITAN Series T-215 retail price \$995.90

SOUND TECH

255 Corporate Woods Pkwy.; Vernon Hills, IL 60061; (708) 913-5511. **Product Name:** Titan Series, "The Stack". **Contact:** Sound Tech sales dept. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Stack is a 4-way, modular, two-box system consisting of dual 18" subwoofers and a dual 12" 3-way mid-high cabinet. All TITANs are trapezoidal in shape and were designed for high SPL applications for live or playback use. All cabinets are made of void-free Marine plywood and are very heavily braced internally.

—SEE PHOTO LOGO TOP OF NEXT COLUMN



SOUND TECH
Titan Series, "The Stack"

The mid-range horn is rotatable to change the vertical and horizontal dispersion characteristics. **Basic Specifications & Suggested List Price:** "The Stack" is rated at 1,000 W RMS with 106 dB sensitivity 1W/1M. Response is 25 Hz to 24 kHz. Retail for "The Stack" is \$1,855.80. 2" Radian driver on rotatable horn option is \$799.90. 3 point flying hardware is a \$149.90 option per cabinet as are foam grills at \$59.90 per cabinet.

TANNOY

300 Gage Ave.; Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158. **Product Name:** Super Dual. **Contact:** Bill Calma. **Date Product Introduced:** 10/92. **Product Description & Applications:** The "Super Dual" is a high power dual concentric transducer featuring true constant directivity. It has been developed for studios demanding very high SPL without sacrificing sonic integrity. **Basic Specifications & Suggested List Price:** MSL 22 022 pair. Frq. res. 30 Hz-21 kHz; Power handle 4,500 watts; Max SPL 135 dB peak.

TANNOY

300 Gage Ave.; Kitchener, Ontario, N2M 2C8 Canada; (519) 745-1158. **Product Name:** System 6 NFM. **Contact:** Bill Calma. **Date Product Introduced:** 10/92. **Product Description & Applications:** Tannoy "System 6 NFM" is the world's "first 6" dual concentric primary reference mixing monitor. System 6 is a true near-field monitor featuring Tannoy's exclusive DMT™ (Differential Material Technology). System 6 NFM has been designed to meet the specific requirements of primary mixing in the home/project studio. **Basic Specifications & Suggested List Price:** Price MSL pair, \$795. Power handle 100 watts; Frq. Resp. 55 Hz to 25 kHz; Imp. 8 ohms; Size 153/4 H x 8 3/4 W x 9 1/2 D.

YORKVILLE SOUND

4600 Witmer Industrial Estate, Unit #1; Niagara Falls, NY 14305; (716) 297-2920. **Product Name:** Elite EX-300. **Contact:** Bud Mayer. **Date Product Introduced:** 10/92. **Product Description & Applications:** The Elite EX-300 is a 3-way P.A. enclosure with 1"x10" woofer and horn with 1" compression driver. Using highly efficient BBC drivers, the EX-300 delivers high SPL with 400 watts power handling. Perfect for situations requiring high output from compact enclosures. The P-200 processor option is available for better linearized bass response. **Basic Specifications & Suggested List Price:** 300 watts, 4 ohms, 1" x 10" woofer, 1" compression driver, 3/4" poplar plywood construction, 2-year unlimited transferable warranty. List N/A.

YORKVILLE SOUND

4600 Witmer Industrial Estate, Unit #1; Niagara Falls, NY 14305; (716) 297-2920. **Product Name:** Elite EX-350/EX-350M. **Contact:** Bud Mayer. **Date Product Introduced:** 9/92. **Product Description & Applications:** New Elite Series 2 way enclosure loaded with 12" BBC woofer and horn with 1" compression driver. With a power handling of 350 watts, the EX-350 can handle most demanding sound reinforcement applications. EX-350M is the wedge-shaped stage monitor version. Crossover features current-to-light protection. Elite processor is optional. **Basic Specifications & Suggested List Price:** 350 watts, 4 ohms, 1"x12" woofer, 1" compression driver, trapezoid enclosure, 3/4" poplar plywood construction, 2-year unlimited transferable warranty. List price is \$799.

MUSIC PRODUCTS



AC-CETERA INC.
Flex-Eze®

AC-CETERA INC.

3120 Banksville Rd.; Pittsburgh, PA 15216; (800) 537-3491. **Product Name:** Flex-Eze®. **Contact:** Mark B. Tarshis, pres. **Date Product Introduced:** 1992. **Product Description & Applications:** Flex-Eze® is a combination microphone-placement system that eliminates the need for a microphone stand. One end clamps to a structure while the opposite end holds the mic. The center section is a flexible material that allows unrestricted direction for miking. Other features include a locking device system for security and vibration shock-absorption protective pads. **Basic Specifications & Suggested List Price:** Clamps open extra wide to hold thin and wide body microphones. Suggested list price is \$30.95.



AC-CETERA INC.
Rubber-Neck®.

AC-CETERA INC.

3120 Banksville Rd.; Pittsburgh, PA 15216; (800) 537-3491. **Product Name:** Rubber-Neck®. **Contact:** Mark B. Tarshis, pres. **Date Product Introduced:** 1/92. **Product Description & Applications:** Rubber-Neck® is a black, no-creak, no-rust, no-glare flexible extension. Four styles are offered. "S" Series is solid throughout and is threaded for mic holders. "H" Series has a hollow center for internal wiring for those mics with a threaded design. "L" Series includes a locking XLR mic connector and is ready for internal wiring. "X" Series is internally wired from male-to-female, XLR-ready to plug into an existing XLR input. **Basic Specifications & Suggested List Price:** The S (solid) and H (hollow) models are available in 10", 16" and 20" lengths. L models are available in 11" and 17" lengths. X models are available in 12" and 18" lengths. All products are also available in custom sizes on request. Suggested retail price is \$15.95 to \$49.95.

AKAI PROFESSIONAL

PD Box 2344; Ft. Worth, TX 76113; (817) 336-5114. **Product Name:** S1100 Version 2.0. **Contact:** James Martin, product mgr. **Date Product Introduced:** 5/92. **Product Description & Applications:** Version 2.0, an option for the S1100 digital sampler, adds direct-to-disk recording capabilities to the sampler. Stereo or mono audio "takes" can be recorded to virtually any standard SCSI hard disk (max. 500 MB), as well as both 5.25" and 3.5" magneto optical disks. Takes can be triggered using the S1100's internal O-List, or by MIDI notes. The S1100's normal sampling facilities and polyphony remain intact. **Basic Specifications & Suggested List Price:** Version 2.0 is supplied on two EPROMs and one PAL chip. Suggested list price is \$650.

ALESIS

3630 Holdrege Ave.; Los Angeles, CA 90016; (310) 558-4530. **Product Name:** S4 QuadraSynth. **Contact:** Allen Wald, VP adv./promo. **Date Product Introduced:** 1/92. **Product Description & Applications:** The S4 QuadraSynth is a rack-mount version of the S5. Projected, suggested US retail price: \$995.

ALESIS

3630 Holdrege Ave.; Los Angeles, CA 90016; (310) 558-4530. **Product Name:** S5 QuadraSynth. **Contact:** Allen Wald, VP adv./promo. **Date Product Introduced:** 1/92. **Product Description & Applications:** The S5 QuadraSynth is a 76-note, 64-voice multibrain sound generator/master MIDI controller featuring Composite Synthesis™, a combination of subtractive and additive synthesis, built-in parallel-matrix digital signal processing and a large easy-to-read, backlit LCD. In "program mode," the S5 has 128 presets and 128 user programs in which the user can program up to 7 simultaneous effects, which can be independently assigned to any of 4 effect buses. Each program is capable of four individual "sounds" with their own set of 3 envelope generators, 3 LFOs, a tracking generator, dynamic lowpass filter, and a very comprehensive modulation matrix. In the "mix mod," the S5 has an additional 128 presets and 128 user programmable "mixes," which can be used for multibrain sequencing applications. Programs may be assigned to each of the 16 MIDI channels simultaneously. **Basic Specifications & Suggested List Price:** Projected, suggested US retail price \$1,495.

ANGEL CITY AUDIO

2 Liberty Place; Middletown, CT 06457; (203) 347-5166. **Product Name:** PCM library for Korg T Series. **Contact:** Jim Fellows. **Date Product Introduced:** Began 1/92, continuous releases every month. **Product Description & Applications:** Audiophile recording of acoustic instruments for use in Korg T1 or any expanded T Series synthesizer. Disks already available include: "African drums," "flutes," "guitars," "exotic percussion," "exotic winds," "Hammond B-3 Organ," "tambourines and high hats." Specific instruments include recorders; gold flute; flutes from Bolivia, Peru, Romania, Balkans; piccolo; 19th C. flute; classical guitar; Les Paul guitar; talking

drums; Nienga, jimbe; caica; bullroarer; conchshell trumpet; bon-brace; ratchet; anklung; etc. **Basic Specifications & Suggested List Price:** Audio demo cassette \$2, PCM disks as low as \$10 each. Each disk contains 1 megabyte of PCM, RAM and up to 50 programs and demonstration songs. Full documentation includes information on instruments, performers, recording techniques, sample size, performance tips, etc. Recommended for film music production, songwriters, producers, etc. New disks monthly.

ASSOCIATED PRODUCTION MUSIC

6255 Sunset Blvd., Ste. 820; Hollywood, CA 90028; (213) 461-3211. **Product Name:** Sonia Classics. **Contact:** Jerry Burnham. **Date Product Introduced:** 3/92. **Product Description & Applications:** 89 digitally recorded CDs of the world's most well-known classics recorded by many of the premiere artists and orchestras of the world. Synchronization licenses available on all material. **Basic Specifications & Suggested List Price:** 89 classical CDs all digitally recorded. Please call for details.

BIG BRIAR INC.

Rt. 3 Box 115A1; Leicester, NC 28748; (704) 683-9085; FAX: (704) 683-9085. **Product Name:** Lintronics Advanced Memorymoog Modification. **Contact:** Robert Moog, pres. **Date Product Introduced:** 3/92. **Product Description & Applications:** The Lintronics Advanced Memorymoog Modification (LAMM) is an extensive hardware and software upgrade to the original Moog Memorymoog Synthesizer. It retains the high-quality sound and synthesis capabilities of the original Memorymoog, but raises the reliability of its hardware and the functionality of its operating system to 1992 standards. In particular, the entire operating system has been redesigned to implement a wide range of MIDI functions, and to give a more clearly arranged and accessible user interface. **Basic Specifications & Suggested List Price:** Lintronics Advanced Memorymoog Modifications are performed at Big Briar Inc. in Leicester, NC. The price for upgrading an original Memorymoog is \$1,795; while the price for upgrading a Memorymoog Plus is \$1,925.

BIG BRIAR INC.

Rt. 3 Box 115A1; Leicester, NC 28748; (704) 683-9085; FAX: (704) 683-9085. **Product Name:** Theremin. **Contact:** Robert Moog, pres. **Date Product Introduced:** 10/91. **Product Description & Applications:** The Theremin is an electronic musical instrument that is played by the motion of the performer's hands in space. Big Briar Theremins retain the tone color and playing characteristics of Prof. Theremin's original designs, but use modern digital and analog components. Available options include MIDI, three cabinet styles, speaker and road case. **Basic Specifications & Suggested List Price:** Base price is \$1,800. MIDI option is \$275. Road case is \$325. Speaker is \$150.

CAPITOL PRODUCTION MUSIC

6922 Hollywood Blvd., Ste. 718; Hollywood, CA 90028; (213) 461-2701. **Product Name:** OGM Premium Production Music. **Contact:** David W. Carroll, sales mgr. **Date Product Introduced:** 7/92. **Product Description & Applications:** The "monogram" Series of production music from Capitol and Ole Georg, the founding father of pre-recorded production music. Companion Series to The Professional Series. Encompasses all music styles from contemporary rock, pop, jazz and country to full symphonic classical. **Basic Specifications & Suggested List Price:** Call for details.

CLARITY

Nelson Lane; Garrison, NY 10524; (914) 424-4071. **Product Name:** Retro MIDI to control voltage converter. **Contact:** Elizabeth Gillespie, mktg mgr. **Date Product Introduced:** Software Version 1.3. Fall 91. **Product Description & Applications:** The RETRO is the most flexible MIDI to control voltage converter made. It can be used for everything from controlling many different analog synthesizers simultaneously or controlling one synth with the industry's most flexible 4-voice polyphony, to triggering non-MIDI drum machines, lighting controllers, VCA mixers, and signal processors. Manufactured to studio standards, the RETRO is installed in leading edge music, commercial and university studios worldwide. **Basic Specifications & Suggested List Price:** 8 CV outputs. Supports all MIDI control sources on multiple MIDI channels. MIDI scope mode. Flexible assignment. 32 programs, each consisting of 16 MIDI to CV patches. Flexible processing of the MIDI input data. 2, 3 and 4 voice polyphony with selectable note-replacement algorithms and selectable gate modes for different synthesizers. Price \$595.

CREATIVE INPUT

4029 S. Pacific Ave., Ste. #5; San Pedro, CA 90731; (310) 548-0218. **Product Name:** QuickCards. **Contact:** Geoffrey Ryle. **Date Product Introduced:** 6/92. **Product Description & Applications:** Double-sided, laminated reference cards provide instant information and allow easy access to many of today's popular MIDI products. Each card is divided into sections (selecting sounds, saving sounds, editing sounds, using a sequencer) and are individually designed for a specific product's mode of operation. Products currently supported: Korg 01/W Series, Korg M1, Roland D-70, and Alesis QuadraVerb Plus. **Basic Specifications & Suggested List Price:** 7.5" by 4.5", laminated, easy-to-read instructions. Suggested retail price: \$9.95.

CREATIVE SUPPORT SERVICES

1950 Riverside Dr.; Los Angeles, CA 90039; (800) 468-6874. **Product Name:** Buy-Out Production Music and EFX. **Contact:** Michael M. Fuller, creative dir. **Date Product Introduced:** 9/92. **Product Description & Applications:** 30 new discs including 2 new sound effects discs. Custom library sets. **Basic Specifications & Suggested List Price:** Available on CD, DAT, DCC, MD, and high bias cassettes; individual discs start at \$119.

DDRUM

25 Lindeman Drive; Trumbull, CT 06611; (203) 374-0020; (800) 882-0098. **Product Name:** ddrumAT. **Contact:** Wendy DeBernardo, cust serv. **Date Product Introduced:** 4/92. **Product Description & Applications:** The ddrumAT is a fully MIDI electronic sound module containing 64 programmable drumkits. Drumkits can be easily modified or edited. The drummer can adjust filters, decays, bends, and other parameters. The link function makes it possible to stock sounds, build up power layers and create stereo effects. The ddrumAT is designed to be compatible with the ddrumPads and studio-quality ddrumTriggers. **Basic Specifications & Suggested List Price:** Brain: 6 programmable kits with 8 channels in each. 2 voices on each channel. 16kHz bandwidth at nominal pitch. 1 Mbyte of stored sounds internally, expandable up to 2 Mbytes. 4 expansion slots for soundPacs. 2.3 ms. response time. 8 pads/trigger inputs. Suggested list: \$4,995.

DIGITAL MUSIC CORP.

5312-J Derry Ave.; Agoura Hills, CA 91301; (818) 991-3881. **Product Name:** GCX Expander. **Contact:** Gene Barkin, VP, mktg. **Date Product Introduced:** 11/92. **Product Description & Applications:** The GCX expander module is an optional, rack-mount accessory for the ground control programmable MIDI foot controller. Together they give guitar players ultimate control—and the ability to completely reconfigure a system instantly. The GCX provides 8 switches/audio loops to control non-MIDI devices (i.e., amplifier channel switching, reverb on/off, etc.) and audio signal routing. It adds audio control to the ground control's MIDI flexibility. **Basic Specifications & Suggested List Price:** 1 space, 19" rack-mount. Provides phantom power to the ground control over a standard MIDI cable. Other details and retail price to be announced.

DIGITAL MUSIC CORP.

5312-J Derry Ave.; Agoura Hills, CA 91301; (818) 991-3881. **Product Name:** Ground Control. **Contact:** Gene Barkin, VP, mktg. **Date Product Introduced:** 1/92. **Product Description & Applications:** Ground Control is a programmable foot-operated controller that gives guitar players unprecedented flexibility for accessing and combining MIDI effects. Easy to program and use, Ground Control sends multiple program changes on multiple MIDI channels, to control up to 8 different MIDI devices. The large LED display allows access to the 100 user-programmable presets and the user's devices by name. Two expression pedal inputs turn ordinary guitar volume pedals into continuous controllers for live control of effects parameters. **Basic Specifications & Suggested List Price:** 8 MIDI program changes on separate channels per preset. 2 expression pedal inputs. 100 programmable presets. 10 program select switches with LEDs; 2 bank select switches. 12-character, 12" high display. 21" w x 1.5" h x 6" d, 5.5 lbs. Five-year warranty. Suggested list price, \$279.

EAST WEST/SDOUNDWAREHOUSE

1631 Woods Drive; Los Angeles, CA 90069; (213) 848-8436. **Product Name:** Bob Clearmountain Drums 2 Sample Library. **Contact:** Doug Rogers, pres. **Date Product Introduced:** AES 1992. **Product Description & Applications:** Drums 2—drum samples CD/CD-ROM is the sequel to the highly successful Drums 1 introduced at AES 1990 recorded by six-time "TEC" winner Bob Clearmountain. Features include 3 dynamically different samples for velocity switching. **Basic Specifications & Suggested List Price:** 1 hour of stereo samples recorded at A & M Studios in Hollywood. Price: \$129.

EMERALD MUSIC CO.

392 Dak Knoll Rd.; Ukiah, CA 95482; (707) 462-0990; (800) 828-3837. **Product Name:** 4210B Thru Box Three. **Contact:** David Smith, customer serv. **Date Product Introduced:** 1/92. **Product Description & Applications:** The 4210B features a standard Thru Box with ten thru ports, plus a second thru box section with four selectable inputs and two more ports (5in, 12 thru) in a single rackspace. The Thru Box sections can be used together or independently, and each has an LED to indicate MIDI data activity. **Basic Specifications & Suggested List Price:** Built-in power supply, all-aluminum chassis, unconditionally guaranteed. Forever. \$269.95.

ENCORE ELECTRONICS

30 Glenhill Ct.; Danville, CA 94526; (510) 820-7551. **Product Name:** OB8MK. **Contact:** Tony Karavidas, owner. **Date Product Introduced:** 6/92. **Product Description & Applications:** MIDI interface for the Oberheim OB8. Functionally equal to original MIDI, with software bug fixes and more reliable hardware. User installable. This allows the OB8 to receive MIDI data on two channels and to transmit note and controller information. **Basic Specifications & Suggested List Price:** Encore can send MIDI specification upon request. Suggested list price is \$175.

ENSONIQ CORP.

155 Great Valley Pkwy.; Malvern, PA 19355; (215) 647-3930. **Product Name:** KS-32. **Contact:** Jerry Kovarsky, marketing director. **Date Product Introduced:** 6/92. **Product Description & Applications:** The KS-32 is a 76-key, weighted-action keyboard workstation designed for the performing pianist, educator and church musician. It features 180 internal sounds, a 16-track sequencer, and flexible MIDI controller functions. Voiced with an abundance of acoustic/electric pianos, jazz and classical organs, other pop and orchestral sounds, the KS-32 covers a broad range of musical styles. Fourteen velocity curves guarantee that every player will find a feel to match their playing style. **Basic Specifications & Suggested List Price:** 76 weighted keys with channel pressure. 32-note polyphony. 3 megs (168) wavesamples. 180 sounds w/3 oscillators per sound, 24-bit dynamic stereo effects, 16-track sequencer, 96ppq, 8,500 note expandable to 58,000, audition every edit, 8/16 part sound combinations, ROM/RAM card, 32-character display. \$2,195.

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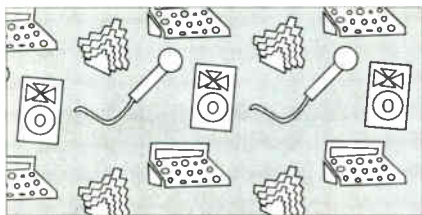
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Music Products

THE HOLLYWOOD EDGE

7060 Hollywood Blvd. Ste. 700; Hollywood, CA 90028; (213) 466-6723; FAX: (213) 463-3972. **Product Name:** Cartoon Trax. **Date Product Introduced:** 7/92. **Product Description & Applications:** Cartoon Trax—the "best of" the high-energy cartoon sound effects created by Hollywood's most-beloved animation studios. Names we all would have recognized before we were four years old. The Hollywood Edge has digitally restored these priceless sound effects. They retain all the power of the originals and sound just like they did on the day they were first recorded. Including red-hot, newly sampled, musical cartoon sounds! **Basic Specifications & Suggested List Price:** Cartoon Trax, the finest cartoon and comedy sound effects package this side of "Toon Town" is the ultimate tool for any audio designer needing that extra energy boost in their production. Available on 5 compact discs. Cartoon Trax comes fully cross-referenced and indexed. Call (800) 292-3755 for a free demo CD and for more details.

THE HOLLYWOOD EDGE

7060 Hollywood Blvd. Ste. 700; Hollywood, CA 90028; (213) 466-6723; FAX: (213) 463-3972. **Product Name:** The Super Single. **Date Product Introduced:** 1/92. **Product Description & Applications:** The Hollywood Edge decided to make a "best of" collection of sound effects that covered a broad cross-section of sound categories. All on one super hot compact disc! The Super Single was born. Originally, The Super Single was only made available to long-time Hollywood Edge customers. The first part of this year, The Super Single was made available to all. "The Hollywood Edge, the best sound effects library without a doubt," Oliver Stone. **Basic Specifications & Suggested List Price:** The Super Single comes indexed and on one compact disc. An indispensable addition to any sound effects collection. The Super Single is guaranteed to make a Hollywood Edge convert out of anyone who uses it in a production First Time. Call (800) 292-3755 for more details.

THE HOLLYWOOD FILM MUSIC LIBRARY

11684 Ventura Blvd. Ste 850; Studio City, CA 91604; (818) 985-9997; FAX: (818) 985-6928. **Product Name:** The Hollywood Film Music Library. **Contact:** Jeff King, prod. mgr. **Date Product Introduced:** 7/92. **Product Description & Applications:** Digital production music with Macintosh Hypercard/IBM interface—controls CD-ROM player functions for sync of music to video/multimedia applications. Automated database searches by thousands of relevant pieces of info, i.e., tempo, SMPTE, length, description, etc. included is 50+ minutes of 16-bit stereo audio and 15+ minutes of 8-bit mono AIFF soundfiles. 40 volumes covering every style and category of music are currently being released. **Basic Specifications & Suggested List Price:** \$149 per volume price includes software and non-broadcast license for multimedia presentations.

KAT INC.

300 Burnett Rd.; Chicopee, MA 01020; (413) 594-7466. **Product Name:** drumKAT 3.0. **Contact:** Maria Katoski, mktg. mgr. **Date Product Introduced:** 1/92 NAIMM. **Product Description & Applications:** The drumKAT 3.0 is the world's most powerful MIDI drum controller. Using FSR sensor technology, the drumKAT 3.0 is capable of capturing every nuance with explosive dynamics and incredible feel on its 10 pads and 9 acoustic/trigger inputs. Using special layering, crossfading and alternating modes, the user can create sounds unimaginable until now. Perfect for the studio that requires quick setups and space considerations. Perfect for the drummer that demands dynamics, control and feel. **Basic Specifications & Suggested List Price:** 30 kits, 4 notes per pad, Simple, multiple, alternate, gate and velocity shift modes per pad, 8 note alternating/random modes. Interaction suppression matrix eliminates cross talk. New variable hi-hat position (up to 8 notes) modes. Superior acoustic and pad triggering. Link modes for pad merging. Internal pattern generator.

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KAT INC.
drumKAT EZ

KAT INC.

300 Burnett Rd.; Chicopee, MA 01020; (413) 594-7466. **Product Name:** drumKAT EZ. **Contact:** Maria Katoski, mktg. mgr. **Date Product Introduced:** 1/92 NAIMM. **Product Description & Applications:** The drumKAT EZ is the latest percussion controller from KAT. KAT has taken the essence of its legendary drumKAT and created a new instrument that's truly easy to use. With 10 natural-feeling playing pads, three stereo (or six mono) trigger inputs and hundreds of preprogrammed factory kits, the drumKAT EZ is truly the most-powerful controller in its price range. Simply plug in a MIDI cable, select the sound source, and play! It's EZ. **Basic Specifications & Suggested List Price:** Compact 10-pad-gum, rubber playing surface. 3 stereo trigger inputs (can be used as 6 mono inputs), 3 note dynamic layering, real time hi-hat control, all-steel construction, 3 inputs for mallet expanders, expressive foot control and breath control inputs.



KILLER TRACKS
Killer Tracks Production Music Library

KILLER TRACKS

6534 Sunset Blvd.; Hollywood, CA 90028; (800) 877-0078. **Product Name:** Killer Tracks Production Music Library. **Date Product Introduced:** 6/92. **Product Description & Applications:** Killer Tracks is the most contemporary production music library available—anywhere. Killer Tracks offers 50 CDs of diverse categories and musical styles (including drama, motivational, comedy, rock, new age and quiet interludes). Updates are free, providing 10 additional CDs yearly of all new material. Mainly acoustic instruments are featured, while utilizing synths in appropriate categories.

KILLER TRACKS

6534 Sunset Blvd.; Hollywood, CA 90028; (800) 877-0078. **Product Name:** Multi Media Music Library. **Contact:** Phil Spießer. **Date Product Introduced:** 1/92. **Product Description & Applications:** Killer tracks multimedia music library is a three-CD audio collection produced specifically for computer-driven productions. Each of the three CD's "sales," "training" and "education" is a complete library unto itself, containing over 60 minutes of music, production elements, and live sound effects. The music categories contained on each CD are as follows: rock, hi-tech urban, comedy, semi-classical, mellow, industrial, and new age. **Basic Specifications & Suggested List Price:** The multimedia library is a collection of "red book" audio CDs. Each CD sells for \$150, and \$400 for all three.

KURZWEIL MUSIC SYSTEMS

YOUNG CHANG AMERICA 13336 Alondra Blvd.; Cerritos, CA 90701; (310) 926-3200. **Product Name:** Upgrades/Options for K2000 and K2000R. **Contact:** Steve Johannessen. **Date Product Introduced:** 1992. **Product Description & Applications:** SMP-K and SMP-R Sampling Options add stereo sampling and analog and digital input/outputs and optical input. This option also adds a new operating system featuring extensive onscreen sampling processing and editing functions; \$795. P-RAM upgrade is a battery-backed program memory upgrade, capable of increasing program RAM from 120K to 760K. It allows the user to load and save additional programs, setups and songs; \$350. **Basic Specifications & Suggested List Price:** Additional upgrades include 1, 4 and 16-meg SIMM RAM modules, two 8-meg ROM soundblocks, an internal Fan Kit for the K2000 and Kurzweil-approved, K2000-compatible SCSI Internal Hard drives (brand names include Quantum and Conner). Four new disk libraries, many converted from the legendary K250 sound library, are now available in 10-disk volumes, \$29.95 each. DL-1 features Percussion; DL-2 offers Mixed Bag; DL-3 features Film Score; and DL-4 comprises Orchestral sounds.

LYNC SYSTEMS INC.

14 Walker Way; Albany, NY 12205; (518) 452-0891. **Product Name:** LYNC76. **Contact:** Kevin Ikeda, VP. **Date Product Introduced:** 6/92. **Product Description & Applications:** The LYNC76 is a fully programmable, four-zone, four-channel MIDI controller designed for use in recording, live performance and computer sequencing environments. Laid out like a mixing console, the LYNC76 is ideally suited for layering sounds on different MIDI channels. Programmable per zone: MIDI channel #; program number; velocity table; transpose; volume; keyboard low and high limits; LYNCString and randomize. The six continuous and three switch controllers are assignable to any MIDI controller number. **Basic Specifications & Suggested List Price:** 76 keys Eo-G6, 16 internal and 16 user programmable velocity tables, 24 aftertouch curves, four overlapping zones, 100 internal programs. Programmable per zone: MIDI channel, program number, velocity, attenuation, transpose for -24 to +99 semitones, 2 assignable wheels, 2 assignable sliders, 2 controller switches, sustain jack, assignable footswitch jack, assignable footpedal jack. \$999.

MANHATTAN PRODUCTION MUSIC

311 W. 43rd St.; New York, NY 10036; (212) 333-5766; (800) 227-5766. **Product Name:** Audiophile Sound Effects Series. **Contact:** Ron Goldberg, nat'l sales mgr; Ben McGinn. **Date Product Introduced:** 10/91. **Product Description & Applications:** A 5-CD Sound Effects Library produced with 128 times oversampling and in stereo. It is available as a buyout, MPM 39 Country, Bluegrass and the Blues and MPM 40 nostalgic Rock are two new MPM music CDs.

C.F. MARTIN & COMPANY INC.

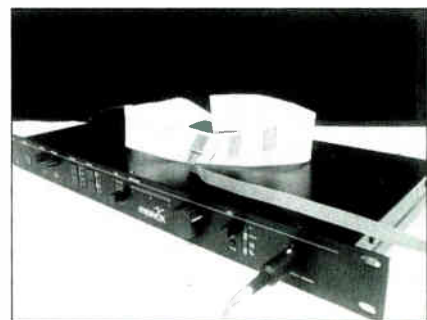
PD Box 329; Nazareth, PA 18064; (800) 345-3103. **Product Name:** BC-40 Acoustic Bass Guitar. **Contact:** Your local authorized Martin Dealership. **Date Product Introduced:** 4/92. **Product Description & Applications:** The BC-40 incorporates a rounded "Venetian" cutaway within the context of the comfortable "J" (Jumbo) body shape. The BC-40 is constructed with a uniquely scalloped solid-spruce top. A sleek low-profile neck allows easy playability and fast action. A full 34" scale genuine ebony fingerboard is available with or without frets. The back and sides are bookmatched from solid East Indian rosewood adding warmth to the already loud boomy bass sound. **Basic Specifications & Suggested List Price:** The BC-40 can be ordered with a specially designed Bass Thinline 332 Pickup. Retail price \$2,530 (less electronic options, hardshell case included).

METALHEAD ELECTRONICS

5707 Cahuena Blvd.; North Hollywood, CA 91601; (818) 980-1975. **Product Name:** Excalibur EP-1. **Contact:** Elan. **Date Product Introduced:** 2/92. **Product Description & Applications:** 3-channel, tube guitar preamp. Key switch protects from unauthorized use. Red cosmetics with chrome hardware. **Basic Specifications & Suggested List Price:** 5 tubes, digital switching, noise reduction, speaker simulation, balanced stereo XLR outputs, 2 EFX loops. \$1,699.

MIDIMIX

PD Box 161; Ashland, OR 97520; (503) 488-1023. **Product Name:** MIDIMIX 2. **Contact:** PJ. **Date Product Introduced:** 12/91. **Product Description & Applications:** Midimix 2 is a MIDI foot-controller. The device allows foot-controlled operation of MIDI equipment. Basic functions include: selection of MIDI program change commands, MIDI bank change, playing notes and chords, Oberheim bank change, FB-01 bank change, MT-32 patch mapping, part selection, partial reserve, reverb changes, timbre bank downloading, MIDI controller messages, and complete sequence control with song select, start, stop and tempo control. **Basic Specifications & Suggested List Price:** Production dimensions: 22 inches by 6 inches. Front panel has 2 rows of 8 switches, 4 LED and a 3 digital display. Power via 4 D-cell batteries that last a year in normal use, or via Midimix 3 power—MIDI adapter. Suggested list price, \$240.



MIDIVOX MARKETING
Midivox®

MIDIVOX MARKETING

4101 NASA Rd. 1, #156; Seabrook, TX 77586; (713) 326-1888; (800) 433-MIDI; FAX: (713) 532-1441. **Product Name:** Midivox®. **Contact:** Timothy Kelly, pres. **Date Product Introduced:** 6/92. **Product Description & Applications:** Midivox professional voice controller. Growl a trumpet—hum a bass—croon a sax. Laugh a clarinet—yell, a cello—scream, a guitar. Hands-free operation. The Biosensor collar instantly translates your vocal cord vibrations into MIDI data. Go direct from your imagination to sound. Midivox is great for scat singing, instant lead sheets and transcriptions, recording, live performance, music education, working with special populations. Midivox® is made and designed in the USA. **Basic Specifications**

& Suggested List Price: Description: Voice-to-MIDI converter. 1 rack-mount interface. Biosensor collar. Features: chromatic and nonchromatic pitch tracking, flat and linear velocity curves, synth audition patch test buttons, voice range selection—male, female, or child, etc. Interfacing: 2 MIDI outs, synth "ah" analog voice output, voice synth, voice and level gates, etc. \$1,595. Factory-direct, 30-day, money-back guarantee.

MUSICRAFTERS INC.

PO Box 595; Montgomeryville, PA 18936; (215) 368-TUNE. Product Name: MusicCrafters Library. Contact: Elena deLise. Date Product Introduced: Updated 1992. Product Description & Applications: Acoustic and electronic music for advertising and video/film production available on CD and tape (including DAT). Basic Specifications & Suggested List Price: Albums are licensed on "buy out" basis. Fees range from \$35 to \$150 per album.

NETWORK MUSIC INC.

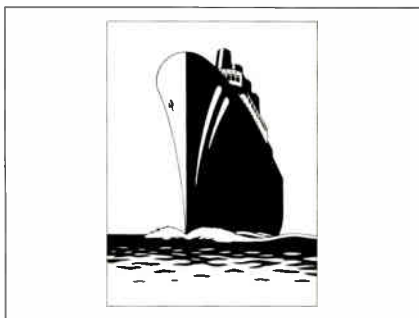
11021 Via Frontera; San Diego, CA 92127; (619) 451-6400. Product Name: Network Production Music Library. Contact: Bruce Tucker, VP. Date Product Introduced: Updated 92. Product Description & Applications: The Network library includes over 110 compact discs featuring a complete range of musical styles — dynamic music for business and sports, cutting-edge treatments, solo instruments, lightly and fully orchestrated themes, specialty, seasonal and comedy styles. Network offers an extensive Descriptive Word index in printed or software formats. The library is updated with a new compact disc release each month. Professionals at broadcast and cable facilities, recording studios, governmental agencies, educational institutions and corporate audio/visual departments all depend on the quality, versatility and consistency of the Network library. Basic Specifications & Suggested List Price: Network offers affordable licensing plans based upon market size, industry group, and the number of compact discs included in the license.

NETWORK MUSIC INC.

11021 Via Frontera; San Diego, CA 92127; (619) 451-6400. Product Name: Network Sound Effects Library. Contact: Bruce Tucker, VP. Date Product Introduced: Updated 1992. Product Description & Applications: The Network Sound Effects Library contains over 4,000 effects on 52 compact discs. Each sound effect is cued to a separate CD track number for easy, reliable access. The library includes an Alphabetical Index and a Sequential Index published in catalog and software formats. Network offers frequent updates to the library. Basic Specifications & Suggested List Price: The Network Sound Effects Library is available for a one-time license fee.

ON-SITE MUSIC GROUP

3410 Park Central Blvd.; Pompano, FL 33064; (305) 971-1728. Product Name: Rok Steady. Contact: Mitch Orelsky, pres. Date Product Introduced: 10/91. Product Description & Applications: Rok Steady support stands are modular and adjustable, and can easily support most keyboards, mixing consoles, amplifiers or monitors. Single, double, and triple-tiered models at quite economical prices can turn any cluttered keyboard or setup into an attractive and efficient system. Basic Specifications & Suggested List Price: Stands are constructed of lightweight tubular steel and won't rock or tip easily. Heavy-duty rubber prevents the keyboard or other supported objects from sliding while playing. They set up in seconds, are height-adjustable, easy to transport, and each single unit is quickly adaptable to support a second or third keyboard with the modular tilting-tier options. Accessories include a height-adjustable bench with a thick, three-inch, firm foam seat set on a 12" x 24" cushion, a sturdy black-nylon carry bag, and attachable mic boom.



THE PRODUCERS SOUND EFFECTS LIBRARY
The Producers Sound Effects Library

PRODUCERS SOUND EFFECTS LIBRARY

8033 Sunset Blvd. Ste. #289; Hollywood, CA 90046; (213) 969-0339; (800) 826-EFXS; FAX: (213) 969-0248. Product Name: The Producers Sound Effects Library. Contact: Melinda Miller, sales; Joel Valentine, pres. Date Product Introduced: 6/92. Product Description & Applications: The Producers Sound Effects Library is proud to announce its recent release of six new CDs. This series features the work from some of the most well-renowned Sound Designers in Hollywood. Three CDs concentrate on the Science Fiction realm. These Science Fiction CDs (SY-01, SY-02 & SY-03) are offered singly, as are all CDs offered by the Producers Sound Effects Library. Also currently available: Applause, AP-01; BGS-Restaurant, BG2-01; Crowds-Parade/Festival, CW1-01; Doors, DO-01; Rain & Thunder, RA-01; Telephones, TE-01; Traffic/General, TI-01; Trains, TN-01; Water, Oceans & Lakes, WA3-01. The Producers Sound Effect

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fects Library guarantees all of its products for life and offers a no-questions-asked, money-back guarantee. The Producers Sound Effects Library sounds more professional and is more usable than any other library. The library is unequalled in quality and organization. CDs are offered singly so that you may customize your library at a very affordable price. The Producers Sound: setting the standard for other libraries to follow. We promise to morph the way you think about sound effects. Basic Specifications & Suggested List Price: New releases are on sale individually for \$79.99. New releases are on sale as a set of six for only \$399.99 (Please, only two substitutions allowed). All other individual CDs are \$89.99. Larger sets are available at substantial savings. Please call for further pricing and information. A new release is already in the works.

PRODUCTION GARDEN LIBRARY

2411 NE Loop 410, Ste. #126; San Antonio, TX 78217; (800) 247-5317; (512) 599-9439. Product Name: Production Garden Library. Contact: Mel Taylor. Date Product Introduced: 1992. Product Description & Applications: The Production Garden Library offers quality, contemporary production music with an affordable lifetime blanket license. The "100" Series currently consists of 1,432 cuts on 15 CDs (:60s, :30, tags). The "200" Series contains 224 different full-length themes (2-4 minutes ea.) plus edits for a total of 739 cuts on 15 CDs. "Air Assault" is an additional disc in the "300" Series providing 240 hi-energy production elements. Five separate sound effects libraries are also available. Basic Specifications & Suggested List Price: Call for rate information.

PROMUSIC INC.

6555 NW 9th Ave., Ste. 303; Ft. Lauderdale, FL 33309; (305) 776-2070. Product Name: ABACO/Power House/Claire Music Libraries. Contact: Alain Leroux, pres; Cheryl Mathauer, mgr. Date Product Introduced: Second half of '92. Product Description & Applications: New music library labels offering a variety of first-class recordings in contemporary styles. Many compositions in full and commercial versions. Also contains music for comedy, drama, sports, hi-tech. Wide range of orchestration incl. many renowned performers. Basic Specifications & Suggested List Price: Needle drop, production blanket, or flexible annual license.

PROMUSIC INC.

6555 NW 9th Ave., Ste. 303; Ft. Lauderdale, FL 33309; (305) 776-2070. Product Name: File Effects. Contact: Alain Leroux, pres; Cheryl Mathauer, mgr. Date Product Introduced: 7/92. Product Description & Applications: 10 CDs of superbly, all digitally, recorded sound effects of the elements, animals, people, cities, travel, industry, etc. Most tracks 3 minutes in duration and avg. playing time per disc: over 75 minutes. Regular new releases. Basic Specifications & Suggested List Price: Discs may be purchased as a complete 10-CD Set (\$600) or individually (\$79/CD).

PS SYSTEMS INC.

8451-A Mirlani Dr.; San Diego, CA 92126; (619) 578-1118; (800) 446-8404. Product Name: The Power Tool. Contact: John Locklar, sales. Date Product Introduced: 5/92. Product Description & Applications: The Power Tool is the hub of your guitar rig. Converts the output of a tube guitar amp to line level with 4x12 or open-back cabinet simulation. Stage or recording without mics or speakers. Internal 50-watt amp powers speaker cabinets at any volume with the "On 11" sound. "Instigator" circuit gives open-back cabinets 4x12 response. Active four-band post distortion E.O. and post distortion effects loop offer new tone shaping possibilities. Basic Specifications & Suggested List Price: Reactive speaker load 50-watt amp ±18dB 4-band tone controls. Effects loop, 25-watt headphone amp. Mix amp and line level in. Balanced and un-balanced line outs. Sealed Bourns pots. Polypropylene capacitors. Metal film resistors. Ultra low noise op amps. Audiophile quality.

QCCS PRODUCTION

1350 Chambers St.; Eugene, OR 97402; (503) 345-0212. Product Name: "PBTM" Royalty-Free Music. Contact: Michael G. Brewer, owner. Date Product Introduced: Updated 92. Product Description & Applications: Currently (8) CD volumes of buy-out music in contemporary/classical/industrial/sports and suspense styles. 50 to 55 minutes per volume. Long themes plus :30 to :60 second segues. Used primarily in broadcast production, commercials and video sales and promotions. Free catalog and 24-hour demo-information line (503) 345-0212. Basic Specifications & Suggested List Price: High-quality professional music at \$70 a disc buy-out.

RIVER CITY SOUND PRODUCTIONS






PO Box 750786; Memphis, TN 38175; (800) 755-8729. Product Name: Production Music Library. Contact: Bob Pierce. Date Product Introduced: 1/92. Product Description & Applications: Brand new buy-out production music library. All new tracks specifically recorded for this library. Currently two general use volumes and one "Wedding" volume available. Volumes 1 and 2 are perfect for corporate video, AV productions, radio and TV spots and multi-image. The "Wedding" CD is targeted to wedding videographers and planners. Basic Specifications & Suggested List Price: Each volume (CD) is priced at \$59 plus \$3 S/H.




SIGNATURE MUSIC INC.

PO Box 98; Buchanan, MI 49107; (800) 888-7151. Product Name: "Light and Lively" and "Orchestral Movements." Contact: Bill Mullin. Date Product Introduced: 7/92. Product Description & Applications: Two new CD volumes feature: (1) Solo instruments and small ensembles, all performed on real instruments, and (2) full orchestra movements themes of prestige, challenge, grandeur and success. The library is appropriate for production applications of corporate, educational, commercial, medical and religious. Basic Specifications & Suggested List Price: Call for info.



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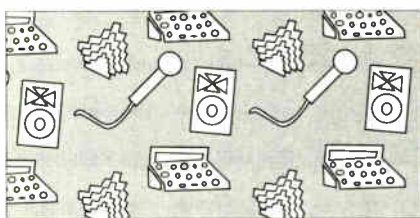
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Music Products

SONIC BOON

2453 East Virginia Ave.; Anaheim, CA 92806-4228; (714) 535-3344. **Product Name:** "The Works" **Contact:** Chris Lango. **Date Product Introduced:** 1992. **Product Description & Applications:** Sound effects library of industrial, mechanical, and specialty sounds, including machines, motors, hydraulics, pneumatics, levers, buttons, switches, stresses, electrical effects, and industrial backgrounds. The library contains over 2,000 effects, and the backgrounds are each 6 minutes or longer. The library comes with detailed descriptive documentation and is supported by Leonardo and Gefen Systems' software programs. **Basic Specifications & Suggested List Price:** 8-CD library list price is \$495, NED optical disc format \$2,750. Significant discounts apply when purchasing multiple libraries. Individual CDs from the library are available separately, as well as single CD of assorted effects compiled especially for use with samplers.



SOUND IDEAS
The General Series 6000 Sound Effects Library

SOUND IDEAS

105 W. Beaver Creek Rd., Ste. 4; Richmond Hill, ON, L4B 1C6 Canada; (416) 886-5000; (800) 387-3030. **Product Name:** The General Series 6000 Sound Effects Library. **Contact:** Michael Bell, VP. **Date Product Introduced:** 7/92. **Product Description & Applications:** The new standard in sound effects libraries. The General Series 6000 is the largest, most-comprehensive, digital sound effects library ever created. It consists of over 7000 digital sound effects (50 hours of recorded sounds) on 40 compact discs. The library includes new and expanded sound categories such as an extensive animal collection, transportation sounds and crowds (small and large), long ambience effects from around the world, weather, aviation, military, Foley sounds and much, much more. As a special feature, the General also includes a unique 4-CD Sound Designer Collection. **Basic Specifications & Suggested List Price:** \$1,495.

STICK ENTERPRISES INC.

6011 Woodlake Ave.; Woodland Hills, CA 91367; (818) 884-2001. **Product Name:** The Grand Stick™. **Contact:** Yuta Chapman, VP. **Date Product Introduced:** 1/92. **Product Description & Applications:** A wider, 12-stringed model of the Stick®, with either 6 bass and 6 melody strings or 5 bass and 7 melody strings, designed for the 2-handed tapping techniques. A new omni-adjustable bridge unit allows reconfiguring to any other pair of tunings in any sequence of bass and melody strings. Everything that can be adjustable is now adjustable, including bridge, nut, truss, pickup assembly, coils, belthook and shoulder strap. **Basic Specifications & Suggested List Price:** Selling price (suggested list price) is \$1,593 for this new model, 12-string, wider Stick®. This price includes the case, book, stereo cord and adjustment wrenches.

TM CENTURY INC.

14444 Bellwood Parkway; Dallas, TX 75244; (214) 448-0050. **Product Name:** Winning Score. **Contact:** Richie Allen, VP. **Date Product Introduced:** 8/92. **Product Description & Applications:** The newest and easiest-to-use AV library. Finally a quality library for film, AV, video and broadcast. Covers industrial sports, moods, novelty, international, plus much more. **Basic Specifications & Suggested List Price:** Pricing varies according to selection.

WERSI

1818 Elm Hill Pike; Nashville, TN 37210; (615) 871-4500. **Product Name:** Wersi Digital Grand Pianos. **Contact:** Jim Rosenberg, product mkt mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** Using a 32-bit transputer (CPU) and RISC software, Wersi Digital Pianos re-create the sound of a real acoustic with no loops. No loops translate to a sound that is "live" and continually changing over time. A patented keyboard with a free-swing-

ing, hammer accurately reproduces the feel of an acoustic. Models are CS1, CT1, CG1 and CPF1. **Basic Specifications & Suggested List Price:** 64-voice polyphony, 88-note, hammer-action keyboard, 24-bit effects, 2 x 100-watt stereo amplifier, 8 speakers, full MIDI, audio in, speaker out, 20,000-note recorder, all wood cabinet, CPF1-flightcase standard. No list prices set—contact CMU/Gibson for further info.

RECORDING DEVICES

ACCURATE SOUND CORPORATION

3475-A Edison Way; Menlo Park, CA 94025; (415) 365-2843. **Product Name:** AS-4010 Cassette Logger/Recorder. **Contact:** Ronald M. Newdoff, pres. **Date Product Introduced:** 10/92. **Product Description & Applications:** Cassette recorder/logger using standard Philips audio cassette. Single and dual deck versions, rack-mounting. **Basic Specifications & Suggested List Price:** 24-hour recording on C90 cassette, 1 or 2 channel, 4 and 8 channel: 8 hours on C120 cassette. Time code/search, VOX, IEEE & RS-232.

ADAPTIVE DIGITAL SYSTEMS INC.

2146 Michelson, Unit A; Irvine, CA 92715; (714) 955-3116. **Product Name:** Solid State Recorder (JBIRD). **Contact:** Attila W. Mathe, pres. **Date Product Introduced:** 5/92. **Product Description & Applications:** JBIRD is an all-electronic, miniature, digital recorder that replaces conventional mechanical tape recorders. It uses advanced integrated-circuit technology and signal processing to achieve recording time of one to three hours, depending on the desired speech quality. Small and compact, the JBIRD is ideal for covert recording and audio surveillance applications. With flash memory option, the unit can retain recorded speech data even after the removal of the batteries. **Basic Specifications & Suggested List Price:** Selectable sample rate: 2KHz to 44.1KHz. Speech compression: 1:1, 2:1, 4:1, 5:1. Dynamic range: 96dB; SNR: 85dB @ 1:1. Manual/auto stereo recording. Size: 4.1 x 2.6 x 0.65". Option: 0-22dB gain, built-in playback. Flash memory, JBIRD: \$6,750; w/option \$9,250. Playback unit: \$2,950.



AIAW AMERICA
Portable DAT Recorder HD-X3000

AIAW AMERICA

800 Corporate Dr.; Mahwah, NJ 07430-2048; (201) 512-3600. **Product Name:** Portable DAT Recorder HD-X3000. **Contact:** Steve Lepore, technical asst. **Date Product Introduced:** 10/91. **Product Description & Applications:** We have integrated DAT and portable technologies. The result is the HD-X3000. The HD-X3000 has the following features: Equipped with AES/EBU-type standard digital interface. Can be used for up to 3 hours and 40 minutes non-stop. Highly reliable Cannon-type connector. Portable yet durable. The entire mechanism is enclosed in a strong aluminum housing. **Basic Specifications & Suggested List Price:** The HD-X3000 incorporates a 1-bit A/D and D/A converter, which has extremely low distortion at low sound levels. Subcode System featuring Absolute Time (A-Time), Start ID, Program no., and Program Time (P-Time). Large LCD screen displays the counter, REC level and subcode for recording and editing. 3-way power source: alkaline battery, rechargeable battery or AC adapter. Sugg. retail price: \$2,500.

AKAI PROFESSIONAL

PO Box 2344; Ft. Worth, TX 76113; (817) 336-5114. **Product Name:** DD1000i. **Contact:** Ron Franklin, dir. digital sales. **Date Product Introduced:** 9/92. **Product Description & Applications:** The DD1000i records stereo digital audio directly to removable magneto-optical disks. Two different events can be played back from disk simultaneously, and full non-destructive editing functions are provided. The DD1000i's combination of comprehensive audio-editing functions, analog and digital I/O, serial machine control, and system expansion capabilities make it ideal for virtually any application requiring random-access audio. **Basic Specifications & Suggested List Price:** One MO drive built in; 6 additional external drives can be connected. Approx. 30 minutes per side of each disk (stereo, 44.1KHz, 48KHz, 44.1KHz, 32KHz sampling rates. 1-bit, delta-sigma A/D w/64x oversampling; 18-bit, 8x oversampling D/A. AES/EBU, IEC958 digital I/O; RS-422 serial port. \$14,995.

ALESIS

3630 Holdrege Ave.; Los Angeles, CA 90016; (310) 558-4530. **Product Name:** ADAT. **Contact:** Allen Wald, VP adv/promo. **Date Product Introduced:** 2/92. **Product Description & Applications:** The ADAT 8-track professional digital audio recorder records 40 minutes of 16-bit linear digital audio on S-VHS cassettes. Its modular

design allows the synchronization of up to 16 ADATs for a 128-track digital recording system. The ADAT Proprietary Synchronization Interface (patent pending) synchronizes multiple ADATs to single-sample accuracy independent of the audio tracks. The ADAT Proprietary MultiChannel Optical Digital Interface (patent pending) carries all 8 tracks of digital information via optical digital I/O for unlimited degradation-free dubbing and editing. Optional BRC Master Remote Control. **Basic Specifications & Suggested List Price:** Suggested list price: \$3,995. Audio conversion: record (A/D), play (D/A); 16-bit linear audio, 64 times oversampling Delta-Sigma, single converter per channel. Sample rate: 48KHz; variable 40.26KHz to 50.85KHz. Frequency response: 20Hz to 20KHz ±0.5dB. Dynamic range: greater than 92dB. Distortion: .009% THD typical. Crosstalk between channels: better than -92dB. Wow and flutter: unmeasurable. Pitch control: +100 cents/-300 cents.

ALESIS

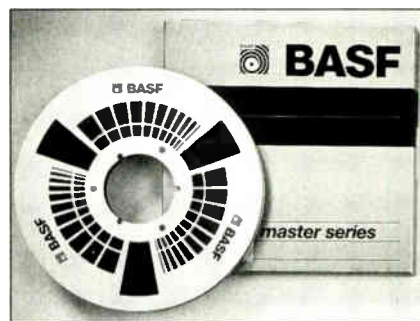
3630 Holdrege Ave.; Los Angeles, CA 90016; (310) 558-4530. **Product Name:** AI-1 Digital Interface. **Contact:** Allen Wald, VP adv/promo. **Date Product Introduced:** 1/92. **Product Description & Applications:** The AI-1 is an ADAT to AES/EBU and S/PDIF digital interface with sample rate conversion for interfacing ADAT to and from other digital recording equipment via ADAT's digital I/O. \$995.

AMS INDUSTRIES (SIEMENS AUDIO INC.)

7 Parklawn Dr.; Bethel, CT 06801; (203) 744-6230. **Product Name:** AMS Logic 1 SPECTRA. **Contact:** Charles Conte. **Date Product Introduced:** 4/92. **Product Description & Applications:** The only fully automated digital workstation on the market that allows you to mix on a real control surface—not on a screen—the Logic 1 SPECTRA now incorporates the following new software, hardware and ergonomic design advancements: on-line magneto-optical drive for recording and editing directly from a removable optical disk (providing zero backup time); high-speed Exabyte backup, with intelligent selective restore (provides 4x realtime backup and the ability to audition cues from the backup tape); slim-design control surface, based on the proven design of "softkeys" around a screen; color LCD active matrix, VGA-resolution control surface screen (standard color VGA can be used as extension monitor). The new AMS Logic 1 SPECTRA is the ultimate digital audio workstation for total sound production for picture. **Basic Specifications & Suggested List Price:** List price: \$220,000.

ANATEK (CREATION TECHNOLOGIES INC.)

400 Brooksbank Ave.; North Vancouver, BC, V7J 1G9 Canada; (604) 980-6850; (800) 736-1271 (US only). **Product Name:** RADAR. **Contact:** Tom Lang, marketing coordinator. **Date Product Introduced:** 10/92. **Product Description & Applications:** RADAR is a stand-alone, 24-track digital audio recording and editing system using state-of-the-art DSP and high-speed storage technology. Hard disk drives provide high-speed random-access storage of CD-quality, 16-bit audio data. Multiple units may be interconnected for additional tracks. The entry-level RADAR recording system records 8-track onto a single large-capacity drive, with optional kits fitting into the original hardware, allowing an economical upgrade path to 16 and 24 tracks. **Basic Specifications & Suggested List Price:** Each unit includes 24 balanced audio inputs and outputs at +4 or -10dB. SCSI expansion ports allow increased track time or backup via external devices. External synchronization is possible to SMPTE, MTC, word clock and video sync. Upgrades include a video monitor interface and remote controller (including a shuttle/fog wheel for editing). Price: under \$16,000/24 tracks.



BASF CORPORATION INFORMATION SYSTEMS
BASF Studio Master 911

BASF INFORMATION SYSTEMS

35 Crosby Dr.; Bedford, MA 01730; (800) 225-3326. **Product Name:** Studio Master 911. **Contact:** Terence D. O'Kelly, dir. sales. **Date Product Introduced:** 5/92. **Product Description & Applications:** BASF 911 is known for its outstanding reliability and storage stability. This unique double-coated tape offers wide dynamic range for demanding professional recording, particularly multitrack recordings. With a low modulation noise, very high maximum output level (+12 dB above reference level 320 nWb/m), and print through ratio of 57 dB, it is useful for long-term archiving. BASF's 911 is backed by BASF's full 10-year guarantee. **Basic Specifications & Suggested List Price:** Studio Master 911 is available in 1/4", 1/2", 1" and 2" reels and NAB hubs.

CONQUEST SOUND INC.

26113 S. Ridgeland; Monee, IL 60449; (800) 323-7671. **Product Name:** ADAT Multicables. **Contact:** Ed Knecht, sales. **Date Product Introduced:** 5/92. **Product Description & Applications:** Interface

multicables for Alesis ADAT machines. EDAC multipin to XLR, EDAC multipin to balanced 1/4", 1/4" to 1/4", 1/4" to RCA. All connectors are Switchcraft. Wire is custom design. Lifetime warranty. **Basic Specifications & Suggested List Price:** List prices vary with configuration and length.

DIC DIGITAL

222 Bridge Plaza S.; Fort Lee, NJ 07024; (201) 224-9344. **Product Name:** Recordable Compact Disc (CD-R). **Contact:** Kevin Kennedy, nat'l mktg. mgr. **Date Product Introduced:** 7/92. **Product Description & Applications:** Recordable compact disc (CD-R) for use in studio and computer applications. The product meets or exceeds industry standards and is compatible with all CD recorders. A unique package design is geared toward user's needs and is easily identified in catalog storage applications common in studio environments.

DIGIGRAM

Parc De Pre Milliet; 38330 Montbonnot, France; (33) 7652-4747; **FAK:** (33) 7652-1844. **Product Name:** XTrack. **Contact:** Girard-Bultoz, pres. **Date Product Introduced:** 1/92. **Product Description & Applications:** XTrack, digital audio storage and editing workstation combines performance technology with intuitive ease of use. This multitrack system is available with 2, 4, 6 or 8 channels in kit or in rack-mounted PC/AT. With XTrack, you are assured of CD quality audio and audio compression resulting in increased recording capacity. The system is PC-based, it is therefore expandable and open to all the PC environment. It includes optional catalog facilities and external synchronization. **Basic Specifications & Suggested List Price:** PC-based system with up to 8 fully independent channels and 16 virtual tracks. XTrack provides CD-quality audio using real-time data compression with algorithms WB4S8BC or MUSICAM (as an option). Up to 10 hours of music can be recorded on a 600 MB hard disk. XTrack can be synchronized by an RS422 or to an external clock (LTC time code video, MIDI). MUSICAM is available as an option. All this makes XTRACK a very creative tool for a price between \$30,000 FRF and \$230,000 FRF depending on the configuration you need.

DIGITAL AUDIO RESEARCH LTD.

2 Silverglade Business Park; Leatherhead Rd., Chessington; Surrey, KT9 2QL England; (44) 0372 742848. **Product Name:** SoundStation with new Version 5.0 software and SigNet. **Contact:** Jeff Bloom, mktg. dir. **Date Product Introduced:** 3/92. **Product Description & Applications:** Version 5.0 software endows SIGMA with advanced segment-based internal digital mixing capabilities, while both SIGMA and SoundStation II now include a number of new productivity-enhancing features, including reel split and reel merge, automated drop-in to time code and new routing configuration presets. True multi-access SoundStation networking is now possible with SigNet, which unites SoundStations into an easy-to-use integrated system for wide-ranging user access to networked SoundStations. **Basic Specifications & Suggested List Price:** SoundStation touchscreen control for fast, familiar tape-like functions including reel-rock editing, cut, mark, copy, loop, splice segment sliding, and seamless crossfades. 4 analog inputs, 8 to 16 analog outputs, 8 to 16 channels of intelligent AES/EBU digital I/O, 4 to 16 track hours audio storage @ 16 bit, 44.1 kHz. Segment-based internal digital mixing, OSP with segment-based equalization, gain and pan settings. Rewritable optical disk sub-system. Full time code chase, machine control, auto location. Stereo TimeWarp time compression/expansion. Backup to optical disk, DAT or other digital storage media. Optional WordFit automatic dialog synchronization. Optional SigNet networking.

DIGITAL AUDIO TECHNOLOGIES SA

34 Ave. De La Gottaz; Morges 1110, Switzerland; (41) 21 803 21 01. **Product Name:** Steladat. **Contact:** Bill Peugh (703) 378-1515. **Date Product Introduced:** 1991. **Product Description & Applications:** Portable professional R-DAT recorder for broadcast and movie field acquisition. **Basic Specifications & Suggested List Price:** Fully modular, water resistant. From \$7,000 to \$16,000.

FOSTEX CORPORATION

15431 Blackburn Ave.; Norwalk, CA 90650; (310) 921-1112. **Product Name:** D-20B. **Contact:** David Oren, VP marketing. **Date Product Introduced:** 10/91. **Product Description & Applications:** Fostex pioneered digital technology with the introduction of the D-20 in 1989. Model D-20B offers added time code generator and chase lock synchronizer, and is capable of transcoding time code from tape. The D-20B offers true VTR emulation and is supported by a wide variety of video editors. Model D-20 will continue to be available.

FOSTEX CORPORATION

15431 Blackburn Ave.; Norwalk, CA 90650; (310) 921-1112. **Product Name:** PD-2. **Contact:** David Oren, VP marketing. **Date Product Introduced:** 10/91. **Product Description & Applications:** The new Fostex Model PD-2 portable time code DAT recorder offers a complete range of features, including switchable 48, 44.1 and 44.056 sampling frequencies, built-in time code generator, off-tape (confidence) monitoring and record synchronization via a variety of external references, including word-sync, composite video reference or frame pulses. Weight with battery pack is less than 10 lbs.

GENTNER BROADCAST SYSTEMS

1825 Research Way; Salt Lake City, UT 84119; (801) 975-7200. **Product Name:** Audisk. **Contact:** Elaine Jones, sales mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** Audisk is a hard disk audio storage/retrieval system that replaces traditional cart machines with higher-quality digital technology. Audisk is computer-based to accurately record up to three hours of stereo,

15 kHz audio from production room sources. In the production room, commercials, PSAs, promos, jingles, sound effects, etc. are stored as audio files in pre-designated slots. Once audio has been recorded in production, it is instantly available for playback in Master Control. New events may be recorded and scheduled at any time, even while the system is on-air. Immediate playback, start-recording-on-audio, and the system's ability to instantly play the first and last few seconds of a recording all make Audisk easy and efficient to use. **Basic Specifications & Suggested List Price:** Audisk System-Mono (includes one record and one playback channel, simultaneous): \$11,500. Audisk System-Stereo (includes one record and one playback channel, simultaneous): \$12,500. Audisk System-Mono with dual output (includes one record and two playback channels, simultaneous): \$12,450. Audisk System-Stereo with dual output (includes one record and two playback channels, simultaneous): \$14,170. Above prices do not include hard drive, which is mandatory for the system. Please call Gentner at (801) 975-7200 to order Audisk and all necessary accessories.

JVC PROFESSIONAL PRODUCTS

41 Slater Dr.; Elmwood Park, NJ 07407; (201) 794-3900 (ext 241). **Product Name:** DSDT900NS. **Contact:** Matthew Weiner, product mgr. **Date Product Introduced:** 11/91. **Product Description & Applications:** SMPTE R-DAT 9-pin serial control for use in video and audio synchronization and editing. New software includes front-panel SMPTE display, A-Time to SMPTE conversion, and "smart digital interface" that accepts S/PDIF and AES and allows start IDs to be written via AES port at -60dB threshold (same as analog inputs). **Basic Specifications & Suggested List Price:** List price is \$4,850 and includes 1-bit converters, AES interface, SMPTE ability, 9-pin serial and 45-pin parallel ports and a built-in video sync generator.

JVC PROFESSIONAL PRODUCTS

41 Slater Dr.; Elmwood Park, NJ 07407; (201) 794-3900 (ext 241). **Product Name:** XP P1 PRO. **Contact:** Matthew Weiner, product mgr. **Date Product Introduced:** Fall '92. **Product Description & Applications:** The world's smallest portable DAT recorder features a digital output microphone (M/S Short Shotgun), 1-bit, 64 times O/S A/D converters, 18-bit twin D/A, 8 times O/S converters, and is operable in a number of configurations. -10 mic/line in, S/PDIF digital I/O, optical input -10 line out. Records analog 44.1, 48. Also comes with a mic stand and remote control (wired). **Basic Specifications & Suggested List Price:** Estimated list price is \$1,500. Applications include mastering for music, V/O, reporter usage at press conferences, location audio recording, interviews, sampling.

KORG USA INC.

89 Frost St.; Westbury, NY 11590; (516) 333-9100. **Product Name:** SoundLink. **Contact:** Dave Goldberg/Mike Haprov, appl. eng. **Date Product Introduced:** 1/92. **Product Description & Applications:** 8-track hard disk random-access recorder/editor. Designed for use in audio-for-video post-production as well as audio production. SoundLink consists of three pieces of hardware: main unit houses all I/Os, OSP including EQ, reverb, time compression/expansion, noise gates and compressor, serial ports for machine control, all synchronization formats. Storage unit houses the hard disk(s) and tape backup. The console, which serves as the work platform, has dedicated faders, switches, jog/shuttle wheel and LED meters. **Basic Specifications & Suggested List Price:** Base system includes 2 hours of track time (expandable to 10 hours), Exabyte 8mm tape backup, 8 analog inputs, 10 analog outputs, 1 digital input, 2 digital outputs, 9 pin machine control, LTC reader/generator, VITC reader, internal DSP and MIDI recorder. \$37,000.

MAXELL CORPORATION OF AMERICA

22-08 Rte. 208; Fair Lawn, NJ 07410; (201) 794-5900. **Product Name:** D-3. **Contact:** Patricia Byrne, product mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** D-3 1/2" composite digital videocassette for 1/2" composite digital VTR. **Basic Specifications & Suggested List Price:** The major characteristics of the product are as follows: (1) Fine ceramic armor metal particles; (2) Special reinforced base film; (3) Highly reliable binder system; (4) High-precision cassette mechanism. Available as 30 minute small, 30, 60 and 90 minute medium and 120, 150 minute large. List prices run from \$151.92 for a 30 minute to \$465.74 for a 150 minute.

MICRO TECHNOLOGY UNLIMITED

156 Windchime Ct.; Raleigh, NC 27619; (919) 870-0344. **Product Name:** MicroSound Studio Systems. **Contact:** M.K. Stierhoff, mktg. dir. **Date Product Introduced:** 8/92. **Product Description & Applications:** MTU has released MicroSound OAWs in rack-mount cases. Standard MicroSound features include: simultaneous play/record on 1 drive, mix/play of 38 simultaneous 1/2-/4-track segments, network compatible, sample precision non-destructive wave editing and DAT archiving of mix/edit files with undoable edits after restoring. Internal drives are shock-mounted for studio/road use. MicroSound Tower Workstations will continue to be offered. Microsound workstations are used in radio, video/film, recording studio and noise removal. **Basic Specifications & Suggested List Price:** MicroSound Studios include: I/O rack (2U), balanced analog input (64x oversampling) and output (8x oversampling), AES/EBU-S/PDIF digital; CPU rack (5U) 80486DX-33 cache motherboard, OOS 5.0, Windows 3.1, MicroEditor 2.0 and shock-mounted drives. 510MB system; suggested retail of \$8,595. Optional MicroStore™ rack holds 4 hard/MO drives.

MICRO TECHNOLOGY UNLIMITED

156 Windchime Ct.; Raleigh, NC 27619; (919) 870-0344. **Product Name:** MicroSync. **Contact:** M.K. Stierhoff, mktg. dir. **Date Product Introduced:** 8/92. **Product Description & Applications:** MTU has

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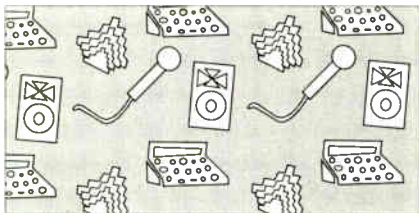
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Recording Devices

—LISTING CONTINUED FROM PREVIOUS PAGE

released MicroSync™, a complete synchronization package for MicroSound digital audio workstations. SMPTE and black burst jam sync are supported with varispeed operation from +13% to -90% at 44.1 kHz. MIDI ports are included to allow MIDI Machine Control. MicroSync allows MicroSound DAWs to perform as well as high-ticket multitrack systems, especially in A/V and audio post markets. Trigger synchronization continues to be offered as a low-cost alternative for project studio and radio markets. **Basic Specifications & Suggested List Price:** Requires one 16-bit slot in a AT-bus (IBM) compatible computer. Includes SMPTE in/out, video in (BNC jacks) with optional D9 MIDI/MMC port. 44.1k sync range is +13%/-90%. Sample rate adjustment range is 4,000-50,000/sec., adjustable to sample/sec. Accuracy is 1 millisecond over 2 hours. Suggested retail price of \$1,500.

OTARI CORPORATION

378 Vintage Park Dr.; Foster City, CA 94404; (415) 341-5900. Product Name: ProDisk-464. Contact: Matt Ward, prod. mgr. Date Product Introduced: Updated 1992. **Product Description & Applications:** Digital audio workstation. 4- to 64-track recording capability includes dedicated control hardware and upgradable software, plus a series of new functions and optional accessories. CB-158 hardware control panel with transport and edit functions controls in lieu of mouse/keypad operation. **Basic Specifications & Suggested List Price:** Four to 64 tracks, expandable in 4-track increments. 120 track-minutes, max. 720 track-minutes per 4-track system. Apple Macintosh Plus or better with minimum of 1MB RAM and Mac OS System 6.0.6 or later. Base price of \$31,950 (4-track).

OTARI CORPORATION

378 Vintage Park Dr.; Foster City, CA 94404; (415) 341-5900. Product Name: R-DAT. Contact: James Goodman, nat'l sales mgr. Date Product Introduced: 4/92. **Product Description & Applications:** R-DAT series includes the DTR-7, which is active balanced analog I/O, both AES/EBU and S/PDIF digital audio interface for versatile system integration. The DTR-90 is compatible with the EIAJ/DAT format, making it ideal for audio mastering, post-production soundtrack editing, broadcast playback, sound library operation and other applications where R-DAT is specified. This unit has a 4-head drum which enables after-monitoring during assemble recording to assure perfect results. **Basic Specifications & Suggested List Price:** DTR-7 is a 2-head transport mechanism which conforms to DAT standards. List price \$1,695. DTR-90 has a front-loading transport mechanism which conforms to DAT standards. It has 4 rotary heads. Shuttle speeds of 1, 2, 3, 5, 9 and 16 times. List price \$8,495.

PHI TECHNOLOGIES/NAGRA

4605 N. Stiles; Oklahoma City, OK 73105; (405) 521-9000. Product Name: NAGRA-D. Contact: Danny R. Grimes, product mgr. Date Product Introduced: 3/92. **Product Description & Applications:** NAGRA-D is a 44-channel, 24-bit portable sync recorder with full SMPTE/EBU time code. The rotary VHS head design provides approximately 1 hour 4 channel/2 hours stereo on a 5" reel of standard 1/4" digital tape. **Basic Specifications & Suggested List Price:** Number of channels: 2 or 4. Auxiliary tracks: SMPTE/EBU time code, cue, control. Record time: 5" reel 2 ch—1 hr. 52 min., 4 ch—58 min., 7" reel 2 ch—3 hr. 52 min., 4 ch—1 hr. 56 min. Sampling frequencies: 32kHz, 44.1kHz, 48kHz. Digital in/out: 24 bits (AES). Analog in/out: 18 bits.



SAKI MAGNETICS, INC.

SAKI MAGNETICS
Sony/AMPEX VPR Audio Post

SAKI MAGNETICS

26600 Agoura Rd.; Calabasas, CA 91302; (818) 880-4054. Product Name: Sony/AMPEX VPR Audio Post. Contact: Diamond Lauf-

fin, sales eng. Date Product Introduced: 4/92. **Product Description & Applications:** Sony and Ampex 1" C format ferrite audio record/playback head. The Saki head is a premium-quality factory-equivalent replacement for use in the Sony BVHs and Ampex VPR VTRs, providing superior sound, smoother tape handling, and increased head life. The Saki head is made of hot-pressed, glass-bonded ferrite, not metal. Because ferrite is much denser than metal, the Saki head is polished smoother to protect precious master tapes. And because ferrite is much harder, it lasts up to 10 times longer than metal. The Saki head is made in the U.S.A. and is mechanically and electrically interchangeable and meets or exceeds all factory specifications. 100% customer satisfaction guaranteed. \$695.



SONY BUSINESS & PROFESSIONAL GROUP
PCM-3324S DASH Digital 24 Channel Recorder

SONY BUSINESS & PROFESSIONAL GROUP

3 Paragon Dr.; Montvale, NJ 07645; (201) 358-4197. Product Name: PCM-3324S DASH Digital 24 Channel Recorder. Contact: Mike Sekiguchi, product manager. Date Product Introduced: 7/92. **Product Description & Applications:** The PCM-3324S 24-channel digital audio recorder is Sony's third generation DASH 24 recorder. This cost-effective recorder has a wide variety of options available, allowing customers to configure the machine to meet their needs. Standard features include an extremely fast transport, 4-times play speed, pre-stripping, and the latest in A/D and D/A technology. **Basic Specifications & Suggested List Price:** List price starting at \$65,500.

STUDER REVOX AMERICA INC.

1425 Elm Hill Pike; Nashville, TN 37210; (615) 254-5651. Product Name: D740 CD Recorder. Contact: Joe Bean, sales mgr. Date Product Introduced: 4/92. **Product Description & Applications:** The D740 CD recorder is a completely self-contained, compact-size unit for recording custom CDs. No external hardware or PC is necessary for control. Studer's exclusive design assures users of complete compatibility with standard model professional and consumer CD players. Superior "Studer" sound is achieved through the excellent A-D/D-A converters, and the D740's logically arranged keyboard offers convenient operation, fast accurate cueing and easy access to commands. **Basic Specifications & Suggested List Price:** To provide the highest quality audio signal, particular attention was given to the development and implementation of the analog circuits and the A-D/D-A converters. Frequency response: 20Hz-20kHz (± 0.2dB). Bitstream converter technology. Phase linearity ± 3 deg. (20Hz-20kHz). Digital I/O, optical, RCA or XLR connections. Data format: S/PDIF and AES/EBU.



STUDER REVOX AMERICA INC.
Studer D780 R-DAT

STUDER REVOX AMERICA INC.

1425 Elm Hill Pike; Nashville, TN 37210; (615) 254-5651. Product Name: Studer D780 R-DAT. Contact: Joe Bean, sales mgr. Date Product Introduced: 4/92. **Product Description & Applications:** To deliver the utmost precision and exceptional speed, the D780 incorporates the most advanced transport technology available today. Extremely high spooling speeds of up to 400 times play speed are achieved. Also supported is a variable search mode with cueing in either direction. The D780 may be operated as a stand-alone unit or mounted in the rack. The ergonomic design features large control keys for simple operation and a cue wheel for fast, accurate positioning. **Basic Specifications & Suggested List Price:** Instantaneous start in play mode is possible through the D780's Quick-Start feature. Approximately 7 seconds of the recording are stored into a

special memory around the desired starting point. Other functions such as Start Review and Auto Cue are standard on the D780. Selection number, as well as start, jump and end points can be programmed. The front-loading R-DAT is equipped with parallel and serial RS-232/422 interfaces.

STUDER REVOX AMERICA INC.

1425 Elm Hill Pike; Nashville, TN 37210; (615) 254-5651. Product Name: Studer D820 48-track digital recorder. Contact: Joe Bean, sales mgr. Date Product Introduced: 3/92. **Product Description & Applications:** The D820-48 offers 48 tracks of excellent sound for high-quality digital recording. Other features include a 40-second, 4-channel, RAM-based internal sound memory for digital editing. Studer's exclusive A/D converters, built-in synchronizer and TC generator, sample-accurate track bouncing in real-time, plus full remote capabilities including channel control, autolocator with synchronizer, and interface for parallel channel control from mixing console. Two of the D820's 4 aux tracks may be used as cue tracks. **Basic Specifications & Suggested List Price:** 48-track DASH format with 4 auxiliary channels; digital I/O—AES/EBU, MADI, SDIF Multi; audio memory for editing; DSP-based signal processing for crossfading, switching and error correction; built-in test signal generator; extremely high error correction capabilities; 4-times oversampling D/A converters.



STUDER REVOX AMERICA INC.
Studer Dyaxis II

STUDER REVOX AMERICA INC.

1425 Elm Hill Pike; Nashville, TN 37210; (615) 254-5651. Product Name: Studer Dyaxis II. Contact: Joe Bean, sales mgr. Date Product Introduced: 8/92. **Product Description & Applications:** Studer Dyaxis II multichannel digital audio production system offers real-time multichannel capabilities, real-time crossfades, non-destructive punch-in/out, and real-time digital mixing and signal processing in a modular multitrack package. Combining up to 6 Dyaxis II processors provides up to 48 tracks of simultaneous playback. Each 8-track, 4-channel Dyaxis II processor includes a multitasking CPU, DSP board with 8 digital signal processors, time code reader/generator/synchronizer, and 4 channels of digital and analog I/O. **Basic Specifications & Suggested List Price:** Unlimited virtual tracks, digital I/Os: IEC 958, AES/EBU, S/PDIF, SDIF-2, SDIF (multitrack), PD dub C, PD dub B (multitrack), Yamaha Cascade, Yamaha multitrack. Control sync: video and word clock. Also includes 5-band parametric EQ with event-based automation, full support for Studer optical media such as the D740 CD Recorder and D780 R-DAT, and Studer Editech's exclusive MultiMix software.

TASCAM

7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: CD 401 MkII. Date Product Introduced: AES 1992. **Product Description & Applications:** The CD 401 MkII is an economical, high-performance CD player designed for the professional recording, production or broadcast studio environment. Special circuits ensure that sound quality meets the most demanding standards. Fader start feature allows play to start automatically on fade in and stop at the completion of a fade out. **Basic Specifications & Suggested List Price:** \$849 suggested retail. Auto cue, pitch control, single play, XLR balanced and RCA unbalanced outputs, digital out, 28-selection music calendar, 4 mode time counter, 4 mode repeat, index search, auto space, skip. 19" rack-mount.

TASCAM

7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: DA 60. Date Product Introduced: AES 1992. **Product Description & Applications:** Time code DAT, professional digital mastering DAT. Capable of synchronizer control using SMPTE time code, off the tape monitoring, punch-in/out recording and variable speed operation insert recording. **Basic Specifications & Suggested List Price:** \$5,500. 4 head machine, word sync, video sync, Sony 9 pin option, X fade fade in, fade out, SMPTE card optional.

TASCAM

7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: HDR 4000. Date Product Introduced: AES 1992. **Product Description & Applications:** 4 track random access recorder. Common edit functions available on top panel for ease of use. Video sync, word sync, direct interface, jog and shuttle and scrubbing. 4 units may be chained to one controller. **Basic Specifications & Suggested List Price:** \$7,000. 2 channel record, 4 channel playback, 200 meg HD, SCSI expandable, MIDI option, multiple sample rates 48, 44.1, 44.056, 32.

TASCAM

7733 Telegraph Rd.; Montebello, CA 90640; (213) 726-0303. Product Name: MDR 88. Date Product Introduced: AES 1992. Product Description & Applications: 8-track digital recorder/reproducer utilizes the compact 8mm tape recording. STD 8mm cassette tape allows more than 1-1/2 hours of recording time. SMPTE capable and multiple deck slaving capability. Basic Specifications & Suggested List Price: \$4,500. 100 min. recording time, auto punch-in/punch-out, shuttle, SMPTE synchronizer card availability, AES/EBU digital interface available.



360 SYSTEMS
DigiCart Hard Disk Recorder

360 SYSTEMS

18740 Oxnard St.; Tarzana, CA 91356; (818) 342-3127. Product Name: DigiCart Hard Disk Recorder. Contact: Don Bird, broadcast products group. Date Product Introduced: 11/91. Product Description & Applications: DigiCart hard disk recorders provide up to 8 hours of CD quality stereo storage in a portable half-rack package. A high-density Bernoulli cartridge drive is also provided for backup and easy transportation of recordings. True random access to recordings makes DigiCart an ideal tool for on-air use, sound effects and production studios. A DSP section provides fast and precise digital editing of files, including generation of fades and adjustment of levels. The accessory hard-disk enclosure extends storage time to 48 hours. Basic Specifications & Suggested List Price: Sampling frequencies: 48k, 44.1k, 32k, 22.05k. Recording format: 16-bit linear in mono or stereo; Dolby AC-2 data compression optional at 48k stereo. Hard disks available in 230MB, 425MB and 1GB capacities. EIA-422/ES-bus serial remote control; SCSI connector for external drives; alphanumeric keyboard for adding titles to recordings. Price: \$3,995 w/o hard disk; \$5,590 w/230MB drive; \$7,295 w/425MB drive; \$8,490 w/1GB drive.

VIF INTERNATIONAL

PO Box 1555; Mountain View, CA 94042; (800) 848-4428; FAX: (408) 739-0809. Product Name: Tape Reel Retainer. Contact: Gordon Mackechnie, advisor, in'l ops. Date Product Introduced: 7/92. Product Description & Applications: Device for securing tape reels to professional audio tape recorders manufactured by TEAC/Tascam. Secures 1/4", 1/2" or 1" tape wide reels. Basic Specifications & Suggested List Price: VIFKIT 1000-T for use with 1/4" wide tape reels, US \$28. VIFKIT 1000-T.5 for use with 1/2" wide tape reels, \$49.50. VIFKIT 1000-T1 for use with 1" wide tape reels, \$75.

WAVEFRAME CORPORATION

4730 Woodman Ave., Ste. 405; Sherman Oaks, CA 91423; (818) 981-9235. Product Name: WaveFrame 1000 16-track. Contact: Susan Sloatman, mktg. mgr. Date Product Introduced: 10/92. Product Description & Applications: WaveFrame has announced plans to release a 16-track option for the WaveFrame 1000 digital audio workstation. WaveFrame 1000 users will soon be able to record, edit and output up to 16 simultaneous tracks of digital audio. When combined with WaveFrame's digital mixer, TimeFit compression/expansion software, digital EQ and reverb, editorial software and 16 voice sampler, the WaveFrame 1000 can complete virtually any audio production project entirely within the digital domain. Basic Specifications & Suggested List Price: List price to be announced soon. The 16-track option requires a WaveFrame 1000 system with at least four audio storage devices (hard disk or magneto-optical).

WAVEFRAME CORPORATION

4730 Woodman Ave., Ste. 405; Sherman Oaks, CA 91423; (818) 981-9235. Product Name: WaveFrame 401. Contact: Susan Sloatman, mktg. mgr. Date Product Introduced: 4/92. Product Description & Applications: With solid software that has been used and refined by audio professionals for over four years, the WaveFrame 401 allows both facilities and independents to apply WaveFrame's superior digital audio technology at breakthrough prices. The WaveFrame 401 includes everything needed to record, edit, sync-to-picture, and output up to 8 simultaneous tracks of audio. It is the newest member of the WaveFrame product line and is data-compatible with all other WaveFrame systems. Basic Specifications & Suggested List Price: The WaveFrame 401 system includes an 8-track recorder/editor, on-screen mixer, comprehensive sync facilities, 8 channel analog I/O, 2 channel digital I/O, hard drives, computer system and software, for only \$14,995. Options include additional audio storage (hard drives/magneto-optical drives), expanded mixer with EQ and editorial software.

WHEATSTONE CORPORATION

6720 VIP Parkway; Syracuse, NY 13036; (315) 455-7740. Product Name: Not So Hard Disk™. Contact: Ray Esparolini. Date Product

Introduced: 10/91. Product Description & Applications: Mass storage audio hard disk system with simple instant retrieval and playback. Designed for "live" applications such as TV audio, industrials, sound reinforcement playback, etc. System can be expanded to store up to 40 hrs. of audio. Perfect replacement for reel-to-reel, cassette, AAD cart playback devices. Basic Specifications & Suggested List Price: Full bandwidth digital audio standard 3 hr. storage system about \$26,000.

YAMAHA CORP. OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. Product Name: CBX-D5 Digital Recording Processor. Contact: Don Bowles, mktg. support mgr. Date Product Introduced: Late fall 1992. Product Description & Applications: A 4-track recording system, with 2-track simultaneous recording and 4-track CD-quality playback. Unit is connected to a controlling computer via SCSI-type connections, and hard disk units are connected directly to the CBX-D5, so much less processing power is demanded from the host computer than with other expansion card-type systems. CBX-D5 also has built-in DEQ (digital equalizer) circuitry to provide multi-band parametric equalization for each channel and digital signal processing. Unlimited MIDI tracks available with Mark of the Unicorn "Digital Performer" for the Macintosh and Steinberg "Cubase Audio" for the Atari. Basic Specifications & Suggested List Price: Recording sampling frequency of 44.1 or 48 kHz; input and output connections can be analog, using internal 16-bit A/D and 18-bit D/A converters, or digital; digital I/O consists of AES/EBU, S/PDIF and Yamaha Y2 (MEL2), allowing PCM audio transfer to digital audio equipment. Suggested list price: TBA.



YAMAHA CORP. OF AMERICA
DMR8 Digital Mixer/Recorder

YAMAHA CORP. OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. Product Name: DMR8 Digital Mixer/Recorder. Contact: Peter Chaikin, sales & mktg. mgr., prof. digital products. Date Product Introduced: 8/91, enhanced for 1993. Product Description & Applications: Integrated all-digital system for exceptionally high-quality recording and mixdown. Built-in 20-bit digital 8-track recorder with dedicated time code track and two aux tracks, 24-input digital console with dynamic automation and snapshot reset of all parameters. 3 onboard effect processors plus in-line effects. Time code generator and synchronizer onboard. Digital outputs to AES/EBU and CD/DAT devices. Analog 20-bit outputs for control room monitors and cue sends. Expandable to 24-track system with the addition of external DRU8 recorder units. New for '93: RC24 remote control option provides control of up to 3 DMR8 or DRU8 recorders. FMC9 8-channel format converter, AES/EBU-to-Yamaha. Basic Specifications & Suggested List Price: Recorder: 20-bit stationary-head uses Yamaha M20P tape. Dynamic range: 120dB. Freq. response: 20Hz-20kHz. Mixer section: 24-bit digital inputs, motorized faders. Output formats for stereo bus, control room, cue send are Yamaha, AES/EBU, CD-DAT and 20-bit analog. A/D converters (external): AD8X 19-bit delta-sigma encoding. Suggested retail price: \$34,000.



YAMAHA CORP. OF AMERICA
DRU8 20 Bit Digital Multitrack Recorder

YAMAHA CORP. OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. Product Name: DRU8 20 Bit Digital Multitrack Recorder. Contact: Peter Chaikin, sales & mktg. mgr., prof. digital products. Date Product Introduced: 8/91, enhanced for '93. Product Description & Applications: 20-bit digital 8-track recorder provides 120dB dynamic

—LISTING CONTINUED ON NEXT PAGE

Digidesign,
Opcode, Toa,
Coda, Passport,
Mark of the Unicorn,
Ramsa, Roland,
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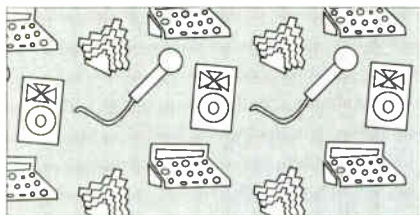
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Recording Devices

—LISTING CONTINUED FROM PREVIOUS PAGE

range in a 3-rackspace transportable unit. 8 digital PCM audio tracks, 2 aux tracks and time code track. Built-in 8x2 digital mixer; sync to time code, 9-pin serial protocol, and MTC. Multiple units may be slaved to provide more tracks. New for '93: RC24 remote control option provides control of up to 3 DRU8 recorders. Also, FMC9 8-channel format converter, AES/EBU-to-Yamaha. **Basic Specifications & Suggested List Price:** Stationary head transport; sampling frequency: 48kHz, 44.1kHz, 32kHz; varispeed $\pm 10\%$. Freq. response 20Hz-20kHz. Dynamic range 120dB, wow and flutter undetectable. I/O formats: Yamaha, other formats with FMC8, FMC9 format converters. Recording time: 22 minutes using Yamaha M20P tape. Suggested retail price: \$22,000.

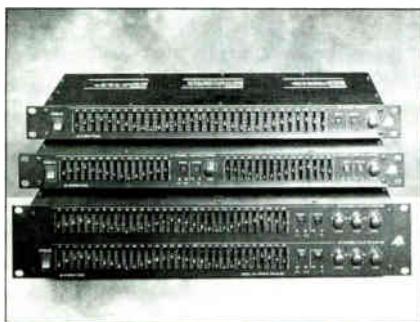


YAMAHA CORP. OF AMERICA
YPDR601 Compact Disc Recorder

YAMAHA CORP. OF AMERICA

6600 Drangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. Product Name: YPDR601 Compact Disc Recorder. Contact: Peter Chaikin, sales & mktg. mgr., prof. digital products. Date Product Introduced: 8/91, enhanced for '93. **Product Description & Applications:** Fully self-contained compact disc recording system using optical WORM discs. Two record modes permit recording to be paused or stopped and later resumed. One recording mode unique to YPDR601 permits playback of partially recorded discs on any standard CD player. All discs created on YPDR601 are fully Red Book compatible. YPDR601 consists of the YPDR601 recorder and RC601 remote controller. Applications: radio play-lists, spots, CD reference discs, compilations, sound effects libraries, sound design and theater applications. New for '93: TC601 time code interface option allows programmed control of YPDR601 functions from sources with time code. **Basic Specifications & Suggested List Price:** Records up to 74 minutes of audio on one CD. Inputs: AES/EBU and SDF-2 (CD Prep) digital, and +4/-10 analog. Outputs AES/EBU, analog +4. Externally controllable via serial and parallel control protocols. RC601 remote controls up to seven recorders. System suggested retail price: \$13,980.

SIGNAL PROCESSING



AB INTERNATIONAL ELECTRONICS INC.
Model 131, Model 231 and Model 215 Graphic Equalizers

AB INTERNATIONAL ELECTRONICS INC.

PD Box 1105, 1830-6 Vernon St.; Roseville, CA 95678; (916) 783-7800. Product Name: Model 131, Model 231 and Model 215 Graphic Equalizers. Contact: Irwin Laskey, vice president. Date Product In-

roduced: 6/92. **Product Description & Applications:** Our graphic equalizers offer affordable, professional-quality performance. The line includes the two-channel, 31-band Model 231, the two-channel, 15-band Model 215 and the single-channel, 31-band Model 131. Standard features on each model include a $\pm 6\text{dB}/\pm 12\text{dB}$ range switch, RFI filters, selectable line voltage, variable level control, passive bypass switch, overload LED, and ground lift switch. The Model 231 features variable low-cut and high-cut filters. The Model 131 features a low-cut filter control. **Basic Specifications & Suggested List Price:** Constant Q circuitry with 3% center frequency accuracy, 20Hz-20k Hz frequency response ($\pm 0.5\text{dB}$), less than 0.01% THD (20Hz-40kHz $\pm 10\text{dBu}$), -94dB EIN. Active balanced (XLR, 1/4") and unbalanced RCA inputs and outputs. Optional transformer balanced outputs. Model 231—\$599; Model 215—\$349; Model 131—\$339.

ADAPTIVE DIGITAL SYSTEMS INC.

2146 Michelson Unit A; Irvine, CA 92715; (714) 955-3116. Product Name: Time Domain Adaptive Processor 408A. Contact: Attila W. Mathe. Date Product Introduced: 5/92. **Product Description & Applications:** The TDAP-408A is an enhanced, 4-channel, Time Domain Adaptive Processor. During live broadcasting the 408A can eliminate background noises caused by machinery, lights and the environment. The filter can be used in the post processing mode to remove noise, hum and crosstalk across the entire audio band. The 8K filter size makes the 408A a powerful echo canceller in large auditoriums. **Basic Specifications & Suggested List Price:** 4-16 Bit inputs (mono or stereo processing), 4-16 Bit outputs, headset, 8K filter size, programmable delay to 4K, RS 232 interface, \$19,500 unit price.



APHEX SYSTEMS LTD.
Type C' Aural Exciter® with Big Bottom™

APHEX SYSTEMS LTD.

11068 Randall St.; Sun Valley, CA 91406; (818) 767-2929. Product Name: Type C' Aural Exciter® with Big Bottom™. Contact: Paul Freudenberg, sales mgr. Date Product Introduced: 9/92. **Product Description & Applications:** The Type C' Aural Exciter with Big Bottom™ is the next generation audio enhancer from Apex. Big Bottom (patent pending) is a bass signal processor which does for bass what the Aural Exciter has done for high-end intelligibility. **Basic Specifications & Suggested List Price:** 2-channel unit, 1/4" balanced in/outputs, \$299.

APPLIED RESEARCH & TECHNOLOGY (ART)

215 Tremont St.; Rochester, NY 14608; (716) 436-2720. Product Name: MDC 2001. Contact: Angelo Biasi, advertising & media relations. Date Product Introduced: 9/91. **Product Description & Applications:** First fully integrated studio-grade dynamics controlling systems. It features a compressor, de-esser, expander, noise gate, exciter, and peak limiter/clipper. XLR and quarter-inch inputs and outputs allow interface with all professional sound equipment.

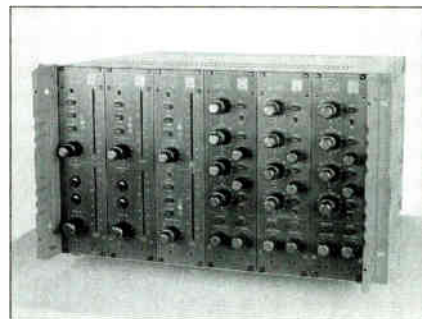


ARCHER COMMUNICATIONS INC./QSDUND LTD.
QSystem II

ARCHER COMMUNICATIONS INC./QSDUND LTD.

2748 37 Ave. N.E.; Calgary, Alberta, T1Y 5L3 Canada; (403) 291-2492. Product Name: QSystem II. Contact: Brian Cowieson, supervisor of music. Date Product Introduced: 9/92. **Product Description & Applications:** QSystem II is a real-time, multichannel, digital signal processing system that localizes sound (QSound) outside the normal stereo field. QSound can be reproduced via any conventional stereo system, with no additional decoding equipment necessary. When used during the mixdown process, QSystem II is fed discrete tracks (sounds) by way of console buses, aux. sends or

both. Users have the option of automated joystick panning to time code/MIDI or auto-panning with adjustable shape, rate and triggering. **Basic Specifications & Suggested List Price:** Sample rate: 48kHz. Frequency response: 20Hz-20kHz. Resolution: 19 bit input, 24 bit internal. Digital I/O: AES/EBU (ANSI S.40). Digital Gain Range: +12 dB to -84 dB. Analog Input/Output Level: +4 dBm. Signal to Noise: 96 dB. Headroom: 20dB. Input Channels: Groups of 8. Output Channels: stereo. Automation sync: SMPTE/MIDI. Power: 110V, 60Hz. Dimensions: 59x54x54 cm, 90kg.



AVALON DESIGN
Avalon Design A19 Modular Recording System

AVALON DESIGN

1310 Domador, San Clemente, CA 92673; (714) 492-2000; FAX: (714) 492-4284. Product Name: Avalon Design A19 Modular Recording System. Contact: Wynton R. Morro. Date Product Introduced: 3/92. **Product Description & Applications:** Avalon's A19 Modular Recording System features pure class A, high-voltage circuit designs. A standard 19" Eurocard rack holds up to 6 modules. Power supply is located externally. Modules include the M22 pure class A stereo microphone preamplifier, E55 pure class A, soft-curve parametric equalizer and the L44 pure class A optio-leveling amplifier. All modules incorporate fully discrete, high-voltage on-card regulators, high current class A output amplifiers LED metering, minimum signal path design and sealed relays for switching and routing. **Basic Specifications & Suggested List Price:** Circuit design: pure class A. Voltage operation: 80V symmetrical. Slow rate: 75V μsec . M22 EIN noise: -126dBv. E55 EIN noise: -100dBv. Maximum output 600 ohm: +31.5dB unbalanced. Frequency response -3dB: 2Hz-500kHz. Distortion, IMD, THD: 0.05%. Preamplifier gain: +18dB to +62dB. Prices: M22, \$2,590; E55, \$2,900; L44, \$1,950.

BBE SOUND INC.

5500 Bolsa Ave., #245; Huntington Beach, CA 92649; (714) 897-6766. Product Name: BBE 462 Sonic Maximizer. Contact: Rob Rizzuto; Steve Gram, dir. of mktg. Date Product Introduced: 5/92. **Product Description & Applications:** Single-rackspace unit. Improves performance of any speaker system through "time domain alignment" and phase correction. Low-contour control adds time-aligned low frequencies. Process control adjusts mids and highs. 462 incorporates RCA and 1/4" connectors. Model 862 has 1/4" and XLR connectors. **Basic Specifications & Suggested List Price:** 462—\$349; 862—\$599.99.

BENCHMARK MEDIA SYSTEMS INC.

5925 Court Street Rd.; Syracuse, NY 13206-1707; (315) 437-6300. Product Name: Benchmark MP-3 Microphone-preamp. Contact: R. Rory Rall, sales/mktg. Date Product Introduced: 7/92. **Product Description & Applications:** New MP-3 Mic Preamp. Jack-mounted, can be installed anywhere a high-quality mic-pre is needed. Balanced input/balanced output, allows it to drive lines up to 300' in length. Has the ability to feed phantom power (external source required). Ideal for applications such as sound reinforcement, E.N.G., classroom monitoring, etc. **Basic Specifications & Suggested List Price:** Gain range +26 to +65 dB; 1 dB noise figure, 0.005% THD @ 2 kHz (A=40 dB); Bandwidth >200 kHz. Only \$95.

BENCHMARK MEDIA SYSTEMS INC.

5925 Court Street Rd.; Syracuse, NY 13206-1707; (315) 437-6300. Product Name: Benchmark MPS-200 Portable Mic-Preamplifier. Contact: R. Rory Rall, sales/mktg. Date Product Introduced: 9/92. **Product Description & Applications:** Portable 2 In/2 Out Mic-preamplifier of "world class" performance. Improve your recordings, especially when using DAT recorders. AC/DC powered with phantom power. Rugged construction makes this unit a "go anywhere" mic-preamplifier. **Basic Specifications & Suggested List Price:** 1 dB Noise Figure, EIN=-130 dBu (150 ohm); THD @ 20 kHz (A=40dB) = 0.0008%; Gain Range = +26dB to +73dB; Bandwidth > 200 kHz. Price: to be announced.

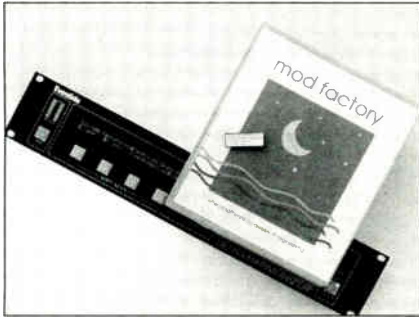
BRYSTON VERMONT LTD.

979 Franklin Ln.; Maple Glen, PA 19002; (800) 673-7899. Product Name: BMP-2. Contact: Martin Bartelstone, VP. Date Product Introduced: 4/92. **Product Description & Applications:** All discrete, 2-channel microphone preamp with instrument input. 48-volt phantom power totally balanced circuitry from input to output. Active balanced output (+30 dBm). Class A operation. Single rackspace. **Basic Specifications & Suggested List Price:** \$2,300.

CAMBRIDGE SIGNAL TECHNOLOGIES

1 Kendall Square, Bldg. 200; Cambridge, MA 02139; (617) 225-2499; FAX: (617) 225-9034. Product Name: AEC 1000. Contact: Burke Mathes, president. Date Product Introduced: 11/92. Product

Description & Applications: The AEC-1000 is a powerful digital filtering system designed to correct loudspeaker and room inaccuracies in monitoring applications. The AEC generates test signals, measures the system, then uses a proprietary algorithm to adapt a correction filter. The algorithm takes into account both time and frequency domain information and differentiates between direct and reflected sounds achieving unprecedented accuracy. Four stereo filters (and bypass) can be accessed via remote control. **Basic Specifications & Suggested List Price:** The main unit (\$8,000) features analog (adjustable sensitivity) and digital (AES/EBU, S/PDIF and Doptical) inputs and outputs. The filter is a two-channel 2544 tap/channel FIR with THD+N < -105 dBFS. Processing delay is < 2.0 mS. The AEC software (\$2,200) and a PC make the system a full-featured acoustic analysis tool.



CRESCENT ENGINEERING
Mod Factory

CRESCENT ENGINEERING

PO Box 1863; Montclair, NJ 07042; (201) 746-9417. Product Name: Mod Factory. Contact: Ken Bogdanowicz, owner. Date Product Introduced: 2/92. **Product Description & Applications:** Mod Factory™ is the latest software upgrade for the Eventide H3000 Ultra-Harmonizer®. It adds new digital audio-processing capabilities to any H3000, including gain-ducked delay and reverb, envelop-controlled filtering, flanging, autopanning and tremolo. New audio-rate LFDs add smooth modulations with a wide variety of continuous or audio-triggered waveforms. Manual flanging and other modulation effects are now possible with a software-simulated "analog" knob. Delays and LFDs can be tapped in via the front panel or a MIDI foot pedal to tune effects to the tempo of the music. **Basic Specifications & Suggested List Price:** Number of presets: 100. Delays: Two delays of up to 32 seconds each (depending on hardware configuration of H3000). List price: \$250.



DEMETER AMPLIFICATION
VTMP-2A Tube Microphone Preamplifier

DEMETER AMPLIFICATION

2912 Colorado Ave. #204; Santa Monica, CA 90404; (818) 986-7103. Product Name: VTMP-2A Tube Microphone Preamplifier. Contact: Michael Melzer, mktg./sales dir. Date Product Introduced: 1/92. **Product Description & Applications:** The Tube microphone preamp makes any ordinary microphone sound like a rare vintage tube mic. The two-channel unit is completely tube-based for a distinctively warm, yet clean and quiet sound. It is typically used to bypass the console preamps to provide the shortest possible signal path, thus greatly increasing fidelity in all recording applications. **Basic Specifications & Suggested List Price:** List price \$1549. 2-channel mic/line preamp. 12AX7A(2) 12AT7 (1) 12BH7 (2), gain 0-52 dB, switchable phantom power (48v), XLR and 1/4" inputs, XLR, 1/4", TT (Bantam) outputs. THD .0662 at 1 kHz. Bandwidth flat ±3dB 20 Hz to 20 kHz. 2 rackspace sizes.

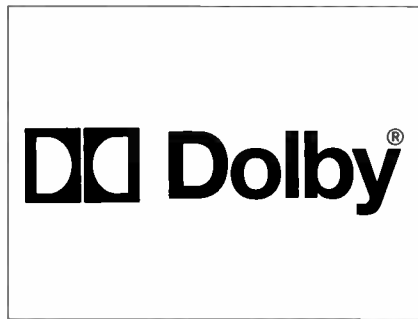
DIGITAL AUDIO RESEARCH LTD.

2 Silverglade Business Park; Leatherhead Rd., Chessington; Surrey, KT9 2QL England; +44 0372 742848. Product Name: DASS 100 with Version 3.0 Software Enhancements. Contact: Jeff Bloom, mktg. dir. Date Product Introduced: 7/92. **Product Description & Applications:** DASS 100, the easy-to-use multifunction digital audio interface, sampling frequency converter, and signal processor is now even more indispensable for solving compatibility problems in digital studios, with new Version 3.0 software enhancements. New DASS features include: stereo fader interface to video switchers, detection and autologging of line errors and advanced speed in function selection. DASS 100 enables engineers to keep audio in the dig-

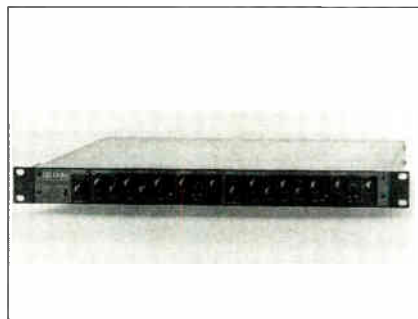
ital domain while transferring between different pieces of equipment; provides essential signal processing functions and, in short, solves the interface problems that arise in digital studios. DASS 100's comprehensive functions include digital audio sample synchronization, gain adjustment, bit flag display and set, mixing, and test signal generation. **Basic Specifications & Suggested List Price:** Sampling frequency conversion between any two frequencies: 29kHz to 53kHz with 24 bit performance. Format conversion between AES, SDF-2 and SPDIF interface standards. Generate audio sample clocks from video, AES, WSYNC, and LTC. Pre- and de-emphasis. Signal generation to 24 bit accuracy. DC removal. Gain adjustment. Routing selection. Time delay.

DIGITAL INTEGRATION INC.

3530 Forest Lane, #38; Dallas, TX 75234; (214) 350-2230; FAX: (214) 350-6344. Product Name: SRC-1000. Universal Digital Sample Rate Converter. Contact: Greg Basile. Date Product Introduced: 1/92. **Product Description & Applications:** The SRC-1000 solves the issue of effectively interconnecting digital audio equipment in an asynchronous environment. Conversion is performed in real time, entirely in the digital domain, between any two signals whose sampling frequencies are within the range of 30 to 50 kHz. The SRC-1000 implements 24-bit signal processing and is designed to convert to 16, 18, 20 or 22-bit digital audio output samples with the highest degree of accuracy. **Basic Specifications & Suggested List Price:** XLR AES/EBU Professional/Consumer Interface; Frequency Response over Bandwidth is less than +/- 0.0003 dB; Reclocking Accuracy is 2 ps; Standard 19-inch rack-mount, single unit height; Selectable Anti Alias Filter; Backlit LCD of input/output frequencies and AES status. Suggested Retail \$5,995.



DDLBY LABORATORIES INC.



DOLBY LABORATORIES INC.
Dolby Spectral Processor

DOLBY LABORATORIES INC.

100 Potrero Ave.; San Francisco, CA 94103; (415) 558-0200. Product Name: Dolby Spectral Processor. Contact: Nancy Byers, studio applications mgr. Date Product Introduced: 6/92 and 10/92. **Product Description & Applications:** The Dolby Spectral Processor, a new, professional, two-channel dynamic equalizer. It raises low-level signals in three frequency bands by as much as 20 dB without affecting high-level signals. Includes controls for adjusting the threshold below which processing occurs, the amount of boost in each band, and the crossovers between bands. For noisy material, a gentle sliding-band noise reduction circuit is also included. Applications in recording, mixing, mastering and post-production. **Basic Specifications & Suggested List Price:** Electronically balanced inputs/outputs, operating level selectable between +4/-6dBu. List price to be announced.

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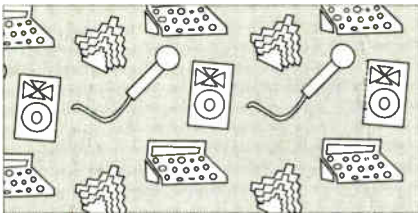
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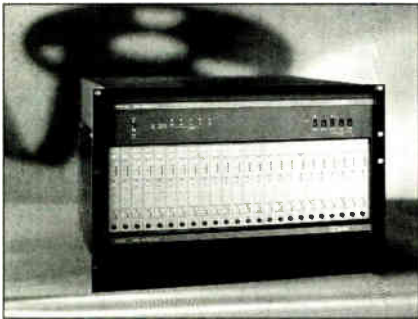
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Signal Processing



DOLBY LABORATORIES INC.
Dolby SRP Series

DOLBY LABORATORIES INC.

100 Potrero Ave.; San Francisco, CA 94103; (415) 558-0200. Product Name: Dolby SRP Series. Contact: Nancy Byers, studio applications mgr. Date Product Introduced: 1/92. Product Description & Applications: Up to 24 channels of Dolby SR priced at 25% less than other Dolby SR multitrack units. Cost-saving configuration ideal for in-house recording and post-production facilities. The Dolby SR circuitry improves dynamic range by as much as 24 dB, providing performance associated with digital formats while maintaining the desirable features of analog recording. Basic Specifications & Suggested List Price: The SRP Series consists of a card frame to accommodate up to 24 Cat. No. 531 Dolby SR modules and PS3 power supply (12-1/4" x 19" x 18-1/8"). Overall frequency response: 20 Hz-20kHz +/-1 dB, encode/decode.



DOLBY LABORATORIES INC.
Model 430 Background Noise Suppressor System

DOLBY LABORATORIES INC.

100 Potrero Ave.; San Francisco, CA 94103; (415) 558-0200. Product Name: Model 430 Background Noise Suppressor System. Contact: Nancy Byers, studio applications mgr. Date Product Introduced: 10/91. Product Description & Applications: The 430 Series is our newest background noise suppressor system for use in reducing broadband noises on location recordings for film and video. Modular system providing from one to six channels of background noise suppression. System configuration consists of a single 1 U-high power supply/control unit, and up to three 1 U-high frames, each with one or two channels of processing. All operating controls are mounted on a remote control module that has been designed for console mounting or can be fitted into a housing for stand-alone operation. Basic Specifications & Suggested List Price: Electronically balanced inputs and outputs, nominal input and output level +4 dB. Independent low- and high-frequency stages with maximum noise suppression of approximately 16 dB and 18 dB respectively.

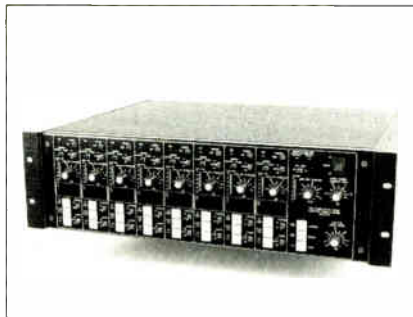
DRAWMER/QMI

15 Strathmore Rd.; Natick, MA 01760; (508) 650-9444. Product Name: DL 441 Quad Auto Compressor/Limiter. Contact: Scott Berrell, pres. Date Product Introduced: 10/92. Product Description & Applications: Four-channel compressor/limiter with auto attack and release and switchable hard/soft knee compression characteristics. Features Drawmer's exclusive zero attack, zero overshoot peak limiter. Four-channel mono or dual stereo operation. Complements Drawmer's D5434 Quad Gate. Basic Specifications & Suggested List Price: Each channel has threshold, ratio (from 1.2 to

∞) gain and peak level controls. Also switches for hard/soft knee operation, hard wire bypass, and stereo linking. Line inputs and outputs are fully balanced XLR jacks. Sugg. price less than \$1,200.

DRAWMER/QMI

15 Strathmore Rd.; Natick, MA 01760; (508) 650-9444. Product Name: Drawmer DL 251 Spectral Compressor. Contact: Scott Berrell, pres. Date Product Introduced: 6/92. Product Description & Applications: Features dynamic spectral enhancement in a 2-channel compressor/limiter. The "enhance" control restores the brilliance that can be lost in compression. The enhance circuit does not increase the output level or raise the noise floor. The DL 251 also features hard/soft knee compression, side chain monitoring and average/peak hold stereo linking. Basic Specifications & Suggested List Price: Each channel contains threshold, ratio (1.2 to ∞), manual or auto attack and release, gain, enhance and peak limit, additional controls are hard/soft knee, side chain listen, enhance "on", hard wire bypass and stereo link. Inputs and outputs are balanced, XLR jacks. Suggested price is \$1,149.



DAN DUGAN SOUND DESIGN
Model D Automatic Mixing Controller

DAN DUGAN SOUND DESIGN

290 Napoleon St.; San Francisco, CA 94124; (415) 821-9776; FAX: (415) 826-7699. Product Name: Model O Automatic Mixing Controller. Contact: Dan Dugan, prop. Date Product Introduced: Available late '92. Product Description & Applications: Product that assists sound operators in mixing multiple live mics. It can eliminate operator errors in reinforcement, broadcasting, performance, and dialog recording. The eight-channel VCA controller patches into console insert points. Transparent automatic cross-fading follows unpredictable action flawlessly. Basic Specifications & Suggested List Price: Inputs: active balanced +22 dBu max. Outputs: unbalanced 50 ohm source. Gain: unity. Frequency response: 20 Hz to 20 kHz to/-1 dB. Output noise: less than -78 dBu. 100 dB dynamic range. Distortion: less than 0.1% THD. Linking: up to 96 channels. Dimensions: 3 RU.

DW LABS INC.

PO Box 882; Millburn, NJ 07041; (201) 376-8453. Product Name: Superconductor. Contact: Jeff Davis, manager. Date Product Introduced: 1/92. Product Description & Applications: The Superconductor is a buffering preamp supplying up to +12 dB of boost and eliminating the high-end loss due to the capacitance in electric guitar cables. This results in the unique clarity and brilliance in recordings and live performance when the Superconductor is used. Basic Specifications & Suggested List Price: The unit is packaged in an ABS plastic case with a metal belt clip. Up to +12 dB of boost is available with a variable gain control. .003% total harmonic distortion. Signal to noise -105. Suggested retail is \$95.

ECLAIR ENGINEERING SERVICES

221 Pine St.; Florence, MA 01060-1267; (413) 584-6767. Product Name: Model 90 Direct Box. Contact: Bruce Seifried. Date Product Introduced: 1/92. Product Description & Applications: The Model 90 is a single-channel, vacuum tube direct box, featuring very low noise and wide bandwidth. Features include: Class A tube circuitry; variable gain; +4 dBm/balanced and -10 dBV/unbalanced outputs; Jensen nickel-core output transformer; premium tubes and hand-selected parts; silver solder used throughout. Soft-start regulated power supplies protect tubes from damaging AC line and turn-on surges. Instruments can be tracked directly to tape, bypassing the mixing console's mic preamps. Basic Specifications & Suggested List Price: Lifetime warranty. Suggested list, \$585.

ECLAIR ENGINEERING SERVICES

221 Pine St.; Florence, MA 01060-1267; (413) 584-6767. Product Name: Model 92 Direct Box. Contact: Bruce Seifried. Date Product Introduced: 1/92. Product Description & Applications: The Model 92 is a dual-channel, vacuum tube direct box, featuring very low noise and wide bandwidth. Features include: Class A tube circuitry; variable gain; +4 dBm/balanced and -10 dBV/unbalanced outputs; Jensen nickel-core output transformer; premium tubes and hand selected parts; silver solder used throughout. Soft-start regulated power supplies protect tubes from damaging AC line and turn-on surges. Instruments can be tracked directly to tape, bypassing the mixing console's mike preamps. Basic Specifications & Suggested List Price: Lifetime warranty. Suggested list, \$1,130.

ELECTROMAN

PO Box 24474; New Orleans, LA 70184; (504) 488-7021. Product Name: Audio Buzz Buster. Date Product Introduced: 1/92. Product Description & Applications: Stop hum and buzz. Flat frequency re-

sponse. Passes phantom power. No coloration of signal. Reduces ground loop interference. Eliminates hum caused by differences in ground potential, electrostatic coupling, magnetic coupling, or faulty circuit elements causing leakage. Virtually no insertion loss. No low frequency or high frequency roll off. No measurable distortion. Up to 60 dB hum reduction. Flat response. Eliminates hum and other interference in audio lines. Passive device-failure free. Small, compact package. Basic Specifications & Suggested List Price: Impedance - 600 Ohms, Bandwidth - DC to over 30 kHz. No insertion loss. Hum reduction to over 60 dB. XLR connectors. \$79.95.

ENSONIQ CORP.

155 Great Valley Pkwy.; Malvern, PA 19355; (215) 647-3930. Product Name: DP/4. Contact: Jerry Kovarsky, marketing director. Date Product Introduced: 3/92. Product Description & Applications: The DP/4 Parallel Effects Processor combines four 24-bit multi-effects processors, a digital patch bay and sub mixer in one easy-to-use device. With 4 inputs and outputs the DP/4 can process from 1 up to 4 different signals at the same time. 46 algorithms, allow the DP/4 to create a variety of effects, from reverbs, delays, chorus/phase/flange, to guitar amp emulations and compression. 400 presets give you access to any type of sound imaginable. Basic Specifications & Suggested List Price: 4 24-bit DSP chips, 4 quarter-inch inputs and outputs, serial parallel and/or feedback routing between processors, 46 algorithms, 400 presets, 2 Hz to 18 kHz frequency response, THD:N: .005%, 2 modulators per processor, extensive MIDI control, 2 rackspaces, 32-character LCD display and 2-character LED display. \$1,495.

ESE

142 Sierra St.; El Segundo, CA 90245; (310) 322-2136. Product Name: ES-219. Contact: Bill "R" factory sales eng. Date Product Introduced: 10/91. Product Description & Applications: ES-219, 4 output black burst generator used for synchronizing entire studios or specific equipment. This black generator is available in the standard desktop model or optional rack-mount. Basic Specifications & Suggested List Price: Meets all RS170A specifications. The output signal consists of sync, blanking, reference black setup level and color burst which is SCH phased. Subcarrier frequency and SCH phase may be adjusted internally if desired. List price is \$195. Optional rack-mount \$45.

EVENTIDE INC.

One Alsan Way; Little Ferry, NJ 07643; (201) 641-1200. Product Name: H3500 Dynamic Ultra-Harmonizer. Contact: Gil Griffith, sales manager. Date Product Introduced: 3/92. Product Description & Applications: Features benefits and programs of an H3000-SE and includes up to 95 seconds of digital sampling plus Mod Factory algorithms, which add dynamics, gating, ducking, compression and more. The unit also includes more than 100 new presets written by friends of Eventide from the recording, performing and post-production industries. Basic Specifications & Suggested List Price: H3500 dtx dynamic Ultra-Harmonizer \$3,495. (22 algorithms, 450 presets, dynamic, 22 second sampling). H3500 dtx/e dynamic Ultra-Harmonizer \$4,495. (22 algorithms, 450 presets, dynamic, 22 second sampling).

EVENTIDE INC.

One Alsan Way; Little Ferry, NJ 07643; (201) 641-1200. Product Name: HS 395 Internal Sampler Board. Contact: Gil Griffith, sales manager. Date Product Introduced: 1992. Product Description & Applications: Adds 16-bit, 44.1 kHz sampling to the H3000. Holds 47.5 seconds in stereo/95 seconds in mono with on-the-fly time compression. Expansion, new drum triggered mode and more. Basic Specifications & Suggested List Price: HS 395 Internal Sampler Board. Suggested list price \$1,995. Contact dealer for trade-in price with return of HS322 board.

FM ACOUSTICS LTD. OF SWITZERLAND

Tiefenhofstr. 17; CH-8820 Wädenswil, Switzerland; (41) 1 780-6444. Product Name: (trademark applied for; name withheld for now). Contact: Manuel Huber, dir./pres. Date Product Introduced: AES show 10/92. Product Description & Applications: A revolutionary new concept in precision microphone preamplification, featuring signal amplification of pristine quality and fully discrete, enhanced Class A circuitry. This new unit finds applications in any situation where signals from microphones and electro-acoustic transducers must be pristinely amplified with guaranteed optimal results. This includes applications in recording studios, remote recording, film recording, live performances, broadcasting, stage preamplification and precision microphone amplification for samplers, etc. Basic Specifications & Suggested List Price: Selectable gain range between 0 and 66 dB, symmetrical balancing of signal lines, CMRR > 100 dB, headroom reserve of +26 dB, maximum output capability of +29 dBu, bandwidth of 1 Hz - 400 kHz at 30dB gain, distortion of 0.003% at +22dBu/30dB gain, output impedance of less than 10 ohms, 180° polarity inversion switch (perfect phase inversion), and switchable phantom voltage (12V/48V).

FURMAN SOUND INC.

30 Rich St.; Greenbrae, CA 94904; (415) 927-1225. Product Name: Punch-10 Bass enhancement system. Contact: Joe Desmond, national sales mgr. Date Product Introduced: 3/92. Product Description & Applications: The Punch-10 is a subharmonic processor that synthesizes bass by generating a bass component one octave below the existing fundamental. The result is bass that can be felt as well as heard, bass that maximizes realism and increases audience involvement. A Subharmonic Level control adjusts the amount of synthesized bass. A low frequency assign button routes the bass content either to the subwoofer output only, or to both the subwoofer output plus the main stereo outputs. The Punch-10 also

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includes a hard limiter for speaker protection. **Basic Specifications & Suggested List Price:** Subwoofer output: 85 Hz and below, high-frequency responses are rolled off at 18 dB per octave. Main output bandwidth: set with the main speakers highpass control, adjustable from 15 to 135 Hz. Limiter threshold: adjustable from -20 to +20 dBu. Suggested list price: \$299.

GAINES AUDIO

1237 E. Main St., Rochester, NY 14609; (800) 442-0780. **Product Name:** #988 Cassette Dist Amplifier. **Contact:** Jon Gaines, owner. **Date Product Introduced:** 1/92. **Product Description & Applications:** Splits your stereo signal eight ways to feed multiple cassette decks for real-time duplication. Also used as a general purpose low-cost distribution amp. **Basic Specifications & Suggested List Price:** \$149.

GENTNER BROADCAST SYSTEMS

1825 Research Way, Salt Lake City, UT 84119; (801) 975-7200. **Product Name:** Lazer 2.0. **Contact:** Elaine Jones, sales manager. **Date Product Introduced:** 7/91. **Product Description & Applications:** Lazer is the industry's first and only 100% DSP digital limiter/stereo generator. Its completely digital nature combines all of the advantages of push-button control, digital precision, and total repeatability to any station's audio chain. Plus, the Lazer provides composite signal, incredible stereo separation while keeping it at optimum and legal modulation. Its ability to generate loudness through digital waveform modification, not clipping, is unique to the Lazer. Lazer also features digitally smart AGC and band limiting, dedicated and selectable peak reading LED meters, and twenty-three processing parameters. **Basic Specifications & Suggested List Price:** Lazer FM Limiter/Stereo Generator lists for \$5,495 and includes an optical encoder. The Lazer comes from the factory with eight factory-preset processing programs in its memory. You can either use one of the default programs or custom tailor the programs for your unique sound.

GRM CO. INC.

PO Box 388127, Chicago, IL 60638; (312) 229-1924. **Product Name:** Missing Link. **Contact:** John Covich, product mgr. **Date Product Introduced:** 11/91. **Product Description & Applications:** Active, passive direct boxes, cable testers, studio headphone Q boxes, rack-mount 5-ch direct boxes.

HEADROOM ELECTRONICS INC.

716 Pennington St., Elizabeth, NJ 07202; (908) 527-8121; FAX: (908) 527-6051. **Product Name:** HMP-MXP microphone preamplifier. **Contact:** Dick Hammond, pres. or Brian Gunn, VP. **Date Product Introduced:** 12/92. **Product Description & Applications:** Headroom Electronics Inc. proudly introduces the HMP-MXP microphone preamplifier. A plug-in upgrade for the Sony MXP-3000 Series consoles. Our ultra-fast, low-noise gain stages provide transparent amplification utilizing audiophile-grade components DC servos. For those who want a high-end outboard microphone preamplifier the HMP-02 is available as a two-channel 1 r.u. rack-mountable unit. It comes with phantom supply and electronically balanced outputs (transformer output optional). **Basic Specifications & Suggested List Price:** Gain: 14 dB - 74 dB, Distortion: 0.03%. Stew rate: 40 volts per microsecond. DC servo coupling. Common-Mode Rejection: 130 dB. Maximum output: 30 dBm. The HMP-MXP is a direct plug-in replacement while the HMP-02 is a stand-alone unit with two microphone preamplifiers with balanced XLR inputs and outputs.



HEADROOM ELECTRONICS INC.
RS-06 & RS-12 Stereo Routing Switchers

HEADROOM ELECTRONICS INC.

716 Pennington St., Elizabeth, NJ 07202; (908) 527-8121; FAX: (908) 527-6051. **Product Name:** RS-06 & RS-12 Stereo Routing Switchers. **Contact:** Dick Hammond, pres. or Brian Gunn, VP. **Date Product Introduced:** 10/92. **Product Description & Applications:** Headroom Electronics Inc. proudly introduces the RS-06 and RS-12 (6 x 1 and 12 x 1) stereo routing switchers. Each balanced stereo input features front panel left and right gain controls for interfacing -10 dB V to +4 dBm equipment and stereo trims for the balanced outputs. Design features include audiophile-grade components, DC servos and state-of-the-art "seamless" switching technology. Front panel mute and input select switches with rear mount remote connector allow for versatile installation applications. **Basic Specifications & Suggested List Price:** Both units are rack-mountable, the RS-06 being 1 r.u. and the RS-12 is 2 r.u. Inputs: 1/4-inch TRS, outputs: balanced male XLRs. Channel off isolation: 120 dB. Maximum output level: +30 dBm. Remote: 25 pin D connector. Call for more information and pricing.

HIGH FIDELITY CONCEPTS

255 Hrubetz Rd. SE, Salem, OR 97302; (503) 363-1586. **Product Name:** NC-4200B. **Contact:** Cameron D. Jones, owner. **Date Product Introduced:** 6/92. **Product Description & Applications:** The NC-4200B is a new floating/balanced version of our product which has four independent sections that can be switched for gating or compression. Controls are provided for the adjustment of threshold, release, and ratio (range in gate motion), while attack is program dependent. Switching is provided for external key inputs and for stereo coupling of sections 1-2 and 3-4. A four segment gain-reduction meter and a clipping indicator are also provided for each section. **Basic Specifications & Suggested List Price:** THD less than 0.05% (20Hz - 20 kHz), THD under 0.02% at 1 kHz with 10 dB of gain reduction. S/N ratio: above 82 dB (above referenced to 1V at output). Suggested retail price: \$489, balanced; \$449, unbalanced.

HOLMES ENGINEERING

1275 Fourth St. #178, Santa Rosa, CA 95404; (707) 542-8246. **Product Name:** HE4/MPM Microphone Preamp-mixer. **Contact:** Ronald Holmes, owner. **Date Product Introduced:** 12/92. **Product Description & Applications:** Holmes Engineering announces a unique, problem-solving preamp-mixer available December 1992. The all tube HE4/MPM is a rugged, 2-rack-unit powerhouse combining four channels of microphone (12/48 phantom), line or instrument DI preamps switching to or paning between up to 4 output modules. A single output module is stock with three more easily added. Features step attenuators and massive headroom, transformer-isolated line outputs for P.A. mix, studio or direct field recording. **Basic Specifications & Suggested List Price:** The HE4/MPM has 4 input channels 150-ohm mic/line or instrument DI (Hi Z): 5dB steps from -85 dBu thru +10 dBu. Output modules have effects sidechain, 1dB steps with push-pull driven 600-ohm outputs to +24 dBm at 20 Hz. 2RU, 14" deep with international power entry pending agency approvals.

IVIE TECHNOLOGIES INC.

1366 W. Center St., Orem, UT 84057; (801) 224-1800. **Product Name:** 784P & 784PW Programmable Matrix Mixer. **Contact:** Glen Meyer, mktg. manager. **Date Product Introduced:** 4/92. **Product Description & Applications:** The 784 is perfect for hotel meeting rooms, schools, multimedia rooms, airports, performing arts centers, theatres, amusement parks and churches. Its low cost and features allow it to be used in everything from simple installations to systems requiring elaborate switching and a variety of remote control capability. Two versions of the matrix mixer are available: one that is programmable either by a computer or from the front panel (784P), and one that is only programmable by the use of a computer (784PW). The latter is \$200 less when front panel controls are not required. **Basic Specifications & Suggested List Price:** 8 x 4 matrix—two mixers can be ganged to form a 16 x 8 matrix mixer. Additional mixers may be added for more inputs. Inputs: switchable mic/line. A/C on all outputs. UL listed power supply. Eight presets. One rackspace. Retail 784P, \$2,990. For 784PW, \$2,660.

IVIE TECHNOLOGIES INC.

1366 W. Center St., Orem, UT 84057; (801) 224-1800. **Product Name:** DCSP 700 Digitally Controlled Signal Processor. **Contact:** Glen Meyer, mktg. manager. **Date Product Introduced:** 8/92. **Product Description & Applications:** The DCSP is a single-rackspace chassis, which can house one or two 2x4 distribution amplifiers or one or two computer controllable, 1/3-octave equalizers or a combination of DA and equalizer. **Basic Specifications & Suggested List Price:** UL approved, VCA on each input and output. Manually programmable or may be programmed by computer.

JBL PROFESSIONAL

8500 Balboa Blvd., Northridge, CA 91329; (818) 893-8411. **Product Name:** M Series Electronics. **Contact:** Bill Threlkeld, mktg. comm. mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** The M Series Electronics products were designed for use in home studio, professional studio and live applications. Model M644, a 4-channel Noise Gate, provides a broad threshold range of -60 to +20 dBu, as well as user control of attenuation, attack and release. Model M712, a 2-channel gating compressor/limiter, offers user control of threshold, ratio, attack and release, and features high-visibility LED meters for easy reference. The Variable Crossovers include Model M552, a 2-way stereo/3-way mono unit, while the Model M553 is a 3-way stereo/4-way mono unit.

KENNEDY ELECTRONICS

6140 Doffing Ave., Inver Grove Hts., MN 55076; (612) 457-1662. **Product Name:** Microphone preamplifier. **Contact:** Dan Kennedy, owner. **Date Product Introduced:** 4/92. **Product Description & Applications:** Transformer-coupled, dual or four-channel mic preamp. Unit has front panel HI-Z input jacks for keyboards or guitars. 48-volt phantom supply included. Optional output transformers. Amplifiers are cascode FET input, discrete OP amps of proprietary design. **Basic Specifications & Suggested List Price:** Two-channel unit is complete in a 1U rack-mount chassis. Four-channel unit is in 1U rack-mount chassis and separate power supply. Two-channel version is \$1,275. Four-channel version is \$1,975.

KLARK-TEKNIK

200 Sea Lane, Farmingdale, NY 11735; (516) 249-3660. **Product Name:** DN 800. **Contact:** Alan Nichols, sales mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Configurable, active crossover. 4 in 8 outputs, 1 rackspace, stereo 4-way, stereo 3-way, or 4-channel 2-way, plug in frequency cards, with choice of 12-18-24 dB slopes with Linkwitz-Riley, Butterworth or Bessel responses. **Basic Specifications & Suggested List Price:** \$1,995.



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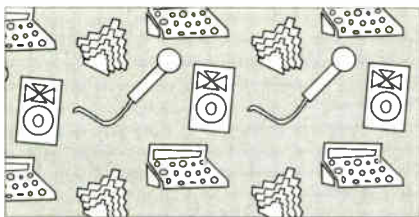
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Signal Processing

KLARK-TEKNIK

200 Sea Lane; Farmingdale, NY 11735; (516) 249-3660. **Product Name:** DN728. **Contact:** Alan Nichols, sales mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** User configurable digital audio delay, 2 in 6 outputs, 1 rackspace, 64 non volatile memories, 18-bit AD/DA conversion, set up in microseconds, feet or video fields. 1.3 seconds standard or up to 5.2 seconds of delay. **Basic Specifications & Suggested List Price:** \$3,295.

LAKE BUTLER SOUND CO. INC.

5331 W. Lake Butler Rd.; Windermere, FL 34786; (407) 656-5515. **Product Name:** Micro Mitigator MSI-8. **Contact:** Emmett Bradford, president. **Date Product Introduced:** 12/91. **Product Description & Applications:** MIDI switch interface providing MIDI control of 8 real relays to switch amp and effect footswitch functions and/or mute audio signals. Emulates click on/off as well as momentary footswitches. Stores 128 presets of on/off settings and responds to MIDI on all channels. **Basic Specifications & Suggested List Price:** Quarter-rackspace (4" w x 1.5" H x 6" L). List \$269.

LAKE PEOPLE

Haidelmoosweg 52; D-7750 Konstanz, Germany; 49-7531-73678; FAX: 49-7531-74998. **Product Name:** A/D Converter ADC F 21 Mk2 (20 Bit). **Contact:** Fried Reim, dir. **Date Product Introduced:** 10/92. **Product Description & Applications:** The ADC F21 Mk2 is a 20-Bit converter of highest range using Ultra Analog A-version modules. Features: balanced analog inputs, internal sample rates are 44.1 and 48 kHz. External clock via AES/EBU and BNC wordclock inputs. The digital signals are simultaneously available in AES/EBU format on XLR, S-DIF2 format on BNC and S/PDIF format coaxial and optical on TBS-LINK. The case is 19" rack size 1U. **Basic Specifications & Suggested List Price:** Price: \$4,100. Inputs: elec. balanced, impedance 10kOhm, adjustable. Sample rates: 44.1 and 48 kHz; sync in: AES/EBU(XLR), Wordclock (BNC) Dversampling: 128 times; Dynamic: 106 dB; THD+N: 0.002% Digital outputs: AES/EBU (XLR), S-DIF2 (BNC), S/P-DIF (coax and Tos-Link); Dimensions 483x44x170 mm (WxHxD); built-in power supply.

LITTLE LABS

8033 Sunset Blvd, Ste. 889; Los Angeles, CA 90046; (800) 642-0064. **Product Name:** Little Labs Multi Z Di. **Contact:** Jonathan Little, design engr. **Date Product Introduced:** 8/92. **Product Description & Applications:** The Little Labs Multi Z Di is a new direct box designed to set a new standard in this often overlooked link in the recording chain. This DI has unsurpassed audio quality and has some unique features including: selectable input impedance, input and output overload indication, separate buffer output for long guitar lines, variable detented volume/input pad, Ground isolate on the instrument in as well as ground lift on the XLR console output. **Basic Specifications & Suggested List Price:** Stand-alone studio model, single-channel unit, \$189. Stand-alone road model single channel unit \$209. Rack-mounted unit (1 7/8" height rack will hold 4 units) single channel \$219, dual channel \$408, three channel \$597, four channel \$786. For more information on this and other LL products please call.



LITTLE LABS
Little Labs Sample Switcher Rev.2

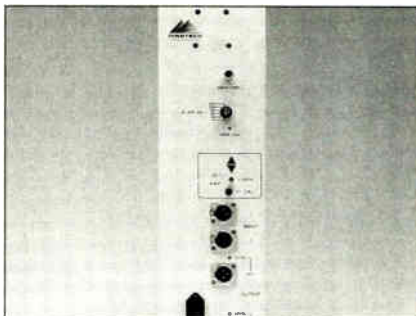
LITTLE LABS

8033 Sunset Blvd, Ste. 889; Los Angeles, CA 90046; (800) 642-0064. **Product Name:** Little Labs Sample Switcher Rev.2. **Contact:** Jonathan Little, design engr. **Date Product Introduced:** 7/92. **Product Description & Applications:** The Sample Switcher rev 2 converts audio into trigger pulse(s) out. With threshold and the new sensitivity adjust, creating a trigger pulse from a problem drum track is easy. The sample Switcher can trigger alternate samplers from one source. The alternate triggering is adjustable to detect fills and

tempo beats for alternate triggering on one or the other or both. If you replace drums on tape the Sample Switcher will save you frustration, time and money. **Basic Specifications & Suggested List Price:** Triggers any sampler with an audio trigger input. Considerably faster than using MIDI triggering. Vital companion for samplers made by Eventide, AMS, T.C. Electronics, Forat, E-mu Systems. Stand-alone, single-channel unit \$219. Rack-mounted unit single-channel, \$249; dual-channel, \$468; triple-channel \$687.

LYDKRAFT APS

Parallevej 65; DK 2650 Hvidovre, Denmark; (45) 31 49 49 67. **Product Name:** Tube-tech LCA 2A limiter, compressor. **Contact:** John G. Petersen. **Date Product Introduced:** 11/92. **Product Description & Applications:** The Tube-Tech LCA 2A limiter compressor is an all tube-based unit (except for the power supply and sidechain circuit) with two independent limiters and compressors per channel. The two channels can be linked together for stereo applications. The attack/release timing can either be chosen from six fixed settings or made manually. **Basic Specifications & Suggested List Price:** Freq. response 10 Hz-60 kHz, noise: below -80 dBu, distortion less than 0.1% THD+N, compression ratio: 1.5:1-50:1, size: 19" rack, 2 units high.



MARTECH, a Division of MARTINSDUND INC.
EMT-140 Echo Plate Upgrade

MARTECH

a Division of MARTINSDUND INC. 1151 W. Valley Boulevard; Alhambra, CA 91803; (800) 582-3555. **Product Name:** EMT-140 Echo Plate Upgrade. **Contact:** Dale Manquen, VP. **Date Product Introduced:** 11/91. **Product Description & Applications:** The Martech Upgrade for EMT-140 Echo Plates eliminates virtually all electronics noise and distortion from EMT plates, but preserves the rich reverberation of the plate. The upgrade replaces the entire EMT electronics chassis (tube or transistor), pickup transducers, and cabling. Built-in LED level indicators and a warble tone oscillator simplify level adjustment and stereo balancing. All units are stereo, permitting easy upgrading of mono plates. **Basic Specifications & Suggested List Price:** List price \$2,495. Overall frequency response follows the original EMT specifications. Maximum input and output levels at 1 kHz with less than .01% THD is greater than +24 dBu. Electronics noise and hum at least 80 dB below normal output level of +4 dBu.

MICROAUDIO INC.

64145 Tanglewood; Bend, OR 97701; (800) 445-1248. **Product Name:** EQ PDD 1.3. **Contact:** Greg Johnson, dir. mktg. **Date Product Introduced:** 1992. **Product Description & Applications:** High-resolution series programmable equalizer. .5 dB steps over a +/- 10 dB range. Programmable low + highpass filters and master gain. 1 rackspace and tamperproof. **Basic Specifications & Suggested List Price:** EQ PDD 1.3 tamperproof programmable 1/3 octave equalizer. \$1,085.



MILLENNIA MEDIA
Model HV-3

MILLENNIA MEDIA

PO Box 277611; Sacramento, CA 95827; (916) 363-1096. **Product Name:** Model HV-3. **Contact:** John La Grou, eng. **Date Product Introduced:** 9/92. **Product Description & Applications:** A stereo high-voltage microphone preamplifier for use with both +48V phantom and +130V Bruel and Kjaer 4000-Series microphones. The HV-3 features exceptional sonic realism and transparency. All components are of the highest quality, such as C & K gold contact switches, Bourns conductive plastic potentiometers, Mogami internal wiring,

gold Neutrik XLRs and proprietary multitap toroidal power supply. Now in use by the San Francisco Symphony, Sacramento Symphony, and NPR. **Basic Specifications & Suggested List Price:** Employs octet-matched transistor front-end with 50V FET-based output drivers. Maintains better than 1 degree stereo phase accuracy, 270 kHz frequency response, -131 dB EIN noise, less than .001% THD 20Hz-20kHz, 25V/microsecond slewing, +31 dBu maximum output +17 dBu maximum input, and can accept an optional plug-in A/D converter. Price \$1,295.

NVISION INC.

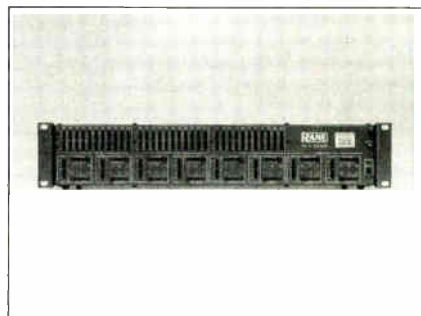
PO Box 1658; Nevada City, CA 95959; (916) 265-1000. **Product Name:** NV3512 Digital Audio Routing Switch. **Contact:** Don Joy, market development mgr. **Date Product Introduced:** NAB 92. **Product Description & Applications:** The NV3512 Series is designed for switching synchronous or asynchronous digital audio, time code signals, or RS-422 data. Featuring non-blocking X-Y architecture, flexible I/O interfaces, and the ability to be slaved to most existing audio and video routers, the NV3512 Series represents the best value in digital signal routing systems. **Basic Specifications & Suggested List Price:** Any size system may be configured in blocks of 8 inputs and 32 outputs. Up to four complete chassis may be linked to expand capacity to 2048 x 2048 with only the addition of input and output cables. Price quotations are available upon request.

POLYFUSION ELECTRONICS INC.

30 Ward Road; Lancaster, NY 14086; (716) 681-3040. **Product Name:** Model 745 Feedback Reduction Unit. **Contact:** Ron Folkman or Alan Pearce. **Date Product Introduced:** 5/92. **Product Description & Applications:** Feedback reduction system intended for use on any public address system. Unlike other available products, the 745 is not a filter, thus it produces no "holes" or coloration of any type. Rather, it is a full spectrum frequency shifter which prevents the formation of loop resonant frequencies. As a result, up to four times the output power can be utilized without feedback worries. Single height, rack-mount, line level unit. **Basic Specifications & Suggested List Price:** Broadcast standard S/N, distortion, and signal level (line) specifications, with full year warranty. Suggested list, \$695.

RAMKO RESEARCH

3501-4 Sunrise Blvd.; Rancho Cordova, CA 95742; (916) 635-3600. **Product Name:** System 2000 Integrated Audio Systems. **Contact:** Mike Pardee, natl. sales coord. **Date Product Introduced:** 5/92. **Product Description & Applications:** The all new System 2000 from Ramko Research allows you to create over 300 different sound systems with only 11 programmable modules and four mini main frames. Create: Room combiners, multiple mic/line mixers with up to 36 inputs, 1 in x 8 out to 20 in x 80 out with programmable mixing and routing, mixing switching systems, multicompressor/noise gates, automatic mic mixer systems remote controlled phones, amplifying systems, audio power distribution systems and much, much more. **Basic Specifications & Suggested List Price:** Specifications vary depending upon system configuration with all modules exhibiting state-of-the-art studio performance. List prices start at \$149 for the main frames and a low \$165 for the modules.



RANE CORPORATION
THX 44 Home Cinema Equalizer

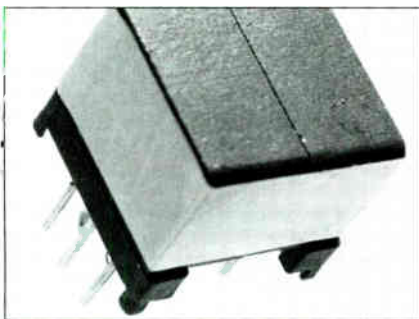
RANE CORPORATION

10802 47th Ave. W; Mukilteo, WA 98275; (206) 355-6000. **Product Name:** THX 44 Home Cinema Equalizer. **Contact:** Ellen Allhands, sales & mktg. coord. **Date Product Introduced:** 10/91. **Product Description & Applications:** The THX 44 is the first home cinema equalizer licensed for use in home THX systems. Exceeding all Lucasfilm THX specs, the THX 44 provides 4 equalization channels: left, center, right and subwoofer. Each front channel gets an 11-band 1/3 octave graphic and 2-band full parametric; subwoofer gets a separate 2-band parametric section. **Basic Specifications & Suggested List Price:** 3 ea. 11-band 1/3 oct. graphics @ 80-800 Hz; 3 ea. 3-band parametric @ 1k-10kHz; 1 ea. 2-band parametric @ 20-80Hz. Interpolating constant-Q filters; 126 dB dynamic range; .0008% THD, 90dB channel separation. Suggested list price: \$1,299.

RE AMERICA INC.

31029 Center Ridge Rd.; Westlake, OH 44145; (216) 871-7617. **Product Name:** RE 8720/8730 Stereo Tie Line Audio Codec. **Contact:** Jim Switzer, sales eng. **Date Product Introduced:** 2/92. **Product Description & Applications:** The RE 8720/8730 Stereo Tie Line Audio Codec is designed for 15 kHz audio transmission over dedicated telephone lines and privately owned twisted pairs. An optional 1200 baud data channel, the 8720/8730 features built-in auto-

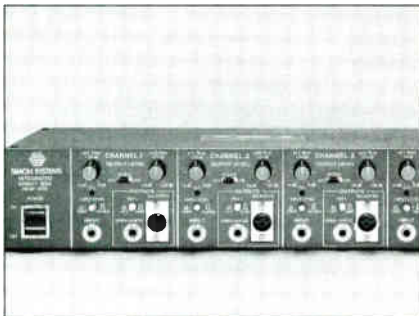
matic line EQ. It can operate at distances of up to six miles, and interfaces with digital networks for further distance. Error concealment and muting circuits are also included. **Basic Specifications & Suggested List Price:** Two channels; 13-segment instantaneous companding; 32 kHz sampling frequency; 600 ohms output load impedance; frequency response 20-14,000 Hz: ± 0.12 dB; weight: 9 lbs.; Dimensions 1.7"x19"x13.4"; price: 8720-\$3,420; 8730-\$4,385.



SCIENTIFIC CONVERSION INC.
Low Capacitance AES/EBU transformer

SCIENTIFIC CONVERSION INC.

42 Truman Dr.; Novato, CA 94947; (415) 892-2323. **Product Name:** Low Capacitance AES/EBU transformer. **Contact:** Jon D. Paul. **Date Product Introduced:** 1/92. **Product Description & Applications:** SC 916-01 is an optimised AES/EBU transformer with low capacitance, built in Faraday shield and compatible pinout for direct replacement. Provides improved resistance to interference from clock leakage and less EMI from your product. **Basic Specifications & Suggested List Price:** Up to 10 times lower coupling capacitance, 10 kHz - 20 MHz BW, 10x core area for low saturation. OEM price is \$3.25 - \$5.50.



SIMON SYSTEMS ENGINEERING INC.
Simon Systems RDB-400 4 Channel Integrated Direct Box

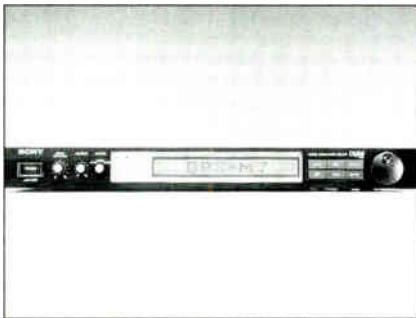
SIMON SYSTEMS ENGINEERING INC.

707 Clear Haven Dr.; Agoura Hills, CA 91301; (818) 707-9980. **Product Name:** Simon Systems RDB-400 4-Channel Integrated Direct Box. **Contact:** Rick Simon, president. **Date Product Introduced:** 12/92. **Product Description & Applications:** The RDB-400 Four-Channel Integrated Box has been redesigned with added features and improvements. These include front and rear inputs and outputs—great for rack-mounting. The rear inputs are automatically bypassed when the front inputs are used. The AC-powered unit boasts a totally active (transformerless) audio path with tremendous headroom. The Line/ATT controls allow direct signal insertion to tape decks. They also facilitate level conversion such as -10 to +4 dB and vice-versa. **Basic Specifications & Suggested List Price:** Frequency response: 10 Hz-150 kHz, input impedance 1 ohms, THD < 0.005%, transient response > 3 microseconds, EIN -108 dB, slew rate 5.88 V/microseconds, output impedance 100 ohms, attenuation range 0 db +0 to -∞, gain range +6 db to +40 db, suggested retail is \$1,115.00.

SONY BUSINESS & PROFESSIONAL GROUP

3 Paragon Dr.; Montvale, NJ 07645; (201) 358-4197. **Product Name:** DPS-F7 Digital Dynamic Filter. **Contact:** Art Gonzales, product manager. **Date Product Introduced:** 12/92. **Product Description & Applications:** The OPS-F Dynamic filter unit provides a wide range of powerful effects, which have a natural and warm sound quality. With 10 filter effects algorithms, 100 factory presets and 256 memories for user-created effects, all under rotary encoder control, the OPS-F is a truly versatile effects processor. **Basic Specifications & Suggested List Price:** 10 algorithms including parametric EQ, dynamic filter, sub-harmonic generator and editor. Two channels (balanced and unbalanced) I/O. Frequency response: 10kHz-22 kHz. THD < 0.0035%.

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SONY BUSINESS & PROFESSIONAL GROUP
DPS-M7 Digital Sonic Modulator

SONY BUSINESS & PROFESSIONAL GROUP

3 Paragon Dr.; Montvale, NJ 07645; (201) 358-4197. **Product Name:** DPS-M7 Digital Sonic Modulator. **Contact:** Art Gonzales, product manager. **Date Product Introduced:** 5/92. **Product Description & Applications:** The DPS-M7 Digital Sonic modulator provides a variety of unique digital modulation effects, including pitch shifting, flanging, KMS panning, and ring modulation. With 20 modulation algorithms, 100 factory presets and 256 memories for user-created effects, all under rotary encoder control, the DPS-M7 is a truly versatile modulation effects processor. **Basic Specifications & Suggested List Price:** Two channel (balanced and unbalanced) I/O. Sampling frequency: 48 kHz. Frequency response: 10 Hz - 22 kHz. THD < 0.0035%. List Price: \$1,500.

SOUND PERFORMANCE LABORATORY

635 Weyburn Sq.; Pickering, Ontario, L1V 3V3 Canada; (416) 420-3946. **Product Name:** Vitalizer. **Contact:** Curt Smith, marketing mgr. **Date Product Introduced:** 11/91. **Product Description & Applications:** Psycho-acoustic equalizer and stereo image surround processor. **Basic Specifications & Suggested List Price:** Analog filter-based equalizer with independent sub bass, mid high & harmonic content controls.

SPATIAL SOUND INC.

743 Center Blvd.; Fairfax, CA 94930; (415) 457-8114. **Product Name:** SSP-200 (Rack-mount); SSP-100x (Desktop Version). **Contact:** Mike Brosio, sales mgr. **Date Product Introduced:** 5/92. **Product Description & Applications:** A programmable multichannel 3-D audio signal panner for the creation of sound movements and surround sound with up to 8 channels; can be used to add dimension and motion to live sound; special effects for films, theater, planetariums, and light shows; special effects on multichannel or stereo recordings; spatial dynamics for nightclub dance music; sound localization for music composition; for demonstrations of sound/physics characteristics. **Basic Specifications & Suggested List Price:** Sugg. list price is \$3,495 (for rack-mount or desktop model). 4 balanced 1/4" TRS inputs, 8 balanced 1/4" TRS outputs, Effects send/return, 8 audio parallel 1/4" TRS outputs, S/N ratio 90 dB, MIDI and FSX connectors, frequency response 10 Hz to 20 kHz, THD .006%. Compatible with all multichannel surround sound including Dolby Surround Sound, THX, Omnimax and IMAX.

SPECK ELECTRONICS

925 S. Main St.; Fallbrook, CA 92028; (619) 723-4281. **Product Name:** EQ16 Equalizer. **Date Product Introduced:** 1/92. **Product Description & Applications:** The EQ16 offers 16 three-band, fully sweepable equalizers in only three rackspaces. Available with stereo and/or mono channels, the EQ16 is designed to satisfy any input intensive requirement, where inadequate EQ is afforded and exceptional equalization is desired. Speck's proprietary "SI" circuitry assures ultra-quiet and, more importantly, extremely open and musical-sounding operation. **Basic Specifications & Suggested List Price:** EQ16-16, 16 stereo equalizers, \$1,495. EQ16-24, 8 stereo and 8 mono equalizers, \$1,875. EQ16-32 16 stereo equalizers \$2,175.

STEWART ELECTRONICS

11460 Sunrise Gold Cir.; Rancho Cordova, CA 95742; (916) 635-3011; **FAX:** (916) 635-1787. **Product Name:** PRO-DAC Digital-to-Analog Converter. **Contact:** Christopher Dragon, sales & mktg. mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Dual-process hybrid Burr-Brown converter, auto sampling rate switching 32 kHz, 44.1 kHz, 48 kHz, discrete Class A amplifier output stage, separate digital and analog power supplies, fully regulated and filtered onboard DC power supply. Will operate on either 110V or 12V. Three S/PDIF, IEC 958 inputs, both coaxial, and fiber optic provided. **Basic Specifications & Suggested List Price:** \$799 retail. Frequency response 5 Hz-20 kHz, THD < 0.015% 20 Hz-20 kHz, channel separation -90 dB @ 1 kHz, single rackspace. D/A converter, 8x oversampling, 18 bit.

SYTEK AUDIO SYSTEMS CORP.

2424 W. Irving Park Rd.; Chicago, IL 60618; (312) 588-1682. **Product Name:** MP-4, EQ4-M1, EQ4B-M1. **Contact:** Mike Stoica, pres. **Date Product Introduced:** 3/92. **Product Description & Applications:** MP-4 four-channel microphone preamplifier; EQ4-M1 and EQ4B-M1: one-channel mic-pre and one-channel parametric equalizer. Hybrid design transformerless, tricolor LED display for peak indicator, phase reverse. MIC EIN: -134 dBm, THD 0.002%, 48V phantom power included. EQ autostabilized state variable filter topology, Bessel polynomial, adjustable bandwidth 1/10 to 2.5 octaves. XLR balanced input and output, each unit 19" rack 1U, low

—LISTING CONTINUED ON NEXT PAGE

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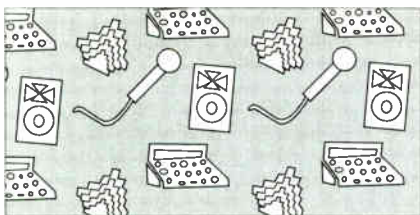
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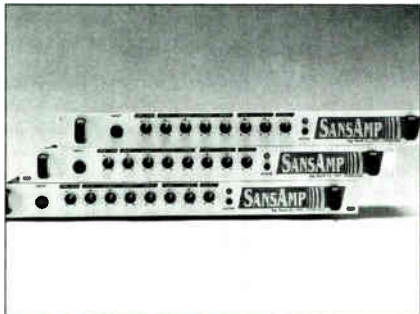
Signal Processing

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EMI internal toroidal transformer power supply. **Basic Specifications & Suggested List Price:** MP2 suggested list \$1,626. Promotional offer \$982. EQ4-M1 list \$2,395. Promotional offer \$1,437. EQ4B-M1 list \$2,812. Promotional offer \$1,687.

T.C. ELECTRONIC OF DENMARK

717-C Lakeland Rd.; Westlake Village, CA 91361; (805) 373-1828. **Product Name:** M5000 Digital Audio Mainframe. **Contact:** Ed Simone, USA manager. **Date Product Introduced:** 7/92. **Product Description & Applications:** M5000 Digital Audio Mainframe—an expandable digital signal processor. The M5000 uses T.C.'s DARC™ (Digital Audio Reverb Co-processor) technology. Programs include Reverb and Pitch Shift effects. A high-speed, 24-bit bus supports up to four modules. The standard M5000 configuration of 1 AD-DA module and 1 DSP module leaves an additional pair of expansion slots. The M5000 may also be configured in the digital domain with up to 4 stereo channels of Digital Processing in a 2U rack with AES/EBU, SPDIF and Optical I/O. Standard interfaces include MIDI, RAM card and SMPTE (in). Options include SCSI, LAN and disc interfaces. **Basic Specifications & Suggested List Price:** All specs. at 48K sampling-Frequency Response: 10-22 kHz, +0/-0.5 dB; THD: <0.01% dBm; IMD: <0.01%; Max. Input Level: +22 dBm; Dynamic Range: >100 dB; Crosstalk <80dB; Group Delay Linearity: <5 microseconds; Phase Linearity: better than 5 degrees; Digital conversion: Li 189bit 64X in, 20bit out; List prices range from \$3,126 to \$6,314 (2 to 8 channels).



TECH 21 INC.
SansAmp Rackmount

TECH 21 INC.

1600 Broadway; New York, NY 10019; (212) 315-1116; FAX: (212) 315-0825. **Product Name:** SansAmp Rackmount. **Contact:** Neal Dstberg, national sales manager. **Date Product Introduced:** 1/92. **Product Description & Applications:** Emulate an entire spectrum of tube amplifiers. Voiced for full-range systems. It is uniquely suitable for recording direct to tape, in mixdowns; and for live performances as an onboard processor; preamp, "monster direct box" to P.A. for guitar, bass, keyboards, etc., even sax & vocals. Flexibility enables customization of sound to exact taste, ranging from very clean to full saturation, without altering instrument's tonal personality. Delivers pure, natural, consistent quality sound in any studio or venue. **Basic Specifications & Suggested List Price:** Single rackspace. Input impedance: 1M Ohm. 1/4" output impedance: 10K Ohm. +4/-10 dB 1/4" inputs & outputs. Trimmable line level transformerless balanced XLR output; impedance: 600 Ohm minimum. Frequency response: Low-10 Hz or better; High harmonic content: 20 kHz or better (varies according to settings). External power supply to reduce hum; locking 2-prong XLR connector. \$595 list.

TROISI EDC

27 River St.; Westford, MA 01886; (508) 692-7768. **Product Name:** Companion Digital. **Contact:** Peter Troisi, pres. **Date Product Introduced:** 5/92. **Product Description & Applications:** The companion line of analog and digital converters provide a reliable, low-cost source for 16, 18 and 20-bit conversion for digital audio processors and recording devices. Suitable for use with AES/EBU and SPDIF interfaces. **Basic Specifications & Suggested List Price:** 16, 18, or 20 bits (modular) multiple sampling frequencies (32-50 kHz) AES/EBU and SPDIF outputs. Priced below \$1,500.

TROISI EDC

27 River St.; Westford, MA 01886; (508) 692-7768. **Product Name:** Digital Companion A/D Converter. **Contact:** Peter Troisi, pres. **Date Product Introduced:** 8/92. **Product Description & Applications:** The TROISI A/D Converter provides state-of-the-art analog

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to digital conversion design at a reasonable cost. The unit offers AES/EBU (XLR) and SPDIF (RCA and Optical) I/Os for easy interfacing to any of the popular digital audio recording formats. As technology improves, new 18-20 bit converter chips can be retrofitted as an inexpensive upgrade. Exhaustive listening tests have confirmed that the Troisi converters sound better than any other converts in this price range. **Basic Specifications & Suggested List Price:** Interfaces: AES/EBU, SPDIF; Sample rates: internal 44.1 kHz and 48.0 kHz external: RS422, 30 kHz to 50 kHz low jitter PLL with auto failover to internal clock. Frequency response: ±1 dB 20 Hz to 20 kHz. THD: <.006%. 16, 18 and 20 bit conversion modules are available. Price: \$1,199.

TUBE WORKS

8201 E. Pacific Pl. #606; Denver, CO 80231; (303) 750-3801. **Product Name:** Real Tube Direct Box. **Contact:** Tom Wright, VP sales & mktg. **Date Product Introduced:** 9/92. **Product Description & Applications:** Tube-enhanced direct box with output for balanced direct line or speaker emulation. Also switches for ground lift and boost. Very warm and dead silent operation. **Basic Specifications & Suggested List Price:** Suggested retail of \$250 (soon to be available). Rack-mount stereo version retailing at \$500.

TUBE WORKS

8201 E. Pacific Pl. #606; Denver, CO 80231; (303) 750-3801. **Product Name:** Real Tube Stereo Spring Reverb. **Contact:** Tom Wright, VP sales & mktg. **Date Product Introduced:** 1/92. **Product Description & Applications:** Single-rackspace tube reverb unit incorporating two (2) 6-spring Accutronics reverbs. Unit can be used mono with 12-spring summing for really big sound. Discrete stereo application at either line or instrument levels. Extremely quiet operation. Control features: input level effects mix, output level, high mid and low EQ each channel. **Basic Specifications & Suggested List Price:** Single rackspace. powered by 30 vac external supply (included) available 110/220. Suggested retail \$550. Quietest and best-sounding unit available.

UREI

8500 Balboa Blvd.; Northridge, CA 91329; (818) 893-8411. **Product Name:** LA Series Compressor/Limiters. **Contact:** Bill Threlkeld, mktg. comm. mgr. **Date Product Introduced:** 4/92. **Product Description & Applications:** The UREI LA Series is comprised of 3 new models, the LA-22 dual channel unit with expansion capabilities, LA-12 dual channel unit, and LA-10 single channel unit. All LA Series models exhibit exceptional signal integrity with very low distortion and high dynamic range capability. Each model employs a patented active circuit which drives a specially designed transformer. This results in virtually no increase in distortion or saturation at the output stage. All models feature differential type signals inputs and outputs capable of handling amplitudes in excess of 24 dBu.

WHIRLWIND MUSIC DIST. INC.

100 Boxart St.; Rochester, NY 14612; (716) 663-8820. **Product Name:** US Audio AS-4 Active Mic Splitter. **Contact:** Ray Bellizia, sales; Ron Long, sales. **Date Product Introduced:** 6/92. **Product Description & Applications:** Whirlwind's US Audio P45a is a high-quality, low-cost, single-rackspace stereo amplifier designed for applications that do not require large amounts of power. Suggested applications include reference monitoring and headphone distribution amplification. The P45a's wide frequency response and low distortion make it perfect for critical listening in the production environment. **Basic Specifications & Suggested List Price:** Frequency response: -3 dB at 10 Hz and 80 kHz at 50 Watts, ±0.2 dB 50 Hz to 20 kHz 50 Watts; S/N Ratio: 110 dB at full power; THD: .02% at 50 Watts; Equivalent Input Noise: -85 dB; Input Impedance: 20K Ohms; Output Power: 60 Watts at 45 Ohms, 45 Watts at 8 Ohms; Rise Time 2.5 µs; AC Mains: 110V 60 Hz or 230V 50 Hz; Pro Net Price: \$349.

YAMAHA CORP OF AMERICA

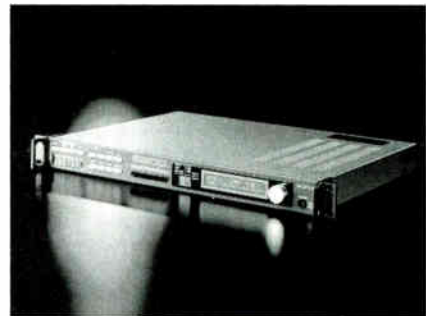
6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. **Product Name:** D2040 Digital Channel Divider. **Contact:** Don Bowles, market support manager. **Date Product Introduced:** 10/91. **Product Description & Applications:** The D2040 is a 2-in/8-out, 20-bit digital channel divider with programmable crossover filters, 15 memory locations for complete dividers setups with rear panel hardware protect switch. All outputs offer full audio band coverage, 2-band parametric equalizer, compressor/limiter, and digital delay (time alignment and offset). Analog and digital inputs and a RS-485 serial interface that allow all parameters to be controlled from an external computer. **Basic Specifications & Suggested List Price:** Analog inputs and outputs are electronically balanced XLR connectors. Digital inputs are AES/EBU-Pro and Yamaha Y2. D2040 is \$3,600.

YAMAHA CORP OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. **Product Name:** DE05 Digital Equalizer. **Contact:** Don Bowles, market support manager. **Date Product Introduced:** 10/91. **Product Description & Applications:** The DE05 is programmable 20-bit digital equalizer with dual-channel 1/3-octave graphic or dual-channel 6-band parametric programs with an auto hum canceller. In addition to the basic notch filters, HPE, LPE and direct digital input/output. RS485 serial port for memory transfer or external computer control. An internal time-code reader allows memory recalls at specific time-code addresses. **Basic Specifications & Suggested List Price:** 40 user memories. Electronically balanced XLR analog inputs and outputs. AES/EBU-Pro and Yamaha Y2 digital inputs and outputs. DE05 is \$2,900 and the DE05E (all the capabilities of the DE05 without the programming controls, up to 23 DE05E can be controlled by one DE05) is \$2,395.

YAMAHA CORP OF AMERICA

6600 Orangethorpe Ave.; Buena Park, CA 90620; (714) 522-9011. **Product Name:** EMP700 Digital Effects Processor. **Contact:** Don Bowles, market support manager. **Date Product Introduced:** 1/92. **Product Description & Applications:** The EMP700 digital effects processor is a true stereo multi-effects processor ideally suited to a wide range of home recording and musical instrument applications. Top-quality effects include: compression/limiting, EQ, reverb, delay, enhancer, distortion, panning, pitch shift, wah, phaser, and a full complement of modulation type effect, such as "Hyper Mod," which creates a remarkable rotary speaker effect. **Basic Specifications & Suggested List Price:** 80 preset effects programs based on 228 fundamental effect types. Programs from the compressor/EQ and reverb/delay/modulation effect groups can be combined and used simultaneously, and can be connected in serial, reverse serial or in parallel. Effect programs can be edited and stored in any of 50 user memory locations. Up to 50 effect programs may be stored externally on optional RAM cards. Suggested list price: \$550.



ZOOM CORPORATION
9200 Advanced Reverberation Processor

ZOOM CORPORATION

385 Oyster Point Blvd. #7; South San Francisco, CA 94080; (415) 873-5885. **Product Name:** 9200 Advanced Reverberation Processor. **Contact:** Peter Rodgers, natl. sales and mktg. **Date Product Introduced:** AES Show 1992. **Product Description & Applications:** Professional studio engineers turn to the 9200 for state-of-the-art, ultra-flexible DSP power. At the heart of the 9200 are spectacular, flawless reverbs and endless varieties of effects combinations, 31 effects, 99 professional preset patches, plus 99 user patch locations. 49 additional patches can be stored on a RAM card. Intuitive user interface and clear, logical controls make the 9200's power immediately available to master any recording task. **Basic Specifications & Suggested List Price:** Frequency response: 16 Hz-20 kHz; dynamic range: 90 dB+; inputs: 4/balanced/XLR+4 dBm; outputs: 4/unbalanced/XLR+4 dBm; A/D & D/A: 16 bit; sampling frequency: 44.1 kHz; programs: 99 user, card 99 (RAM/ROM); number of effects: 31; comprehensive MIDI functions.

TEST EQUIPMENT

ALPHATON ELEKTROAKUSTIK

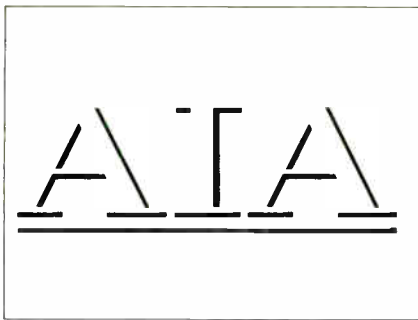
Fischbacher Str. 27; D-6233 Kelkheim, Germany; (49) 6195-74 032. **Product Name:** Audio Level Metering System. **Contact:** Liane Ernst. **Date Product Introduced:** 9/92. **Product Description & Applications:** ALM-1000 Audio level metering system for broadcast, recording, and sound reinforcement applications. 19-inch rack-mounted version: 2 heights. Housing version: H= 89 mm, W= 430 mm. **Basic Specifications & Suggested List Price:** Price: U.S. \$1,870 for ALM-1000.

ALPHATON ELEKTROAKUSTIK

Fischbacher Str. 27; D-6233 Kelkheim, Germany; (49) 6195-74 032. **Product Name:** Multi-Function Audio Test Set. **Contact:** Liane Ernst. **Date Product Introduced:** 9/92. **Product Description & Applications:** MKA-10 Multifunction audio test system for measuring sound pressure level, system polarity, phantom power and cable integrity. The test set is packed in a metal carrying case along with special adapters. **Basic Specifications & Suggested List Price:** Price: \$1,820 for MKA-10; MKA-10 consists of 8 parts.

AMBER ELECTRO DESIGN

6969 Trans-Canada Hwy, Ste. 113; St. Laurent, Quebec, H4T 1V8 Canada; (514) 333-8748. **Product Name:** 7000 Precision Audio. **Contact:** Vincent DeSousa, sales mgr. **Date Product Introduced:** 1/92. **Product Description & Applications:** Amber's newest generation of precision audio measurement equipment, the 7000 System, is a self-contained programmable generation (10 Hz-100 kHz) and analyzer (500 kHz bw) system, which combines high-performance analog measurement capabilities with digital processing and measurement functions required by modern mixed-signal systems. Powerful computing resources allow a flexible user interface and extensive programming facilities. **Basic Specifications & Suggested List Price:** Analog Generator: +32 dBu, balanced output - ±0.1 dB, basic level accuracy < 0.005%, mid band THD + N - up to 4 simultaneous tones, square wave, burst, noise. Digital Generator: 24-bit data path, 20-bit analog output serial, parallel, optic output, video sync. Analog Analyzer: ±0.1 dB basic accuracy, < -96dBu residual noise (50C kHz bw), < -95dB residual THD +N (30 kHz bw). Wideband level, narrow band level, THD + N, phase, freq. IMD. Digital Analyzer: 24-bit data path, 18-bit analog input, serial parallel, optic input, spectrum analysis, waveform display, AES/EBU analysis, etc.



APPLIED INNOVATION AMERICA
Program Evaluator™

APPLIED INNOVATION AMERICA

PD Box 340; Old Alewife Rd.; West Kennebunk, ME 04094; (207) 985-2892. Product Name: Program Evaluator™. Contact: RP Wyman, tech. dir. Date Product Introduced: 1991. Product Description & Applications: The Program Evaluator™ is a low-cost data-acquisition device, which automatically measures critical parameters of video recorded programs to control the duplication process. Available in PAL/SECAM/NTSC-SP/NTSC-EP. Basic Specifications & Suggested List Price: List price NTSC=\$4,600. PAL/SECAM = \$6,400. Measures control track phase, level and pulse aberrations, VRF, ARF, breathing, dropouts, tape scratches, audio levels, loss of video. Used with a dedicated playback deck and printer or PC for error report.

AUTOMATIC INSPECTION DEVICES INC.

PD Box 6295; Toledo, OH 43614; (419) 536-1983. Product Name: A.I.D. Model CD-A Optical Disc Analyzer. Contact: David Miller, senior sales engineer. Date Product Introduced: 1/92. Product Description & Applications: A.I.D. Model CD-A is a versatile tool for evaluating CD-Audio, CD-Rom, and CD-Recordable discs. The PC-based analyzer is ideal for production-line quality assurance or in-house quality certification. System measures signal levels and error rates over the entire disc, including Lead-in area, to verify the performance quality of the disc. Includes REPRT function for generating performance trend plots for SPC analysis. CD Glass Master and LD versions are available. Basic Specifications & Suggested List Price: A.I.D. Model CD-A measures BLER, E11, E21, E31, E22, E32, Push-Pull Tracking, Radial Noise, I3, I11, BURST, and EFM Asymmetry. Audio and visual alarms alert the operator of out-of-tolerance conditions. Basic model CD-A includes player. IBM AT-compatible PC board, application software and calibration disc.

AUTOMATIC INSPECTION DEVICES INC.

PD Box 6295; Toledo, OH 43614; (419) 536-1983. Product Name: CD Glass Master Inspection System. Contact: Arthur D. Harmala, VP sales & mktg. Date Product Introduced: 4/92. Product Description & Applications: The new A.I.D. CD Glass Master Inspection System is designed to inspect a 120 mm - 130 mm diameter region of transparent glass masters with overall diameters of approximately 240 mm. The defect-detection channel is equipped with a high-resolution, linear-array camera for detection of superficial surface flaws as well as dense surface or included flaws. The system is similar in principle and operation to the standard A.I.D. CD-5A, except no birefringence channel is supplied. Basic Specifications & Suggested List Price: Inspection Time: less than 1 minute; Scan Resolution: Minimum - 6.6 um (micrometers); Maximum - 19 um; Pixel-Pixel Resolution: 20 micrometers (10 um option available).

BLACK AUDIO DEVICES

Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: #PC-1 Phantom Checker. Contact: Bruce Black, owner. Date Product Introduced: Spring 92. Product Description & Applications: The PC-1 checks the phantom power on both pins 2 and 3 of a mic line or input. A two-color LED shows green for power on pin 2 and red for power on pin 3. The PC-1 is built into a A3M male cable-mount XLR for a very compact size that easily fits in your pocket. Basic Specifications & Suggested List Price: \$18 each.

ESE

142 Sierra St.; El Segundo, CA 90245; (310) 322-2136. Product Name: ES-215/ES-216 Series. Contact: Bill "R." factory sales eng. Date Product Introduced: 4/92. Product Description & Applications: The ES-215 and ES-216 Series are Audio Level indicators, which are available in mini panel mounts as well as rack-mount configurations. The rack-mount units are available in mono, stereo/dual-mono, dual-stereo, and tri-stereo. These highly attractive meters with superior dynamic characteristics are designed for easy mounting into consoles racks or table tops. Basic Specifications & Suggested List Price: Both the ES-215 and the ES-216 series are available for "peak" or "vu" modes. Prices start at \$66 for the ES-216 Series and at \$138 for the ES-215 Series.

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FM SYSTEMS INC.
SPM-1 Stereo Performance Meter

FM SYSTEMS INC.

3877 S. Main St.; Santa Ana, CA 92707; (800) 235-6960; (714) 979-3355. Product Name: SPM-1 Stereo Performance Meter. Contact: Frank McClatchie, president. Date Product Introduced: 1/92. Product Description & Applications: Measures stereo content of stereo program. It is the only meter in existence that measures the degree of stereo separation existing in a particular musical passage. Digital display from 1 to 50 dB in one dB steps. Accuracy 1 dB to 40 dB, 2 dB above 40 dB. It is probably the only new audio product in many years. Basic Specifications & Suggested List Price: Measures from one to 50 dB in one dB steps. With 1 dB accuracy from one to 40 dB and 2 dB above 40 dB. Also displays static and dynamic stereo inversion.



GOLD LINE
DSP-30

GOLD LINE

PD Box 500; W. Redding, CT 06896; (203) 938-2588. Product Name: DSP-30. Contact: Marj Miller. Date Product Introduced: 2/92. Product Description & Applications: The new DSP-30 Audio Spectrum Analyzer is a portable test instrument that offers features formerly unavailable in non-DSP-based systems. Features include: the user can capture a response and scroll up or down thru a full 85 dB window; an automatic sum and average function stabilizes pink noise and compensates for random variable plus averages SPL over time; scales from 1/4 to 5 dB allow the user to check studio machines with audio test tapes, monitor the mix, equalize rooms or adjust a P.A. System. Basic Specifications & Suggested List Price: A Portable Audio Spectrum Analyzer, which, at \$1,500 retail price, offers advanced digital specifications such as: filters are keypad-adjustable to either triple-tuned or to new sharper filters for notching applications; "user" programmable curves; options include RT-60, RS-232 and printer ports, plus 30 non-volatile memories; new options are under development that are cost-effective and will address other needs of the audio professional. New options can be user-installed; portable and powered by 8 AA batteries.

JEANIUS ELECTRONICS

2815 Swandale Dr.; San Antonio, TX 78230; (512) 525-0719. Product Name: Russian Dragon RD-R. Contact: Marius Perron, chief eng. Date Product Introduced: 6/92. Product Description & Applications: A one-space rack unit, which measures timing accuracy of both machines and musicians to an accuracy of .1 milliseconds. Applications include: reveals MIDI timing problems, enables you to synchronize triggered sample with existing tracks, checks tempo stability of sequencers, checks for perfect sync of virtual tracks and SMPTE-locked recorders. Basic Specifications & Suggested List Price: New features over the older rack model, RD-2, include: LED level indicators for the most accurate measurements possible, signal polarity check switches, variable signal mask controls, rotary-switched "ms per LED" control. \$499.

JEANIUS ELECTRONICS

2815 Swandale Dr.; San Antonio, TX 78230; (512) 525-0719. Product Name: Russian Dragon RD-T. Contact: Marius Perron, chief eng. Date Product Introduced: 10/91. Product Description & Applications: This is a low-cost version of the RD-R. It is especially suited for small home studios or MIDI setups, and drummers that play with click tracks. Applications: easily helps in replacing drums on tape with drum samples, enables drummers to turn down the click and play while watching his timing, reveals MIDI timing problems. Basic Specifications & Suggested List Price: The handy front


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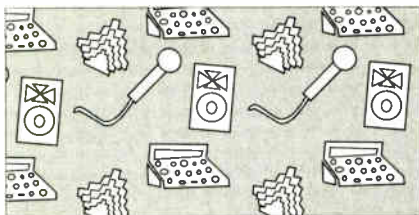
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Test Equipment

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display of LEDs (25) shows how closely a drummer is playing with a click. The RD-T mounts easily on drum hardware, and can be placed right in front of the drummer. Also, it sits right on consoles and near-field monitor for easy viewing. \$175.

RE AMERICA INC.

31029 Center Ridge Rd., Westlake, OH 44145; (216) 871-7617. Product Name: d940 Compact Digital Audio Headphone Interface. Contact: John Casey. Date Product Introduced: 5/92. Product Description & Applications: The d940 headphone interface allows for easy, convenient monitoring of digital audio data streams via a unit small enough to clip to the user's belt. Easily the smallest and most portable unit of its type, the d940 provides the ability to monitor both AES/EBU and SPDIF digital audio by performing a 16-bit digital-to-analog conversion. The unit will lock to any of the three standard sample frequencies. Basic Specifications & Suggested List Price: Dimensions: 4.75" x 2" x 1.25". Lead cable supplied, can be specified XLR or mini-XLR. Price: \$505.

RESEARCH TECHNOLOGY INTERNATIONAL

4700 Chase, Lincolnwood, IL 60646; (708) 677-3000. Product Name: Tape Chek DXA-11 Dropout Analyzer. Contact: William B. Wolavka, VP sales. Date Product Introduced: 1992. Product Description & Applications: Designed specifically for testing and monitoring both analog and digital videotape recording formats. Evaluates with confidence heads during recording or with playback heads during play. Two dropout counters in one—permits independent counting of small and large dropouts. Reports dropouts by time code or by type run time. Selectable time modes for display and printout permit accurate location of tape problem segments. Selectable dropout depth levels and durations. Front panel display and hard copy printer. 5.19x11.7 inches, 24 lbs. 120V, 60Hz.

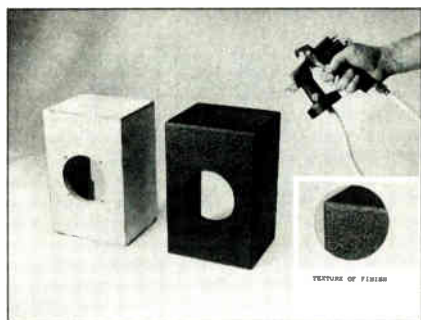
RESEARCH TECHNOLOGY INTERNATIONAL

4700 Chase, Lincolnwood, IL 60646; (708) 677-3000. Product Name: Tape Chek Model 4100 Tape Cleaner/Evaluator/Recycler. Contact: William B. Wolavka, VP sales. Date Product Introduced: 1992. Product Description & Applications: Recycles any size Betacam SP tape in one fast, automatic operation. Erases metal and oxide tapes. Cleans and polishes tape for better performance. Multichannel line-array CCD detector locates physical tape damage, wrinkles and creases. Fast playback—recycle as few as 2 or 3 Betacam cassettes weekly and Tape Chek will pay for itself. Basic Specifications & Suggested List Price: Call for prices and literature. Other Tape Chek products available for all professional formats.

WIREWOKS CORPORATION

380 Hillside Ave., Hillside, NJ 07205; (908) 686-7400. Product Name: TEN-4 Speaker Cable Tester. Contact: Angela Kelly, customer service mgr. Date Product Introduced: Autumn 92. Product Description & Applications: Wireworks' TEN-4 Speaker Cable Tester has been specifically designed to test speaker cable assemblies terminated with Neutrik 4 Conductor Speakon Connectors and quarter-inch phone plugs in any combination. You'll undoubtedly recognize TEN-4's ruggedness, convenience, clarity, and excellent performance as reminiscent of Wireworks' renowned TE-3 Mic Cable Tester. Basic Specifications & Suggested List Price: Approximate price is \$150.

OTHER EQUIPMENT



ABILENE RESEARCH & DEVELOPMENT CORP.
Texturelac

ABILENE RESEARCH & DEVELOPMENT

PD Box 294; Hewlett, NY 11557; (516) 791-6943; FAX (516) 791-6943. Product Name: Texturelac. Contact: Elgin Miller. Date Product Introduced: 10/91. Product Description & Applications: Spray-on finish for speaker boxes. Looks like leather. Eliminates high cost of laminating and carpeting. Texturelac is applied with standard air spray gun. You can apply Texturelac on all woods, plywoods, MDF and particle board, paper tubes, hot and cold roll steel castings, including iron, aluminum and zinc. Also on most plastic surfaces. Texturelac is a one-part paint product that dries to touch in 15 minutes. Can save you over 70% in paint finishing costs. Produces a tough, hard, mar-resistant surface. Basic Specifications & Suggested List Price: Texturelac can be applied with standard air spray equipment like Binks, Devilbiss. Also can be applied with HVLP, air assist and airless spray guns. For complete details including switch panel, price and specs write or call.



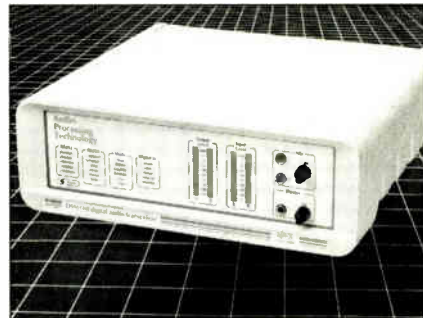
ATHAN CORPORATION
ATH-90-S

ATHAN CORPORATION

50 S. Linden Ave., #10; South San Francisco, CA 94080; (415) 589-5206. Product Name: ATH-90-S. Contact: George Athanasios. Date Product Introduced: 6/91. Product Description & Applications: This product is a replacement puck for the MTR-90 I, II, III and MTR-100A Otari tape-recorder machines. It is made from new top-quality polyurethane material, which assures no tape slippage, no servo instability and no inaccurate location readings. Basic Specifications & Suggested List Price: Suggested list price is \$275 each. With exchange: \$250 each.

ATM FLY-WARE

20960 Brant Ave., Carson, CA 90810; (310) 639-8282. Product Name: AMFS Series. Contact: Mark Duncan, sales mgr. Date Product Introduced: 6/92. Product Description & Applications: Modular loudspeaker flying systems for APOGEE, Community, EAW, Electro-voice, Martin, PAS, Meyer Sound Labs, Renkus-Heinz and various other brands of loudspeakers. Basic Specifications & Suggested List Price: Compact, lightweight, and modular flying system for most popular loudspeaker manufacturers. Designed with a "systems" concept and with a 6-to-1 design factor, prices range from \$95 to \$300.



AUDIO PROCESSING TECHNOLOGY LTD.
DSM100 Full-Duplex Transceiver

AUDIO PROCESSING TECHNOLOGY LTD.

21 Stranmillis Rd., Belfast BT9 5AF, Northern Ireland; 44/232-662714; FAX: 44/232-382208. Product Name: DSM100 Full-Duplex Transceiver. Contact: Steve Cheung, sales/mktg dir. Date Product Introduced: October 91 at AES Convention. Product Description & Applications: The self-contained DSM100 Full-Duplex Transceiver allows transmission of full-fidelity audio over low-capacity digital lines via standard RS-449, V.35 or X.21 interfaces. Conventional dial-up ISDN (Integrated Services Digital Network) or Switched-56 links provide CD-quality audio transmission between locations. System utilizes proven apt-X 100 4:1 Sub-band ADPCM audio-compression techniques. Basic Specifications & Suggested List Price: Features include analog and digital I/O (AES/EBU and S/PDIFs); input and output level indicators; RS-449, V.35 or X.21 interfaces operating at baud rates between 56 and 384 kbps; Front-panel audio data and clock status indicators; up to 9600 baud of auxiliary serial data; external alarm interfaces; headphone monitoring. Pro-user price is \$6,990.

AUDIOLAB ELECTRONICS INC.

5831 Rosebud Ln., Bldg. C; Sacramento, CA 95841; (916) 348-0200. Product Name: TD Bulk Tape Degausser. Contact: Ron Stofan. Date Product Introduced: Updated 92. Product Description & Applications: The Audiolab Electronics Inc. Model TD-5 Metal Particle Tape Degausser is designed to accommodate High-Coercivity Tape Cartridges (Beta SP, M-II, D1-2, DAT and 8mm Metal Particle Cassettes) as well as High Coercivity Tape Reels up to 16 inches in diameter and 2 inches in width. Drawing only 10 amps, Audiolab's efficient design provides a long-lasting, cool-running, professional tape degausser. Suggested list price is \$1,495.



BEC TECHNOLOGIES INC.
AudioPlex AD16 & DA16 Analog to Digital Converter

BEC TECHNOLOGIES INC.

SALES OFFICE: 1101 N. Northlake Way, Ste. 100; Seattle, WA 98130-0891; (206) 632-2431. Product Name: AudioPlex AD16 & DA16 Analog to Digital Converter. Contact: Michael C. Creamer, VP sales. Date Product Introduced: 7/92. Product Description & Applications: Multichannel digital audio transmission/distribution systems. In touring concert sound systems, broadcast production facilities, commercial sound installations, replacing conventional multipair cable "snakes." Product line includes: AudioPlex AD16 16-channel A/D conversion and mixed data transmission module, AudioPlex DA16 16-channel mic preamplifier splitter with remote gain control (MX16), FB2 Fiber Optic. Basic Specifications & Suggested List Price: Transceiver module for up to 64 channels of digitized mixed audio bi-directionally communicated mixed data over two miles or one dual multimode fiber optic cable (FDDI Type), MP16

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BLACK AUDIO DEVICES

Box 106; Ventura, CA 93002; (805) 653-5557. Product Name: #XIB-2 Transformer Isolation Box. **Contact:** Bruce Black, owner. **Date Product Introduced:** Spring 92. **Product Description & Applications:** The XIB-1 is a line level box that provides signal isolation by means of a transformer. A Jensen JT-11-FL is used to insure virtually no signal degradation. Ins and outs are XLRs and a ground lift switch is provided. The XIB-1 is built into a rugged, wallet-sized, die-cast box. **Basic Specifications & Suggested List Price:** \$65 each.

CANARE

511 5th St., # G; San Fernando, CA 91340; (818) 365-2446. **Product Name:** BCJ-XJ-TR. **Contact:** Barry Brenner, GM. **Date Product Introduced:** 1/92. **Product Description & Applications:** Impedance transformer. For AES/EBU/SPDIF equipment. Converts 110 Ohm "XLR" to 75 Ohm "BNC" coax. Connects to all digital audio input/output. Allows very long cable runs using common coaxial video cable. Use Canare video patch bays as distribution routing system. **Basic Specifications & Suggested List Price:** Two versions available: male/XLR to BNC; female/XLR to BNC. Price @ \$50 each.



DAVID CARROLL ELECTRONICS
System Five

DAVID CARROLL ELECTRONICS

805 Gilman St.; Berkeley, CA 94710; (510) 528-8054. **Product Name:** System Five. **Contact:** Rosie Alexander, sales. **Date Product Introduced:** 10/92. **Product Description & Applications:** DCE's System Five—Modular Panel System is the total solution for your custom panel needs. Standard modules accommodate all popular connectors, and combine to provide any type of custom panel assembly. Options include surface and flush wall mounting enclosures, rack-mounting adapters, cable strain relief, and trim strip. For studios and other technical facilities where professional appearance, flexibility and expandability are important. **Basic Specifications & Suggested List Price:** All panels are 1/8" aluminum-grained and black-anodized, 6" high by a specified # of Mod Units (1 MU=875). Panels are priced without conn. and range from \$5.06 to \$14.06. Engraving is to order with white ink fill. Chases are available in black or unfinished for customer finishing.

CASE COMPONENT NETWORK

PD Box 68065; Schaumburg, IL 60168-0065; (708) 884-0514. **Product Name:** Steel Dishes. **Contact:** Gerald Van Kollenburg, coord. of oper. **Date Product Introduced:** 1/92. **Product Description & Applications:** New line of steel dishes in a professional black finish. Available blank or prepunched for a variety of jacks including XLR males and XLR females 1/4, EPS, and Speakon. Also available are two sizes of louver dishes to allow for air circulation in a case or cabinet.

CASE COMPONENT NETWORK

PD Box 68065; Schaumburg, IL 60168-0065; (708) 884-0514. **Product Name:** Steel Rack Panels. **Contact:** Gerald Van Kollenburg, coord. of oper. **Date Product Introduced:** 1/92. **Product Description & Applications:** Steel rack panels coated with a professional black finish. Available in 1, 2, 3 or 4 space blank versions or prepunched in various configurations including XLR males, XLR females, 1/4 jacks or combinations of these. Also available are 1 and 2 space vent panels and 3 space panels prepunched for 1, 2 or 3 ventilation fans.

CLEAR-COM

945 Camelia St.; Berkeley, CA 94710; (510) 527-6666. **Product Name:** Clear-Com. **Contact:** Michael Goddard. **Date Product Introduced:** 10/91. **Product Description & Applications:** 2, 4, 8, 12 channel wired and wireless production intercom including main stations, remote stations, Belt-Packs, interfaces, speaker stations and headsets. Matrix Plus digital matrix 50x50. All audio and control over twisted pair from switching matrix to user stations. Full display user stations for ease of operation.

COOPER SOUND SYSTEMS

31952 Paseo de Tania; San Juan Capistrano, CA 92675-3919; (714) 248-1361. **Product Name:** CSPA (Two channel mic preamp). **Contact:** Andrew Cooper, owner. **Date Product Introduced:** 4/92. **Product Description & Applications:** The CSPA-1 is a battery operated, two-channel microphone preamplifier. This unit, in addition to providing a higher quality alternative to existing built-in preamps on location recorders, also provides microphone powering, filters and

switchable M/S decoder, thus eliminating the need for other interface boxes. Features include: internal or external powering, 48V phantom or 12V "T" power, balanced inputs and outputs, very low noise and distortion preamplifiers, switchable gain (20-70 dB) and overload indicators for each channel. **Basic Specifications & Suggested List Price:** EIN: -128.5 dBu, THD & N: .003%. Size: 7"x5"x1.5". List price: \$990. Weight (w/batteries): 2 lbs.. Internal supply: 4x9 V batteries. External supply: ±12 to ±18 V DC.

CRYSTAL SEMICONDUCTOR CORPORATION

PD Box 17847; Austin, TX 78760; (512) 445-7222. **Product Name:** CS3310—Digital Volume Control. **Contact:** David Bresemann, digital audio prod mktg mgr. **Date Product Introduced:** 12/92. **Product Description & Applications:** The CS3310 is a complete stereo digital volume control for digital audio systems. It provides digital gain/attenuation control of stereo analog signals through a 16 bit serial interface. Each channel can be independently adjusted for a maximum gain of 30 dB or a maximum attenuation of 98 dB in 0.5 dB step sizes. The device also contains a hardware mute function and daisy chaining in the digital interface. **Basic Specifications & Suggested List Price:** The CS3310 features 110 dB dynamic range, 0.005% total harmonic distortion and less than 50 mW of power consumption. It is available in both a 0.3" wide 16-pin plastic DIP and 16-pin SDIC packages. Pricing is \$5.50 in 1,000s.

CRYSTAL SEMICONDUCTOR CORPORATION

PD Box 17847; Austin, TX 78760; (512) 445-7222. **Product Name:** CS4303—107 dB D/A Converter for Digital Audio. **Contact:** David Bresemann, digital audio prod mktg mgr. **Date Product Introduced:** 8/92. **Product Description & Applications:** The CS4303 is a high-performance digital to analog converter for digital audio systems that require wide dynamic range. It includes an 8x digital interpolating filter followed by a 64x oversampled delta-sigma modulator that outputs a 1-bit signal to an external analog lowpass filter. A flexible serial port supports both 16- and 18-bit input words. **Basic Specifications & Suggested List Price:** The CS4303 features 107 dB dynamic range, 101 dB signal-to-(Noise + Distortion), and a passband ripple of 0.001 dB. It is available in both 28-pin plastic DIP and 28-pin SDIC packages. Pricing is \$29 in 1,000s.

CRYSTAL SEMICONDUCTOR CORPORATION

PD Box 17847; Austin, TX 78760; (512) 445-7222. **Product Name:** CS5389—18-bit, stereo A/D Converter for Digital Audio. **Contact:** David Bresemann, digital audio prod mktg mgr. **Date Product Introduced:** 12/92. **Product Description & Applications:** The CS5389 is a complete, stereo, 18-bit, analog to digital converter for high-performance digital audio systems. The device contains a fifth-order delta sigma modulator with 64x oversampling followed by digital filtering and decimation. A differential architecture provides excellent noise rejection throughout the ADC. A power down capability is also available. **Basic Specifications & Suggested List Price:** The CS5389 features 107 dB dynamic range, 100 dB signal-to-(Noise + Distortion), a passband ripple of 0.01 dB, and 550 mW power consumption. It is available in a 28-pin plastic DIP. Pricing is \$42 in 100s.

CRYSTAL SEMICONDUCTOR CORPORATION

PD Box 17847; Austin, TX 78760; (512) 445-7222. **Product Name:** CS8425 - Audio Local Area Network Transceiver. **Contact:** David Bresemann, digital audio prod mktg mgr. **Date Product Introduced:** 12/92. **Product Description & Applications:** The CS8425 is a digital audio transceiver that implements the physical layer of an Audio Local Area Network. Nodes in the network can include CD players, digital equalizers, digitized cassette decks, tuners, amplifiers, etc. Node-to-node message communication is via the user channel. Audio data or messages can be sourced from any node and received by any other node. The device can also be used as a general purpose transceiver. **Basic Specifications & Suggested List Price:** The CS8425 audio data is transmitted using the Sony/Phillips Digital Interface Format (S/PDIF). The Audio Local Area Network is configured in a ring topology and many nodes can be supported. It is available in a 44 pin PLCC package. Pricing is \$20 in 100s.

DAVIDSON-WHITEHALL CO.

555 Whitehall St.; Atlanta, GA 30303; (800) 848-9811. **Product Name:** Storadisc™. **Contact:** Eric Willadsen, sales exec. **Date Product Introduced:** 10/91. **Product Description & Applications:** Storadisc™ is a line of CD storage systems especially suited for the professional. These shelving units are strong, stable and beautifully designed. The shelves are angled for easy viewing, and a non-slip surface on each shelf holds even a single CD upright. Storadisc™ comes in two sizes with capacity of 360 and 576 CDs. **Basic Specifications & Suggested List Price:** LS-576 holds 576 CDs and measures 63.5" H x 31.5" W x 11" D (\$236 base price). LS-360 holds 360 CDs and measures 41.75" H x 31.5" W x 11" D (\$148 base price). All units are available in three decorative painted finishes.

DENECKE INC.

5417 B. Cahuenga Blvd.; N.Hollywood, CA 91601; (818) 766-3525. **Product Name:** EC-2 Rm Studio Footage Counter. **Contact:** Spike Dolomite, mktg mgr. **Date Product Introduced:** 6/92. **Product Description & Applications:** Rack-mount counter designed for film dubbing and screening rooms. Designed to drive the Denecke TC-Maxi studio time code readers displaying footage, speed, run time, and time code. **Basic Specifications & Suggested List Price:** \$1,750.

ESOTERIC SOUND

4813 Wallbank Ave.; Downers Grove, IL 60515; (708) 960-9137. **Product Name:** Esoteric Sound Custom Truncated Styli for 78s. **Contact:** Mike Stosich, owner. **Date Product Introduced:** 6/92. **Product Description & Applications:** Special, large-sized (3.0, 3.5, 4.0

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TAPE & DISC

—FROM PAGE 219, DOLBY DOES DIGITAL

So the best we can say is, "Go listen and see what you think."

What kind of listening tests have been done to evaluate how AC-3 sounds? Have there been any controlled, independently verified trials? Two kinds of work have been done. One is the fundamental development of more advanced models of human hearing: What dynamic range can we hear? What kind of masking is going on? That work is not only related to coders, but once you know some of the information, you can design a coder more intelligently.

Once we have a design, we subject it to difficult material, and we listen in an A/B situation. It's usually not done with a listening panel, but by a few people here who are extremely well-trained in the kinds of artifacts these coders create. Having spent several years developing them, they tend to know where their Achilles' heels are. Each successive refinement is aimed at eliminating these remaining identifiable points. As far as outside testing, AC-3 has not been submitted to anybody.

You mentioned the possibility of letting the user define the appropriate playback mode for a particular setting. Does the fidelity remain constant regardless of the number of channels being reproduced?

Since the system doesn't currently exist, it's hard to say exactly what the final form will be. We do know that the system needs to be down-convertible to two-channel stereo modes in certain situations, such as listening with headphones. If you decide that there are audible artifacts in the multichannel format, it's possible that they would be reduced as you go to fewer channels, in which case you could say that fewer channels sounds better. But if you decide that the multichannel format sounds good, then the fidelity is essentially the same as you reduce the number of channels.

The question that we have to answer for down-conversion is, "How do you combine what is essentially a five-channel soundfield into something with artistic continuity in two channels?" You don't want the various sound elements to change volume. You don't want anything about

the mix to change except the spatial characteristics. That's not necessarily easy to do. That's really the challenge. I don't think fidelity in the traditional sense is really a problem.

What steps have been taken to encourage consumer-electronics manufacturers to incorporate AC-3 into their products, and what has been the response so far?

The first step is simply letting them know what our technology is and what it can do. Normally, we don't go public with a technology unless there is something imminently available for our licensees to use. But precisely because AC-3 isn't yet fully defined, we need to start talking to the people who are creating the next generation of media. Our only way of getting in is to let them know very early that multichannel sound not only is desirable, but there is a very technically efficient way to do it. If they had known that when they were planning DCC and MD, they might have built in the capability of upgrading to it later.

We've had AC-3 demonstration sessions in Japan, the U.S. and Europe. We've invited all of our licensees to come and hear it, and understand what this technology offers. The universal response has been, "We can't wait to have it. When can we get it?" We have a single-chip AC-3 processor in development, which should be ready by the middle of next year.

Once the companies decide that they like AC-3, it becomes a question of how to get the standards committees and the hardware and software associations together on picking a universal interchange format to avoid incompatible implementations. That is part of the process of licensees deciding what they would like the next generations of media to be. The replacements for CD or VHS have not been announced or defined. Somebody is working on these new media, but there is still the opportunity to sit around the table and say, "We want multichannel sound. We think we're going to use this much data. How does that fit with you?" That's the seed we are planting; getting this whole discussion going. ■

Philip De Lancie is a mastering engineer at Fantasy Studios in Berkeley.

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—FROM PAGE 34

Museum, and even they could not confuse my other gear, no matter how seriously I tried. I tried tricks like plugging cables into the target equipment incompletely to cause open grounds, cheating power grounds, holding the CD player directly against all possible surfaces with 20 feet of earphone line attached to act as a broadcast antenna. Nothing.

If this MD-11 problem is real, how the hell are they shielding? Who designed this thing? Why is security so bad that you can *play* a CD player before they find you? They stopped me at 30,000 feet.

If the guy is wrong, and no CD player ever dropped a SwissAir MD-11 even ten feet and *can't* in fact cause any problems, why do airline employees keep insisting on this kind of stuff over the years? I remember when they would come running down the aisle at you if you had a cassette player! I think I have been jumped on for Walkmen maybe 20 times in the last decade.

Does anybody out there know what the answer is? Can you really drop a huge commercial aircraft out of the sky with a little portable CD player? Or is this just another case of paranoid clerk mentality?

Either way, though I fought like I always do, I eventually gave up, just *in case* it was true. So, no music at all for me for ten hours, and I had seen the movie and read the book.

EPILOGUE

I need to know which it is. I mean, are we facing a future where we may find ourselves sitting in a seat 38,000 feet over the Atlantic, staring fearfully into the eyes of some crazed terrorist as he waves a little Sony CD player in the air and screams, "Fly me to Venezuela or I'll turn this thing on and play the first three songs from Megadeth!?" Maybe our parents *were* right after all. Maybe rock and roll *is* bad for you. ■

St. Croix is going to stick to shorter flights for a while now, or maybe buy a new little cassette player. He would also like you to turn to "Current," page 12, to see what color his cat really was.

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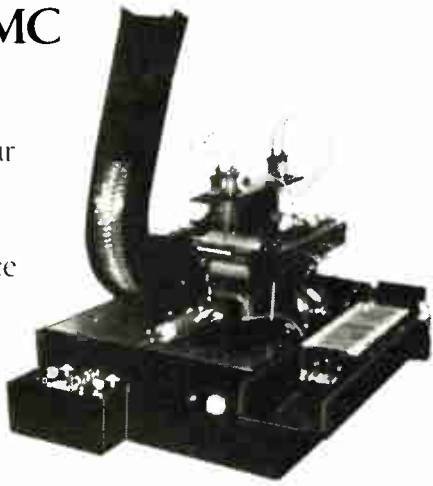
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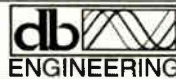
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